An E-learning Ecosystem for Deaf Young Adult Learners' English Literacy Attainment in India

by

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STUDENT DECLARATION FORM

I declare that while registered as a candidate for the research degree, I have not been a registered candidate or enrolled student for another award of the University or other academic or professional institutions.

I declare that no material contained in the thesis has been used in any other submission for an academic award and is solely my own work.

I declare that the current study is part of the Peer-to-Peer Deaf Literacy project undertaken in collaboration between the University of Central Lancashire and Lancaster University. My individual contribution is to investigate how an interactive and participatory e-learning ecosystem is conceptualised and constructed for Deaf young adult learners' English literacy attainment. For data collection, I made use of the human resources including recruited research assistants and peer tutors, and shared the facilities and equipment for the wider project, as well as the standard English literacy tests developed by the wider project.

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Abstract

Overwhelming evidence indicates the unsatisfactory English literacy attainment of Deaf learners around the world, and this issue is especially pertinent in countries with few dedicated resources such as India. The interaction approach in Second Language Acquisition and the participatory approach for adults' literacy attainment urge practitioners to increase learners' interaction and participation as well as to place learners at the centre of learning. The increasing use of technologies in India and the shift from the Web 1.0 era to the Web 2.0 era in the global context afford new opportunities for Deaf learners.

Using a developmental perspective, this study investigates the primary outcomes of an innovative project, an e-learning platform entitled "Sign Language to English by the Deaf" (abbreviated as SLEND) and its context of delivery, attuned to Deaf young adult learners' English literacy attainment in India. The study uncovers how an e-learning ecosystem in a low-resource context is conceptualised and constructed to foster interaction and participation, by looking into the design concept, learner experience and learning outcomes of the SLEND.

A thematic analysis is used to discover factors that emerged as the key characteristics of the SLEND and its context. These key characteristics and their sub-characteristics fall into three main components of an e-learning ecosystem: stakeholders, pedagogy 2.0 and Web 2.0 technology. Positive overall learner experience highlights the significance of the key characteristics of the SLEND and its context including catalysing power of real life English, comfortable and confident experience of using Indian Sign Language, peer-to-peer interaction and Web 2.0 social tool. Unsure learner experience indicates several areas ripe for further development, including SLEND access, multimedia materials and emergent syllabus mapped to the CEFR. Prompt responsive actions are taken such as using short in-class videos with English subtitles to facilitate learners' understanding, dispersion of diversified topics with sufficient opportunities for output, and provision of instant support to Deaf learners for understanding Indian Sign Language varieties.

It is revealed that learners' English literacy improves after the intervention, and long-term retention of learning testifies to the efficiency of the SLEND and its context of delivery. Further examination of differences in outcomes between the five learning centres used in the project suggests the professionalism of peer tutors and the provision of a relatively supportive technological environment.

The findings emerging from each sub research question stimulate and inform the evolution of the SLEND, and ultimately forge a guiding framework for an interactive and participatory e-learning ecosystem for Deaf young adult learners' English literacy attainment in India. Some key characteristics of this e-learning ecosystem enable comprehensible input, interaction and output fundamental to language acquisition, while some facilitate a learner-centric approach in favour of learner participation and learning for a social change. Characteristics such as peer-to-peer interaction and learner content creation are indispensable for amplifying collective intelligence and crowdsourcing in low-resource contexts.

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CHAPTER 1 INTRODUCTION

Most deaf and hard of hearing [1]people lag behind their hearing peers in literacy, and literacy is widely considered as a predictor of success in academic achievement and career development (Traxler, 2000; Marschark, Lang, & Albertini, 2002). In India, 2.2 million deaf people are illiterate and largely dispersed in rural areas (India Census, 2011). Deaf people's attainment in English literacy is facing challenges such as lack of curated learning materials and qualified teachers (Randhawa, 2005; Sahasrabudhe, 2010; Singal, 2010). The theoretical evolution in the areas of adult learning theory, second language acquisition, literacy and curriculum theory justifies and scaffolds a participatory approach to adult literacy attainment (Auerbach 1992; Auerbach 1996). This participatory approach is well accommodated in a Web 2.0 e-learning environment which fosters "culture of participation" and encourages active participation, personalized learning as well as learners-driven knowledge creation (McLoughlin & Lee, 2008). The increase in Deaf young adults' ownership of technological devices widens Deaf young adults' access to learning of English. The advance in technologies and the evolution of pedagogies in Deaf education catalyse the innovative practices in learning and teaching. The current study adopts a mixed-methods design to examine an e-learning platform and its context of delivery for Deaf young adults' English literacy development in India, with a view of proposing a framework of an interactive and participatory e-learning ecosystem in a low-resource context.

Chapter 1 presents introductory information, including an overview of the current situation of Deaf learners' English literacy worldwide and in India (Section 1.1), an innovative project for Deaf young adults' English literacy attainment that this study has been embedded in (Section 1.2), and the scope of the current study (Section 1.3). Section 1.4 describes the overall goal and specific objectives of the current research together with anticipated original contributions to the field. The last section introduces the structure of the entire thesis.

1.1 CURRENT SITUATION OF DEAF LEARNERS' ENGLISH LITERACY

Before introducing the current situation of Deaf learners' English literacy, it is worth noting that there is differentiation among people with 'hearing loss' in terms of the use of sign languages. Ladd (1995) distinguishes 'deaf' from 'Deaf': the lower-case 'deaf' refers to those who experience deafness at any stage in their life, either resist sign languages or have no opportunity to learn them, and prefer spoken languages for socialisation, whereas the upper-case 'Deaf' indicates those with 'hearing loss' since birth or in early (sometimes late) childhood who use sign language and regard themselves as members of a linguistic/cultural minority, and perceive themselves as similar to other language minorities. The current study takes into consideration the differentiation between 'Deaf' and 'deaf' posited by Ladd (1995) and uses 'Deaf' to refer to Deaf sign language users in India.

[1] According to the World Health Organization, a person who cannot hear as well as someone with normal hearing- hearing thresholds of 25 dB or better in both ears- is considered as having hearing loss. Hearing loss ranges from mild, moderate, severe to profound. People with profound hearing loss are regarded as the "deaf", while "hard of hearing" refers to those with mild to severe hearing loss. Information retrieved at http://www.who.int/mediacentre/factsheets/fs300/en/ on 11 November, 2015.

1.1.1 English Literacy Attainment Gap in Deaf Learners

Deaf learners have been reported consistently to have an unsatisfactory literacy performance in industrialized areas. In the US, Herman, Roy and Kyle (2013) find that half of the oral deaf learners emerged as good readers and half are below the average level of their hearing peers. They also report that deaf learners' literacy levels are worse than those with dyslexia. Eventually, at the age of leaving schools, 18-19 years old, deaf learners' literacy is at the level same as the average of 8-9-year-old hearing learners (Paul, 1998; Traxler, 2000). The National Deaf Children's Society of the UK has been comparing GCSE results of deaf children and their hearing peers, and found that deaf learners in the UK are 42% less likely to achieve GCSE benchmarks compared to their hearing peers (NDCS, 2007).

Given the literacy problems deaf children face in countries that are better resourced, it is likely that the situation is similar or worse in developing countries with low resources. As a matter of fact, there are no reliable and detailed statistics on Deaf learners' English literacy in India, and even the size of the Deaf population is unclear. According to CensusIndia, 2.2 million deaf people in the deaf community are illiterate and primarily from rural areas (India Census, 2011; Zeshan, 2000). Among the illiterate population with hearing problems, there is no big gap in gender, with 0.98 million and 0.72 million for females and males respectively. It is worth noting that the data from CensusIndia has its limitations and does not differentiate the Deaf from the deaf population. According to Sahasrabudhe (2010), there are approximately 70.4 million deaf and hard of hearing people in India. Over one million adults and half a million children (Vasishta, Woodward, & Wilson, 1978) or an estimated number of 1.4 million (Zeshan, 2007) are actual users of Indian Sign Language (ISL), many of whom leave school with poor literacy proficiency.

The low literacy level of Deaf people around the world has been attributed to both intrinsic and extrinsic factors: these include early language experiences, knowledge bases, cognitive strategies, and teaching and learning strategies. Among these factors, the exclusion of sign languages cannot be ignored (Bailes, 2004). It appears that sign languages have been discouraged or even banned as a means of communication and instruction in some countries, and have continued to be stigmatised by many teachers in the classroom (Lane, Hoffmeister, & Bahan, 1996). There is also increasing concern that literacy programmes for hearing learners are utilized with deaf learners without adaptation (Marschark, Lang, & Albertini, 2002).

In India, Randhawa (2005, p. 13) pointed out that more than 52% of the teachers from special schools considered their Deaf students' language skills as less than satisfactory due to their "poor speech and speech-reading skills" rather than the education policy at schools. On the contrary, Sahasrabudhe (2010) argues that oralism has been proven a failure in India, and accounts to a large degree for the poor literacy skills of Deaf people; he calls for transformation in education, including the use of methods such as distance education and non-formal education. Further evidence-based research is needed in India to enable the verification of these different claims.

1.1.2 Influential Status of English in India

Deaf learners' unsatisfactory English literacy levels must be seen in the context of the dominant role of English in education as well as national policy issues, since India's independence. English was first recommended as the language of instruction in Higher

Education and High Schools by the Kothari Commission (1964-1966). English has since become even more important and has been required at an early stage of education. Besides education, it is also recommended for official use. The Parliament of India passed the *Official Language Bill* in May 1963, which has granted the official role of English for an indefinite period (Government of India, 1963). Furthermore, the significant role of English in India transcends education and official use; as Graddol (2010, p. 124) emphasizes in his report to British Council, "Throughout India, there is an extraordinary belief, amongst almost all castes and classes, in both rural and urban areas, in the transformative power of English. English is seen not just as a useful skill, but as a symbol of a better life, a pathway out of poverty and oppression."

According to Begum (2014), English has been employed as the link language in the areas of international business, commerce, science, technology, trade, politics and industry. Consequently, assessment and evaluation in recruitment procedures is largely in English. Lack of English knowledge is a significant drawback for some kinds of employment. Meanwhile, English also suits the "multi-religious, multi-cultural and multi-linguistic" (Begum 2014: p.127) situation of India. According to the India Census (2001), more than 30 languages in India are used as native languages by over a million people respectively. As Begum (2014) further points out, people from different regions of India use different local languages and may not understand each other. In this case, English functions as a lingua franca to bridge communication and unify people from a variety of regions.

1.1.3 Challenges and Opportunities in a Low-resource Context

Despite the important status of English in India, the teaching and learning of English varies according to different areas and language backgrounds. It can be even more complicated for Deaf learners who have limited access to spoken/written language as compared to their hearing peers. Another challenge is the under-resourced educational environment, which lacks qualified teachers and learning materials that are customized to the needs of Deaf people. A typical case is that teachers have no knowledge of sign languages and use learning materials designed for hearing students with Deaf learners without adaptation.

In India, according to Singal (2010), systemic pre-service training for regular teachers working with children with special needs including deaf children is absent, and the focus is solely on in-service training. To facilitate teaching and learning, there are trained resource teachers. *Sarva Shiksha Abhiyan*[2] (SSA, 2003, cited in Singal, 2010) specifies their role as providing remedial assistance in the regular classroom or ideally in a resource room, and advising regular teachers on coping with children with special needs in class. The Ministry of Social Justice and Empowerment (MSJE, 2007) is mindful of the inadequacy of the fully-trained resource teachers, and states that the current ratio is "one teacher for 182 children" which is far from the desirable ratio for children with specials needs, one teacher per eight children.

Kontra (2013) reports a similar story in Hungary. She identifies the factors affecting Deaf learners' learning of English: choice of school, language choice, language learning opportunities in higher education, teachers and teaching methods. Schools for the Deaf learners are found to be generally lower in educational level and provide no foreign

[2] Sarva Shiksha Abhiyan is a programme implemented by the government of India to deliver education to children until class VIII.

language courses (including English). Even when the child is enrolled in a school for hard of hearing learners, Kontra (2013) notes that there is still no choice of which language is learnt; and at the higher education level, language learning is even less accessible. In the end, self-study becomes the best solution for Deaf learners. Meanwhile, teachers are inconsistent in their methods, with little knowledge of sign language and Deaf culture.

A participatory approach is considered one of the most effective approaches for adults' literacy development, particularly applicable to the context of Deaf young adults' literacy learning. It places learners at the centre of instruction (Fingeret, 1989), and learning takes place by addressing learners' real needs from their own lives and encouraging collaborative learning and problem-solving (Kaewjumnong, 2013). More notably, participatory literacy goes beyond a learner-centred approach and ultimately aims for social change and learners' empowerment (Auerbach, 1993). To this effect, the participatory approach is especially conducive to empowering Deaf learners, who are most likely exposed to oppression and discrimination.

Technologies are considered to be advantageous to Deaf learners and used widely in teaching and learning, such as captioning, pictures and signed videos (Beal-Alvarez & Cannon, 2014; Stinson, 2010; Sadoski & Paivio, 2004). Meanwhile, the prevalence of the participative Web 2.0 technologies enables e-learning to be more in tune with the participatory approach and facilitates the transformation to Pedagogy 2.0 encompassing learners' participation, personalisation and productivity (McLoughlin & Lee, 2008) (see more about Web 2.0 technologies in Section 2.4). With the wave of technological advances in India, the affordances of technologies can potentially help to revitalise Deaf adult literacy attainment in terms of increasing access and enhancing quality. The pedagogical implications of the integration of Web 2.0 technologies for the current context are that Deaf young adult learners are very likely to actively participate in communication, collaboration, connectivity and community, orient learning process, content and learning management, and make considerable contribution to knowledge creation and innovation.

The so-called low-resource context is in evidence with respect to several factors within the status quo in India, and is situated in relation to the design and construction of the SLEND (see further in Section 2.12.1.2). Firstly, Deaf young adult learners' access to learning opportunities is far less than that of school-age children, which is already very limited. Secondly, teachers for Deaf young adult learners are insufficient in number and poor in quality. Thirdly, the learning materials for Deaf young adult learners' English literacy are generally borrowed from those for hearing learners without adaptation to Deaf learners' learning processes and characteristics. Finally, although technological advances can potentially increase access and improve quality of learning, it is equally important to be aware of the low-tech environment in terms of constrained technological infrastructure and limited Internet connectivity.

1.1.4 Call for Evidence-based Practice[3] with Curated Resources

While English is crucial to Deaf learners' academic achievements and career development (Graddol, 2010), Deaf learners have limited English literacy with fewer

[3] The Federal Government of the United States has implemented laws (i.e., the Individuals with Disabilities Education Improvement Act of 2004 [P.L. 108–446] and the No Child Left Behind Act of 2001, or NCLB [P.L. 107–110]) to ensure all students meet the state academic standards. One key characteristic of NCLB is to adopt

resources and less support in learning (Randhawa, 2005; Sahasrabudhe, 2010). Low English literacy levels in light of the important role of English in daily life fuels the demand for learning English literacy from Deaf people in India. In the US, the No Child Left Behind Act of 2001 states that transformative education practices based on evidence from research and scientific guidance are crucial for the success of the child.

However, evidence-based practice regarding Deaf English literacy development is rare even in industrialised countries. Likewise, it is also scarce in India. Luckner and Handley (2008) review research on reading comprehension for Deaf learners and find that 27 of 52 published studies included an intervention, but that none of the reviewed studies met the criteria for "strong" or "possible" evidence of effectiveness (U.S. Department of Education, 2003). Even if evidence-based research in the US provides effective strategies and practices, these findings are not necessarily applicable to the context in India. Therefore, it is essential to develop evidence-based programs with curated resources tailored to Deaf learners' English literacy development in India which can improve the teaching, learning and assessment of English literacy with Deaf learners. Most of the learning resources originally designed for hearing learners might not be suitable for Deaf learners' learning. Thus, the direct adoption of these learning resources in Deaf learners' English literacy attainment is unlikely to arouse Deaf learners' interest or motivate them, and might cause poor understanding and frustration instead.

1.2 THE WIDER PEER-TO-PEER DEAF LITERACY PROJECT

In response to the current situation of Deaf learners' English literacy in India, the Peer-to-Peer Deaf Literacy Project (hereinafter, the 'P2P Deaf Literacy Project')[4] is an example of an innovative programme that aims to transform English literacy education for Deaf young adult learners in India. Led by the University of Central Lancashire and Lancaster University, this pilot project was implemented from April 2015 to July 2016.

The nature of the P2P Deaf Literacy Project is interdisciplinary, with collaboration of specialists from the areas of Sign Linguistics, Deaf Studies, TESOL, cross-cultural research on literacies, online learning technology and pedagogy. As specified in the Project Proposal of the P2P Deaf Literacy Project by Zeshan et. al (2014), the project is dedicated to creating a sustainable programme for teaching English literacy to Deaf young adults in India, including an e-learning platform to improve educational attainment and employability; empowering the Deaf community in India, Uganda and Ghana in terms of enhancing their teaching, learning and research skills; and undertaking pilot studies on needs analysis in Ghana and Uganda to determine the potential upscaling of the work from India to Uganda and Ghana, and more widely, in other developing countries.

scientifically based interventions (Evidence-Based Practice, EBP). That is to say, any instructional programme needs to be researched and being proven effective before practical use.

[4] The project is entitled "Literacy development with deaf communities using sign language, peer tuition, and learner-generated online content: sustainable educational innovation", a collaboration between the University of Central Lancashire and Lancaster University, funded through a joint scheme by the Economic and Social Research Council (ESRC) and the Department for International Development (DFID). This one-year pilot project studies new ways of teaching literacy to deaf learners, alongside project partners, including the Uganda National Association of the Deaf, Lancaster University Ghana, and the National Institute for Speech and Hearing in India. Official website: https://islandscentre.wordpress.com/

The P2P Deaf Literacy Project has a wide remit, including facets beyond the SLEND platform and its context of delivery. Geographically, the project targets not only India, but also Uganda and Ghana in Africa.

1.3 SCOPE OF THE CURRENT STUDY

In contrast to the wider P2P Deaf Literacy Project outlined above, the scope of the current study is restricted to the investigation of how an e-learning ecosystem is conceptualized and constructed to maximize interaction and participation for Deaf young adult learners' English literacy attainment. This study adopts a developmental approach to examining and feeding the development of this e-learning environment by looking into design concept, learner experience and learning outcomes. The current study is of benefit to the wider P2P Deaf Literacy project, particularly in terms of formulation and evaluation of the e-learning platform. The research process also addresses transformative considerations of social justice and human rights for Deaf participants throughout the research process.

1.3.1 The SLEND Moodle Platform

One of the main aims of the wider P2P Deaf Literacy Project is to establish a Moodle-based[5] learning platform for English attainment, and this platform is referred to as *Sign Language to English by the Deaf* (SLEND). The SLEND platform is not a ready-made product created before the intervention; instead, it was conceptualized and developed in the process of learning with the participation and interaction of Deaf learners and peer tutors, and it was positioned in a low-tech context where there is also a lack of education access for Deaf young adults, customized English learning resources as well as qualified teachers.

The development of the SLEND was underpinned by the interaction approach in SLA (Gass & Mackey, 2014) stressing the comprehensible input, interaction and output for language acquisition, and the participatory approach entailing learner-centric and life-changing notions (Auerbach, 1993). Learner agency (Lindgren & McDaniel, 2012) played an essential role in learning with the SLEND because Deaf learners had "the power to act". Therefore, the conceptualisation and construction of the SLEND follows the principle of maximizing interaction and participation of Deaf young adult learners in the process of English literacy attainment.

1.3.2 Definition of 'the Context of the SLEND'

The term 'the context of the SLEND' is used to refer to the circumstances that form the creation of the SLEND and the delivery of English learning and teaching on the SLEND platform. To be more specific, the context, as an essential part of the intervention, is not the learning content itself, yet determines and interacts with the development of the SLEND platform as a whole. To simplify the expression, "the SLEND" hereinafter refers to "the SLEND and its context" unless the specific context needs addressing under certain circumstances, whereas "the SLEND platform" solely refers to the platform excluding the context.

[5] Moodle is one variety of Massive Open Online Courses (MOOC) platforms. It allows the users to set up an online environment for teaching and learning activities.

The context of the SLEND can be interpreted in both a broader sense and a narrower sense. For this study, the broader sense, such as the circumstances of Deaf education in India, is not the focus. It is the context in the narrower sense, directly linked with the SLEND, that requires attention. The context in this sense affects the progress of learning and teaching on the SLEND, and influences the operation and implementation of the SLEND. For example, a potential characteristic of the narrower context that might be of interest here relates to technology. The ownership of digital devices and the situation of Internet access affect the development of multimedia materials used on the SLEND, learning on the SLEND, and the operationalization of the SLEND.

1.3.3 A Developmental and Transformative Perspective

The research on the effective e-learning environment for low-resource context is conducted alongside the development of the SLEND and its context, which is innovative, dynamic and complex. Hence the research is compatible with developmental evaluation (Patton, 2011) which supports "innovation development to guide adaptation to emergent and dynamic realities in complex environments" (p.1). The development of the SLEND is an ongoing adaptive process alongside the intervention, because the Deaf participants are the users as well as the essential developers. In this regard, developmental evaluation can better serve the needs of "adaptive development" (Patton, 2016, p. 4), and ensures innovative development in facilitating adaptation to ongoing, dynamic platform construction.

Furthermore, the development of the SLEND and its context is situated in a complex setting, in which Deaf literacy education is influenced by developments in the global context as well as in India. These developments include the shift to the rising sociocultural status of the Deaf community (see Section 2.1), the interaction approach in SLA (see Section 2.4), the participatory approach(see Section 2.3); and the evolution of the participative Web 2.0(see Section 2.1). Behind the participatory literacy approach for adult learners' English literacy attainment lies a series of relevant theoretical evolutions such as the interaction approach in SLA, literacy as a social practice, and emergent curriculum, which serve as a theoretical base for a participatory literacy approach. The interaction approach in SLA endorses active participation to foster language acquisition and addresses the challenges facing the Deaf communities caused by isolation, oppression and discrimination. The shift to Web 2.0 provides technological affordances for the interaction and participatory approaches in an e-learning environment, while the rising status of the Deaf community with the recognition of its distinct culture and sign language (Ladd, 2003), catalyses the adoption of the participatory literacy approach as a social pre-condition.

Ultimately, the current study is dedicated to dealing with emergent issues, informing adaptation for the development of the SLEND in a complex environment with theoretical paradigm shifts, and distilling the essentials of an e-learning ecosystem for Deaf adults' literacy development in a low-resource context. As the current study works closely with and for Deaf communities in India that qualify as linguistic and cultural minorities (Zeshan, 2009), experiencing long-term oppression and discrimination, it is imperative to safeguard the social justice and human rights of the Deaf communities through transformative considerations while conducting research.

The emergence of the transformative paradigm is mainly due to the dissatisfaction with dominant evaluation paradigms, which tend to marginalize minorities. Mertens (2010)

points out the limitations shared by evaluation under the dominant paradigms, and further summarizes six approaches of transformative evaluation (Mertens, 2009) including developmental evaluation. With a transformative paradigm, the evaluation provides credible evidence of the needs of the marginalized community by prioritising their social justice and human rights. For the concerned Deaf communities in India in the current study, transformative considerations pertaining to the whole evaluation process can ensure that the developmental evaluation of the SLEND is in favour of their interests. The integration of developmental evaluation and transformative considerations (see elaboration in Chapter 3) ensures a dynamic research process continuously engaged with, by and for the Deaf communities in India.

1.4 RESEARCH QUESTIONS

The current research seeks to facilitate the development of an ecological learning platform (the SLEND). The quest for the e-learning ecosystem is very mindful of the shift to a participatory and interactive direction in various theoretical areas relevant to Deaf adult literacy attainment, the technological affordances with the advance into the Web 2.0 era and its pedagogical implications as well as existing models and frameworks of the e-learning ecosystem.

The general assumption is commensurate with the claim that the enabling e-learning conditions for Deaf learners are not entirely the same as those of their hearing peers due to different needs and strengths (Marschark, 2003). Meanwhile, it is assumed that an effective e-learning environment for Deaf young adults' English literacy attainment is to be aligned with a participatory approach maximizing interaction for English literacy development, and it is also expected to bear unique features in a low-resource context with fewer education opportunities, fewer qualified teachers, limited customized learning materials, constrained technological infrastructure and limited Internet connectivity.

An overarching research question (RQ) has been posed together with three subordinate research questions (sub RQs) for the investigation of the effective and enabling e-learning environment for Deaf young adult learners' English literacy development.

The **overarching RQ**: In light of the development of the SLEND platform, how can an e-learning ecosystem in a low-resource context be conceptualised and constructed to foster interaction and participation for Deaf young adult learners' English literacy attainment in India?

The overarching RQ seeks to uncover the conceptual architecture and underlying frameworks of an e-learning ecosystem, with an ultimate goal of obtaining optimal learning conditions for Deaf adult literacy attainment in a resource-constrained context. It builds upon the investigation of the characteristics/design concept, learner experience and learning outcomes of the SLEND and its context through the three sub RQs.

Sub RQ1 What factors have emerged as the critical characteristics and features of the SLEND and its context?

Sub RQ2 How does learner experience correspond to the characteristics and features of the SLEND?

Sub RQ3 To what extent does the intervention with Deaf learners through the SLEND platform affect their English literacy proficiency?

The first sub RQ is a thematic analysis of the perspectives of UK researchers, Deaf research assistants and peer tutors in the field. It attempts to explore and identify the characteristics of an effective e-learning platform in the context of an English Literacy intervention with Deaf learners.

The second sub RQ investigates how learner experience corresponds to the characteristics of the SLEND both quantitatively and qualitatively. It is anticipated that both positive and negative experiences will be found. Positive experiences will further explain and corroborate the successful design concept, whereas negative experiences will be carefully examined to refine the platform and its delivery context.

The last sub RQ assesses the learning outcomes of Deaf learners, to cast light on the effectiveness of the platform. It is worth noting that Deaf learners have been invited to self-assess their achievements, and these self-assessments are available besides objective standardized tests. The intervention for Deaf learners' English literacy through the SLEND platform has the potential to affect learners' English literacy development positively in terms of overall attainment, retention of learning, and specific literacy skill development. Correlations between learner experience and learning outcomes may shed light on platform development, as well as refining and enriching the conception of the characteristics of the SLEND identified through sub RQ 1.

In general, this study will provide an insight into how an interactive and participatory e-learning ecosystem for Deaf learners' English literacy growth should be conceptualised, and constructed. Potential evidence-based 'best practice' will be extracted to inform further research, policy development and practice for Deaf learners' English literacy development.

To be more specific, this study makes original contributions to the field of Deaf learners' English literacy in India. It provides a theoretical framework of an effective e-learning environment by applying the existing general e-learning ecosystem models to a specific domain of Deaf English literacy development in a particular resource-constrained context in India. This framework can serve as a guide for establishing an enabling e-learning environment to maximize participation and interaction for Deaf young adults' English literacy attainment, which have not previously been much researched. Notably, the current study undertakes a pioneering, if not the first, application of the interaction approach in SLA (comprehensible input, interaction and output) to the field of Deaf adult literacy learning. It provides a new perspective to look into Deaf learners' English literacy attainment.

Meanwhile, this study evaluates the effectiveness of Deaf learning platforms with mixed methods, both quantitative and qualitative, with a substantial group of participants from different regions. This fills gaps left by previous studies in India that are qualitative in nature and small in scope. In addition, it applies developmental evaluation for the first time to Deaf learners' English literacy attainment in India. This approach addresses emerging problems alongside platform development and acknowledges dynamic evolution of innovations.

1.5 THESIS STRUCTURE

Besides this introductory chapter, the thesis consists of six chapters. In Chapter 2, the background for the current research is framed through a critical review of key issues in Deaf adult literacy attainment, notions of participatory approach and interaction approach, Web 2.0 technologies and pedagogical implications as well as the technological advances in India. The methodological framework of developmental evaluation with transformative considerations is presented in Chapter 3, together with a detailed description of the mixed-methods research design underpinning the methodological frameworks.

Findings regarding the examination of the design concept, learner experience and learning outcomes are elaborated in Chapters 4-6 respectively, which gradually build the blocks of an interactive and participatory e-learning ecosystem for Deaf young adults' English literacy development. The characteristics of the SLEND from the point of view of both UK researchers and the Deaf fieldwork team are identified and discussed in Chapter 4. In Chapter 5, the quantitative findings arising from a learner experience questionnaire are introduced, with a special focus on the experience of the key characteristics, supplemented by qualitative justification and explanation from interviews. Chapter 6 summarizes the findings of learning outcomes from standardized tests and self-assessment in four aspects: overall attainment, retention of learning, differences between study centres and specific literacy skills. The thesis concludes in Chapter 7 with a summary of the evolution of an e-learning ecosystem, implications, recommendations, limitations of this research, and suggestions for further research.

CHAPTER 2 BACKGROUND

As specified in Section 1.2, the P2P Deaf Literacy Project is an interdisciplinary project, combining different areas such as adult English literacy, TESOL, e-learning, and Deaf education. The advances in each field are inevitably mirrored in the development of the SLEND. A thorough understanding of the background information can anchor the research process and facilitate interpretation of findings.

In this regard, Chapter 2 is intended to take stock of key information of each aspect concerned. It starts with the introduction of the Deaf adult learning context in India, followed by an elaboration of the interaction approach in Second Language Acquisition (SLA) and the participatory approach to Deaf adult literacy attainment as well as its theoretical underpinnings. Then a detailed account of the Web 2.0 technologies and their pedagogical implications for e-learning is presented. Finally, the existing models and framework for e-learning ecosystems are reviewed with a further call for adaptation to the current low-resource context with limited educational resources, constrained technologies and Internet connectivity.

2.1 DEAF ADULT LEARNING CONTEXT IN INDIA

A thorough understanding of the context facing Deaf adult literacy learning in India is instrumental to the conceptualisation and construction of the SLEND, as it is the learning conditions including both internal and external influences that keep an e-learning system dynamic (Chang, 2008).

2.1.1 A Large Deaf Community with a Rising Public Status

According to the figure from the official website of the World Federation of the Deaf, 70 million Deaf people worldwide consider a sign language to be their first language or mother tongue (WFD, 2018). This accounts for over 1% of the world's population and forms a large deaf world/family associated with terms such as "Deaf Community" or "Deaf Communities", which is defined by Baker and Padden (1978, p. 4) as follows:

> "The deaf community comprises those deaf and hard of hearing individuals who share a common language, common experiences and values, and a common way of interacting with each other, and with hearing people".

It was not until the year of 2001 that India included data on disabilities in the national census. The most up-to-date statistics come from CensusInfo India 2011. Applying the rate of over 1% mentioned above to India with a huge population of 1.2 billion (India Census, 2011), it can be inferred that there might be 12 million deaf Indians. However, according to the CensusInfo (India Census, 2011), the total number of people with hearing loss is 5.07 million. The underreporting of the deaf population could result from "stigma and a range of other socio-cultural variables", as explained by the World Bank (2007). It is also possibly due to the adoption of different standards and definitions of "hearing loss". The Deaf population in India is estimated at over 1.5 million (Vasishta, Woodward, & Wilson, 1978) and 1.4 million (Zeshan, 2007). In spite of the inconsistence of figures and lack of differentiation between the Deaf and the deaf, which researchers must be cautious about, these figures are helpful to shed light on the size of the group.

Despite the large size of the Deaf community and Indian Sign Language users, the attitude of the public towards Deaf people and their education is unexpectedly low-

profile in India. According to Randhawa (2005), people with hearing problems were historically considered to be 'dumb', in the sense of both speechlessness and stupidity. Even worse, they were deprived of rights to inheritance, marriage, education and challenging work. Banerjee (1896, cited in Randhawa, 2005) and Banerji (1903, cited in Randhawa, 2005) described that it was even difficult for the school to persuade the parents to send their Deaf children for education. This resulted from the biased belief that Deaf people were born as a result of their misdeeds in their previous life, and enrolling them in education was against the will of God (Miles, 2001). By the time of independence of India in 1947, only a limited number of deaf Indians could have access to education and the whole deaf community was subject to discrimination to some extent (Dennis, 2005).

The perception of the Deaf Community as a linguistic and cultural minority is commonplace in many countries. Deaf communities are considered as linguistic and cultural minority groups by benchmarking against the following criteria proposed by Zeshan (2009, p. 4):

> "• The group has its own language, the regional or national sign language.
>
> • There is regular in-group interaction between the members of the group, for example during deaf sports competitions, religious services in sign language, and the like.
>
> • The group has its own institutions, such as deaf associations.
>
> • There are shared collective experiences and values within the group, such as experiences of linguistic oppression and positive attitudes towards sign language.
>
> • The group has its own norms of communication, its own history and cultural heritage, and/or its own art forms."

By applying these criteria to the Indian context, Zeshan (2009) argues that the Indian Deaf Community qualifies as a linguistic and cultural minority and Indian Sign Language should be acknowledged as a language, even more appropriately, as an official language in India. In fact, the estimated 1.4 million actual users of Indian Sign Language in India (Zeshan, 2007) are comparable to the number of speakers of several scheduled languages[6] used in both urban and rural areas in India.

Meanwhile, empowering activities carried out by the Deaf NGOs and Deaf communities continued during the time of suppression after the Milan Resolutions, and have been thriving in recent years. According to Bhattacharya and Randhawa (2014), Deaf NGOs and clubs actively engage in advocating the use of sign language, and recognition of the Deaf community as a social-cultural community. Bhattacharya and Randhawa (2014) mention a variety of Deaf NGOs and clubs existing in India, including state-level Deaf organisations and city-level Deaf clubs. They especially point out some Deaf clubs such as ISHARA Foundation in Mumbai and Vadodara that encourage Deaf teachers to teach Deaf learners English through sign Language with an empowering angle. Another striking development is a BA programme in Applied Sign Language Studies for Deaf students. In

[6] There are twelve schedules in the *Constitution of India* and each schedule is a list of a specific topic. The eighth schedule is concerned about languages. So far, 22 languages from India have been listed in the eighth schedule. These scheduled languages are entitled to representation on the Official Language Commission. (Rana, 2014)

collaboration with the University of Central Lancashire, the Indira Gandhi National Open University (IGNOU) in New Delhi, implemented this BA programme successfully through ISL as language of instruction with Deaf learners enrolled from India as well as other developing countries.

Governmental policy and legislation advance alongside with the academic research and practices discussed above. *The Right To Education (RTE) Act* (India, 2009) ensures the provision of free and compulsory education to children aged 6 to 14 including those with disabilities. *The Rights of Persons with Disabilities Act, 2016* (RPDA, 2016), affirms sign language as the language of communication for Deaf people, and requires training and employment of teachers qualified in sign language.

Therefore, although the historical view of Deaf Indians is oppressive and negative, the trend of recognising the Deaf community as a linguistic and cultural minority is rising and evident from the remarkable achievements in research, practice, policy and legislation in India. Nevertheless, the pursuit of the official status of ISL as the first language of Deaf people and the use of ISL as primary language of instruction in education has a long way to go. The nationwide implementation of the favourable policy and legislation is likely to take longer, especially in rural areas.

2.1.2 Constrained Access to Education and Learning Resources Inhibiting Literacy Progress

As Randhawa (2005) summarized, general education and vocational education have been established to meet Deaf people's learning needs in India. For general education, this is across different levels of education, from pre-school, to primary, secondary, college and open school and university. Both segregated education and integrated education are available. There were about 550 special schools by 2005 for Deaf learners at various levels of education (Randhawa, 2005). However, these special schools are far from enough to accommodate all the Deaf students, as Vasishta (2002) claims they only encompass 2% of the Deaf children who are in need of special education services.

In consideration of this shortage, in 1974, the government launched the Integrated Education for Disabled Children (IEDC) to encourage regular schools to include disabled children. However, as Randhawa (2005) points out, due to lack of qualified resources these mainstream schools do not function well for Deaf children, who are more likely to encounter communication problems together with socio-emotional isolation (Kundu, 2000).

Unlike the role of general education to promote literacy skills and academic achievements, vocational education is to facilitate Deaf people to be employed. In this way, Deaf people can be independent and contribute to the society. According to Randhawa (2005), Deaf people have traditionally been trained within the family such as farming, tailoring and carpentry, etc. With the booming of technology and the economy, Deaf people are being trained in a large number of careers to keep up with the social and economic development. There are professional pre-vocational and vocational schools, and also government and non-government training centres.

Despite the efforts invested into general education and vocational education, deaf people's access to education is limited and the human and technical resource base in terms of qualified teachers and customized learning resources is relatively thin. Unsurprisingly, a large group of deaf people are illiterate, with a number of 2.2 million

(India Census, 2011) (see also in Section 1.1.1), and the progress on literacy attainment for Deaf young adults remains unsatisfactory.

2.1.3 Technology Advancement Revitalising Deaf Learning

The advances in technology bring new opportunities for life, work and education. As an integral part of the society, Deaf communities cannot withdraw themselves from the technology environment. When it comes to Deaf learners, technology is an enabler to take forward progress including expanding access and enhancing quality. Meanwhile, technology-assisted teaching and learning for Deaf learners not only motivates Deaf learners (Easterbrooks, Stephenson, & Mertens, 2006; Kaplan, Mahshie, Moseley, Singer, & Winston, 1993; Cited in Beal-Alvarez & Cannon, 2015), but also improves their learning outcomes (Beal-Alvarez & Easterbrooks, 2013; Cannon, Easterbrooks, Gagne, & Beal-Alvarez, 2011).

It is acknowledged that technology enables a combination of visual and verbal information, which enhances Deaf learners' information and knowledge processing and retention (Sadoski & Paivio, 2004). By reviewing previous practice, current situation and future trend of technology in education, Stinson (2010) identified the prevalent practices: captioning, interactive whiteboards, tablet PCs, web-based instruction, and handheld technologies.

The 2015 issue of Odyssey[7] consisting of 15 articles by Gallaudet University explores the influence, impact and opportunity of technology for Deaf learners. Diversified technology-assisted teaching and learning techniques have been identified, such as captions, whiteboards, animation, videos, iPADs, robots, screen recording, storybook apps and tele-intervention. Based on a review of studies, Beal-Alvarez and Cannon (2014) found that most classroom instruction for Deaf learners includes multiple aspects of technology. They further classified these aspects of technology as "text, pictures, animation, and sign language" (Beal-Alvarez & Cannon, 2014). To sum up, captioning, pictures and signed videos are the most commonly researched areas.

There is an increase in ownership of digital devices in India. According to the 2011 Census, 63.2% of households own a mobile or fixed telephone connection, in comparison with just 9.1% in 2001. According to the ICT Development Index (IDI) 2017 (International Telecommunication Union, n.d.), India is ranked 134 worldwide in terms of IDI in 2017, with some key sub-indexes listed in Table 2.1. In general, the ownership of mobile devices and the access to the Internet via mobile devices are higher than those of computers and fixed-telephones.

[7] The Odyssey is a magazine of the Laurent Clerc National Deaf Education Center located on Gallaudet University campus. It is published once a year with a focus on research, philosophy and practice of instruction in the Deaf Education classroom.

Table 2.1 Key sub-indexes of IDI 2017 for India (Data Source: ITU Website)

Items of Sub-Indexes	Values
Percentage of fixed-telephone subscriptions per 100 inhabitants	1.88
Percentage of mobile-cellular telephone subscriptions per 100 inhabitants	86.95
Percentage of households with computer	15.20
Percentage of households with Internet access	22.64
Percentage of individuals using the Internet	29.55
Fixed (wired)-broadband subscriptions per 100 inhabitants	1.44
Active mobile-broadband subscriptions per 100 inhabitants	16.76

Compared to industrialised countries, the ownership of devices and connectivity to the Internet are still lower in India and vary greatly in geographical distribution, so it seems more appropriate to profile India as a 'low-tech' context if only the technological infrastructure (physical aspect) is taken into consideration. Nevertheless, the physical aspect is just one side of the coin, and limited technology does not necessarily mean 'low-tech'. Gonzalez and St. Louis (2013) list the determining factors for a low-tech context: human constraints, institutional constraints, physical constraints and high cost of Internet access. In general, the first two factors can be seen as human constraints, and the latter two as physical constraints. In a similar vein, Egbert & Yang (2004) propose the dichotomy of "good use" and "bad use". In other words, they take less account of the physical constraints. Instead, they focus on how those who have technology make the most of it in language teaching and learning.

Unlike the physical factor which can be reflected in figures, the human factor is much more difficult to be quantified. At the policy-making level, the *National Policy on Information and Communication Technology (ICT) in School Education* (India, 2012) was developed by the Department of School Education and Literacy, Ministry of Human Resource Development in 2012 in India, and distributed to schools at the same time. In the document, there are specific requirements for each level of institution to ensure the implementation of ICT in education. Regarding capacity building, it is specified that it covers in-service training, pre-service teacher education and school heads.

In 2015, the Prime Minister of India launched a flagship programme, *Digital India,* which is envisaged to "transform India into a digitally empowered society and knowledge economy" in the areas of digital infrastructure, e-Governance and digital literacy (Government of India, 2018). Under this initiative, Bharat Broadband Network Limited has been tasked with connecting all the villages in India through broadband with a project period of two year (Bharat Broadband Network Limited, 2018).

Therefore, in terms of policy assurance and governmental action, it seems that there are no constraints for ICT in education and institutional support is in place. However, the implementation of the policy, actual teacher preparedness, interests and learners' association with technology for both academic and non-academic purposes are still worth exploring, though challenging.

The controversial technology status of India is also reflected in the survey by Gonzalez and St. Louis (2013). They invite a group of worldwide language teachers to assess the technology status in each country. Five of them are from India, with three teachers

considering India as a low-tech context, and two assessing it as a non-low-tech environment. As for the current study, besides the general background of technology in India, the particular context of the current study is also elaborated in terms of both human and physical factors later in Sections 3.2 and 3.6 respectively.

The employment of ICT is considered as one innovation in Deaf education in India (Sahasrabudhe, 2010), and has brought new opportunities to Deaf learning. According to Denmark (2013), the pioneers are the Ishara Foundation and the Indira Gandhi National Open University (IGNOU). The Ishara Foundation led by the Deaf community was set up in 2005 in Mumbai and runs continuing education, distance education and literacy enhancement courses for Deaf children and adults. IGNOU was in partnership with the University of Central Lancashire, through the International Institute for Sign Languages and Deaf Studies. These educational organizations have produced several projects for Deaf learners, such as the English Learning Platform (ELP), the Bachelor Preparation Programme for Deaf Students (BPPDS), the Bachelor of Arts (BA) Applied Sign Language Studies (BAASLS). The first one focuses specifically on e-learning platform, while the last two integrate technology in teaching and learning.

In 2010, Sahasrabudhe conducted a case study on an English Learning Platform (ELP) and demonstrated the usefulness of the platform in developing learners' linguistic skills and metalinguistic awareness. He also found that Deaf learners prefer guided peer support, interpersonal and vicarious learning materials. Another study (Denmark, 2013) also corroborated that Deaf learners were engaged with an e-learning platform through the investigation on usage patterns and user engagement. Learners were satisfied with the interactive features in terms of peer group chats and forums, and also the signed explanations and readings.

The advances in technology make it possible to revitalise Deaf learning. Although India is likely to be profiled as low-tech in terms of technological infrastructure, the efficiency of e-learning could be remedied with the purposeful and good use of technology. Some good practices of technology-enhanced learning for Deaf people have been identified. However, despite confirmed effectiveness evidenced from learners' way of use and engagement in existing research, there is a scarcity of research that examines the learning outcomes to assess the effectiveness of e-learning platforms for Deaf learners. Furthermore, research has not shown the model under which an effective e-learning system for Deaf learners can be constructed. The current research is designed to bridge these gaps by looking into the learning outcomes, and the framework for an efficient and effective e-learning platform in a low-resource context in which Deaf young adults' English literacy attainment sits.

2.2 INTERACTION APPROACH AND DEAF LEARNERS' SECOND LANGUAGE ACQUISITION

The input-interaction-output hypotheses are fundamental concepts in the field of Second Language Acquisition. In view of abundant empirical studies and theoretical advancement, Gass and Mackey (2014) claim that the Interaction Hypothesis has advanced to the interaction approach, which subordinates some aspects of the Input Hypothesis and Output Hypothesis, similar to Long's claim (1996).

The interaction approach is also frequently referred to as input, interaction, output model (Block, 2003) and interaction theory (Carroll, 1999). It hypothesizes that language

learning is realised through learners' exposure to language, production of language and feedback received on production. According to Gass (2003), the starting point of the interaction research is "the assumption that language learning is stimulated by communicative pressure and examines the relationship between communication and acquisition and the mechanisms (e.g., noticing, attention) that mediate between them" (p. 224).

One sociocultural notion underpinning the interaction approach is Vygotsky's (1978, p. 86) notion of the Zone of Proximal Development (ZPD), which is defined as

> "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers".

Learning occurs with the shift from the potential development level to the actual developmental level, when learners overcome the problems that they cannot solve independently, but through interaction with or scaffolding from the people around them. In this way, it not only strengthens the importance of interaction in language learning, but also lays the foundation for the hypothesis of comprehensible input 'i+1' which is discussed below. Although the ZPD was originally applied to the education of children, it is applicable to or more suitable for adults' education suggested by later research (Fani & Ghaemi, 2011).

2.2.1 **Comprehensible Input**

According to Krashen (1985), the fundamental principle in Second Language Acquisition is a combination of the Input Hypothesis and Affective Filter Hypothesis. It posits that learners can acquire a second language provided that they are exposed to comprehensible input and that they are motivated and confident to absorb the input.

Krashen (1985) explains comprehensible input in terms of 'i+1' which is slightly beyond 'i', the current level of language competence. Comprehensible input does not necessarily mean simplified input although simplification is one way of conveying comprehensible messages. Other options include elaboration (Gass & Mackey, 2014) and providing extra-linguistic context to facilitate understanding messages. It is believed that a large amount of frequent and repeated exposure to this 'i+1' language leads to acquisition.

Krashen (1985) further argues that comprehensible input is necessary, but not sufficient for language acquisition. The 'affective filter' serves as a pre-condition to determine to what extent learners can fully utilize the comprehensible input. For instance, when learners lack motivation, self-confidence and are full of anxiety, they are less likely to internalise the language although they receive the comprehensible language input. Learners tend to be more anxious if they perceive that their weakness can be revealed in the acquisition. The Affective Filter is especially prominent after puberty, and adults tend to have higher affective filters than children. This implies that adult language acquisition deserves more attention to the affective aspects of the language learners such as attitudes, motivation and confidence.

As for Deaf learners, they lack language exposure to as well as comprehensible input of spoken languages through listening. It is instrumental to consider other remedial means

for increasing comprehensible input besides reading. Previous projects such as the Italian-funded VISEL project (DeMonte, Groves, & Nuccetelli, 2011) and the Deaf Port Project (Makosch, 2011), suggest transferring listening as well as speaking of spoken languages for Deaf learners to an online learning environment or online social communication. This can serve as a rationale of adopting e-learning and online communication for Deaf learners' English literacy attainment. Meanwhile, due to long-term oppression and isolation, Deaf adult learners are more likely to experience higher affective filters in language acquisition with contrast to hearing adults. This should also be addressed in Deaf learners' language acquisition process.

2.2.2 **Interaction**

Evidence shows that comprehensible input is insufficient for learning to take place, especially for adult learners with nativelike proficiency as the goal (Long, 1996). In SLA, interaction refers to the conversations that learners engage in as part of the process of language acquisition. Long (1996) suggests that negotiation for meaning, and particularly negotiation leading to interactional adjustments from more competent interlocutors, supports acquisition, since it links input, internalisation of knowledge, selective attention and output in a synergised and productive way.

In the negotiation process, learners receive information about both the correctness and the incorrectness of their utterances (Gass & Mackey, 2014). The latter information is referred to as negative evidence in the interaction approach, which learners receive through interactional feedback. The interactional feedback can take the forms of both overt correction and negotiation.

Gass (1997) illustrates the process that negative evidence leads to interaction for learning. Interpreting negative evidence is to alert learners to errors in their speech. After noticing the errors, learners start determining what the problems were, how to modify existing linguistic knowledge and what the correct form should look like. Then learners may search for further input to confirm or discard their hypothesized correct form or produce the new form to test its correctness.

Gass and Mackey (2014) summarize a wide array of issues on the agenda of interaction research, including grammatical aspects and interaction, individual differences and interaction, and the most beneficial forms of interaction for learners in specific settings. They further identify that there is a trend to acknowledge the role of social context for interaction. For instance, as Dornyei (2009) proposes, the relationship between learners can affect learners' willingness to communicate. Dornyei (2009) believes that learners cannot be meaningfully separated from the social environment in which they operate language learning because they are social human beings. The social context is a higher order combination to understand and influence each individual difference factor and language acquisition. Social contextual influences may ultimately impact learners' opportunities to interact for learning.

Mackey (1999) examines the effect of different types of conversational interaction on SLA, including active participation in interaction for negotiation for meaning, and watching interaction or taking part in interaction with no negotiation. She confirms that active participation exerts a positive impact on language acquisition, whereas the interaction with no active participation is not detrimental but with more limited effect on language development. In general, it is agreed that participation in interaction with

opportunities for negotiation for meaning can yield comprehensible input, push output (Swain, 1995) and have a facilitative effect on SLA. To this effect, the importance of a participatory approach for an enabling learning environment to encourage meaningful interaction for language acquisition is elaborated in Section 2.3.

Considering the long history of oppressing views towards the Deaf community in India (see Section 2.1.1), it is likely that it might be challenging to keep Deaf learners motivated and confident for active participation in conversational interaction. Deaf learners may also hold a reserved position depending on the conversational partners. At the same time, Deaf learners' way of taking part in the interaction differs from their hearing peers. They are more likely to engage in the conversational interaction through using L1 (ISL) or through online conversation in L1/L2.

2.2.3 **Output**

Examining the evidence of non-native performance of students in immersion programmes in Canada, Swain (1984) concludes that comprehensible input alone is not sufficient for learners to reach nativelike proficiency, and what is lacking is sufficient opportunities of language use. Swain (1995) therefore puts forward the Output Hypothesis. It posits that producing the target language is likely to prompt learners to realise some of their linguistic problems, and to pay attention to some aspects they need to improve in L2. Different from the Interaction Hypothesis, learners notice the gaps in their own knowledge of L2 by producing the target language even without feedback from conversational partners. On occasions, learners are pushed to modify their output by responding to clarification requests and confirmation checks (Pica, Holliday, Lewis, & Morgenthaler, 1989).

In this sense, the Output Hypothesis (Swain, 1995) acknowledges that learners are able to consciously monitor their production. This echoes the Monitor Hypothesis described by Krashen (1985). The Monitor Hypothesis explicates the ways acquisition and learning are used in production, and argues that conscious knowledge as an editor, or Monitor, corrects the output of the acquired system before or after language production. Krashen (1985) later rejects the Monitor Hypothesis as it is difficult to meet both the conditions set for using the Monitor: learners must be conscious of the correctness and the rule. However, the Output Hypothesis as described by Swain (1995) counters Krashen's rejection of the Monitor Hypothesis and provides new evidence of learners' capability in constantly monitoring their language production.

The Output Hypothesis (Swain,1995) emphasizes the importance of having enough opportunities for language production. Language output enables learners to move from semantic comprehension to syntactic processing of language which is needed for production. Production allows learners to identify knowledge gaps and refine their language. To be more specific, Gass and Mackey (2014) recap three functions of output: pushing for more target-like output, testing hypotheses about the target language and promoting automaticity in L2 use.

This implies that it is an imperative to create more output opportunities for learners to fully acquire a language. For Deaf learners, similar to the situation of comprehensible input, there is a need for transfer of the production to online communication context in L2 to increase the opportunities for output. It is of necessity to explore other means maximizing the opportunities of use of L2 for Deaf learners.

Nevertheless, it is necessary to emphasise that output is not the only way leading to language learning. It has been agreed for some time that a synergy of comprehensible input, interaction and output as the interaction approach is the key to second language acquisition. Long (1996) explains the orchestra of these three elements,

> "Negotiation for meaning, and especially negotiation work that triggers interactional adjustments by the NS (native speakers) or more competent interlocutor, facilitates acquisition because it connects input, internal learner capacities, particularly selective attention, and output in productive ways." (pp. 451–452)

The research with reference to the Input-Interaction-Output Hypotheses in Deaf literacy development is very limited. The current study attempts to fill the gap by looking into how an e-learning environment in favour of comprehensible input, interaction and output is established for Deaf young adult learners' literacy development in view of their special educational needs.

2.3 PARTICIPATORY APPROACH TO ADULT LITERACY

The interaction approach is most effective when learners are actively involved in the interaction process. Adopting a participatory approach to maximize the effect of the interaction is essential in the quest of an effective e-learning environment for Deaf adult learners' literacy attainment. Besides, the participatory approach is one of the most prevalent approaches that has been used for adults' literacy development worldwide. Aside from Second Language Acquisition, several other relevant theories also underpin the participatory approach in adult literacy development and contribute to the knowledge base, including literacy theory, and curriculum theory (Auerbach, 1992; Auerbach, 1996).

2.3.1 Understanding Participatory Learning and Research

The approach of participatory learning has become a trend since the late 1980s, when learner participation emerged in research (Norton, 2000). Fingeret (1989) claims that participatory learning places learners at the forefront and centre of instruction. However, participatory literacy goes beyond learner-centred approach, as it is a critical learning process dedicated to social change (Auerbach, 1993). Thus, it is argued that social change might be one of the outcomes of adopting a learner-centred approach (Jurmo, 1989).

The many definitions of participatory learning converge on placing learners at the centre of the approach. Participatory learning is defined as self-directed learning and frequently used for problem-solving purposes (Buyukkurt, Morin, Li, & Doreen, 2013). Participatory learning process consists of both experiential learning and group learning (Kaewjumnong, 2013). The former refers to learning realized through sharing real experiences among learners within the community, while the latter emphasizes the learning process that a group of learners collaboratively work on the real problems and situations (see Section 2.3.2). Through participation, learners are actively engaged in individualised learning as well as knowledge construction collaboratively.

Participatory approach advocates and promotes learner empowerment. Haron et al. (2017) claim that participatory learning stresses learner empowerment with educators' role slightly shifting from a controller to a facilitator. Traina (n.d.) identifies

empowerment as one of the two distinctive features of participatory approach for research with disabled people. Traina (n.d.) lists three dimensions of empowerment: personal, relational and collective dimension. At personal level, participatory approach helps to alleviate internalized oppression and to develop self-confidence. At the same time, the approach promotes inter-personal and collective participation and empowerment.

Beyond encouraging participation, the participatory approach addresses the slogan of disability movements "Nothing about us without us" (Charlton, 1998). Participation and involvement are the stepping stones to emancipation or a strong version of participation. Barton (2005) differentiates 'participatory' from 'emancipatory' as the former is the pre-requisite of the latter. Zarb (1992) explains the distinction between participatory and emancipatory further,

> *"Participatory research which involves disabled people in a meaningful way is perhaps a prerequisite to emancipatory research in the sense that researchers can learn from disabled people and vice versa, and that it paves the way for researchers to make themselves 'available' to disabled people - but it is no more than that. Simply increasing participation and involvement will never by itself constitute emancipatory research unless and until it is disabled people themselves who are controlling the research and deciding who should be involved and how." (Zarb, 1992, p 125-126)*

Participatory approach is one of the effective tools for researchers to advance social change for disabled people, which implies that it is necessary to engage disabled people not only to gather information and feedback, but also to foster an active agency during the research for gaining more empowerment (Oliver, 1992). In this way, disabled people in education research are not only the object of research, but also direct the research or co-research with the researcher.

2.3.2 Peer Interaction

The participatory approach advocates collaboration between peers to acquire and create knowledge as it places learners at the forefront of learning. Previous studies have reported the efficacy of peer tuition among students in special education (Maheady, Harper, & Mallette, 2001) and the strategies in peer tuition for learners with specific learning needs (Heron, Villareal, Yao, Christianson, & Heron, 2006; Saenz, Fuchs, & Fuchs, 2005; Miller, Barbetta, Drevno, Martz, & Heron, 1996). Peer-tuition is equally important for Deaf learners. Several studies attempt to examine the effectiveness of peer-tuition on the academic achievements of the Deaf learners. By adapting a peer tutoring model to Deaf learners, Herring-Harrison et al. (2007) concluded that systematically implemented peer tutoring can improve Deaf children's acquisition in academic skills of different content areas. Cannon and Guardino (2012) also encourage use of peer-tutoring and recommend metacognitive strategies such as comprehension monitoring and careful pairing of peers for cooperative learning activities.

Meanwhile, peer support is claimed to be beneficial to Deaf children's school success (Ladd & Coleman, 1997). As for e-learning, Sahasrabudhe (2010) identified in his research that Deaf young adult learners involved in an online learning platform considered guided peer support as very helpful. Denmark (2013) reaffirmed the

usefulness of interactive peer support through online chats or forum discussion among young Deaf Indians.

Besides the positive effect on academic skills, peer interaction can also facilitate Deaf children's cognitive development (Ladd & Coleman, 1997), and alleviate their disengagement and isolation (Falchikov, 2001). Peer friendships either between Deaf children and hearing peers or among themselves can enable them to develop specific social, emotional, and cognitive skills, consequently raising their entire well-being and confidence (Batten, Oakes, & Alexander, 2014).

Another aspect of justification for the use of peer tuition and support is that there is lack of formally qualified language teachers with sign language skills in India. Considering the limited English literacy level of Deaf learners, it is necessary to provide peer tuition and support during their informal learning to prevent them from being overwhelmed during study. Therefore, taking all the evidences into account, inclusion of Deaf peer tuition, support and interaction is crucial in a participatory intervention on Deaf young adults' literacy development in India.

2.3.3 Literacy Theory

A participatory approach is also purported by literacy theory, with the notion of New Literacy Studies (NLS) (Street, 1997) which marks the shift in perspective of literacy learning, from a cognitive model with an emphasis on reading, to an understanding of social practices in social and cultural contexts according to Gee (2015) and Street (1993).

Gee (1990) claims that 'literacy' is always plural instead of being a single monolithic entity. Street (2003) further explains that NLS recognizes multiple literacies which are characterised by time, space and relations of power. Likewise, in literacy research for Deaf learners, Evans (2004, p. 139) also agrees that literacy is beyond the basic tasks of reading and writing, and there is a strong connection between language learning and learners' "thinking, identity and community". Therefore, literacy teaching and learning is supposed to vary from one context/culture to another context/culture. So far as the current study concerned, literacy attainment is rooted in the context of Deaf communities in India, and aligned with their culture.

Viewing literacy as a social practice, adult literacy development may also vary from person to person and from community to community, as the social and ideological model of literacy suggests that each individual as well as each community is unlikely to be engaged in exactly the same literacy practices. Rather, it is a dynamic process during which literacy is constructed and reconstructed as each individual enters into new social contexts. Therefore, Castanheira et al. (2001, p. 356) conceptualise that literacy is "both a product of, and a cultural tool for, a social group".

Another notion of literacy in line with the perspective of literacy as a social practice is the real literacies approach. This is an approach emerging from the projects of the Department for International Development (DFID, UK), and specifically designed for young adult learners' literacy development in developing countries. According to Rogers (1999), the real literacies approach neither emphasizes the deficit model of seeing illiteracy as disadvantages, nor boasts about the supremacy of reading and writing skilfully; instead it insists that people, regardless of literacy level, engage in literacy practices over the course of their lives, and focuses on what learners are already

experiencing in their daily lives. The ultimate goal of this approach is to enable learners to undertake real-life tasks with the English skills learnt.

The application of the real literacies approach to the context in India for Deaf young adult learners' English attainment has two implications. Firstly, it is aligned with the notion of Deafhood in opposition to the deficit model, as shows respect to the Deaf communities and cultures. The Deafhood model is seen as a process through which Deaf individuals actualise their identity (Ladd, 2003). The concept of Deafhood goes beyond language and embraces the community and culture as well. Secondly, it emphasises the daily lives and literacy practices that the Deaf communities have already engaged in. The learning content for Deaf young adult learners is derived from the activities, situations and texts they encounter in their real life. The expected benefit of practicing the real literacies approach is that it provides for instant use of what is learnt.

The immediate implication of the NLS and real literacies for adult literacy teaching and learning is identifying literacy practices by engaging learners in the process of investigating language and literacy usage. At the same time, learners can critically analyse and understand literacy learning as context-dependent and culture-specific. It is equally important for learners to determine their own learning purposes and self-direct their learning, rather than simply accepting prescribed learning.

2.3.4 Curriculum Theory

The evolution of the curriculum theory conforms to the aforementioned participation-oriented theoretical shifts. Traditionally, the curriculum is devised by the teachers without consultation with learners. The sole concern is how the information could be efficiently transmitted from teachers to learners. The new model places learners at the centre and the curriculum tends to be emergent. Both teachers and learners are in quest of syllabus objectives, content, and methodologies. Combining this interactive curriculum approach with Freire's literacy approach, an emergent curriculum for adult literacy entails a systematic process to develop a curriculum encapsulating learners' lived experiences and social realities.

For an emergent curriculum via a participatory approach, learners need to be involved in every stage of curriculum development, including decision of the learning content, methods, processes and evaluation. To be more specific, an emergent curriculum is developed through the participation of learners in identifying the themes/topic, re-presenting these topics into learning materials with appropriate knowledge extension by teachers (Auerbach, et al., 1996). Likewise, Auerbach (1992, p. 22) claims, "In a participatory approach, the curriculum emerges as a result of an ongoing, collaborative investigation of critical themes in students' lives." In this way, curriculum content addresses adult learners' realities, concern and goals in real world.

A recent curriculum notion, "crowdsourcing the curriculum" (Paulin & Haythornthwaite, 2016), is in support of wider collective participation for developing a curriculum. It comes into being with the wave of the openness of the Web. In a collective manner, crowdsourcing rests upon the wisdom of the crowd, which is assumed to outperform the best individuals in that crowd (Surowiecki, 2005). Through crowdsourcing, a large crowd of learners, teachers, educators and experts generate a wide multitude of quality open educational resources integrated into the curricula. There is concern over the overflow of information and how best it could be incorporated into the curricula. An

effective measure could be setting up a vetting and selection mechanism among the concerned crowds.

Coupled with the evolution of the theories in SLA, literacy and curriculum, the interaction approach and participatory approach are considered to be facilitative of Deaf young adults' English literacy development. The adoption of the interaction approach and the participatory approach in adult literacy learning is justified and grounded. As Deaf young adults' literacy attainment is contextualized in an e-learning environment, it is equally important to take stock of the technologies available to maximize interaction and participation.

2.4 E-LEARING IN THE PARTICIPATIVE WEB 2.0 ERA

There is rising concern over the issues of isolation of learners and lack of teachers' feedback in traditional e-learning. Evidence shows that e-learning tends to convene individualized instruction (Leow & Neo, 2013) with less chance for social interaction (Dondi & Delrio, 2006; Vanve, Gaikwad, & Shelar, 2016) in comparison with classroom instruction. Consequently, e-learning, especially of the traditional kind without adequate interaction, can cause further seclusion and jeopardize participatory engagement (Haron, Aziz, & Harun, 2017). An e-learning environment may well become a lonely and isolated space where the presence of others is hardly felt. This is extremely harmful for Deaf learners since isolation is already a longstanding issue across their life. Hence, it is imperative to construct an enabling e-learning environment with proactive participation and interaction of Deaf learners.

The affordance of technology brought by the transition from Web 1.0 to Web 2.0 stimulates interactive participatory e-learning. According to Thomas and Brown (2011), a new 'culture of learning' arises in which technology is viewed as a participatory medium in support of an e-learning environment continuously being altered and reshaped by learners' participation. Specifically, Web 2.0 applications and tools are utilized to scaffold participatory learning in terms of enabling collaborative learning, providing instant feedback as well as cues for self-reflection, and facilitating interaction (Haron, Aziz, & Harun, 2017).

2.4.1 Definition and Features of Web 2.0

The term "Web 2.0" coined by Darcy Di Nucci first came into being in January 1999. It has become popular since 2004 when O'Reilly Media and MediaLive organized the first Web 2.0 conference. The key concept of Web 2.0 is that Web users are also the producers of the Web content. While Web 1.0 is solely used for information dissemination with organizations as the content producers, Web 2.0 welcomes the public as the main information contributors. Web 2.0 is also seen as the democratization of the Web as it empowers the end-users to access, create, disseminate and share information easily in an open and user-friendly environment.

In a broad view, Web 2.0 is defined as "a second generation, or more personalized, communicative form of the World Wide Web that emphasizes active participation, connectivity, collaboration and sharing of knowledge and ideas among users" (McLoughlin & Lee, 2007, p. 665). It fosters a "culture of participation" and blurs the boundaries of producers and consumers of content (McLoughlin & Lee, 2008). It enables diversified modalities of expression and opens up to web-based multimedia production and distribution tools which incorporates rich audio, photo and video, and involves users

as “prosumers” in terms of active participation, knowledge creation and seeking engaging personal experiences.

Teaching and learning that is enriched with Web 2.0 technologies is primarily underpinned by social constructivism, which posits that learning takes places through engaging learners in understanding their experiences and creating meaning (Wang, Love, Klinc, Kim, & Davis, 2012). Social constructivism is pertinent to the Web 2.0-based social process, as learners take the initiative to interact with each other for knowledge acquisition (Snowman & Biehler, 2000; Spady, 2001), and to collaboratively create new knowledge building upon existing information. In this way, learners with diversified backgrounds, needs, knowledge and experiences benefit from the collaborative learning and interaction enacted by the Web 2.0 learning environment. Meanwhile, Web 2.0 technologies encourage learners, rather than teachers, to control what and how learners learn (Downes, 2006). Web 2.0 and its associated applications redefine the roles of teachers as facilitators and learners as decision-makers.

Another feature of Web 2.0, peer production, is derived from the aforementioned features: collaborative learning and user-oriented content creation. This feature echoes with the pedagogy of peer tuition discussed in Section 2.3.2. Rogers et al. (2007, p. 21) define peer production as “collective intelligence by collaborating in the creation, reorganization, ranking, sharing, and reuse of rich content, assignments, and assessments”. Haythornthwaite (2009) identifies two contrasting models of peer production: lightweight and heavyweight peer production positioned on two ends of a continuum. Weight here stands for the commitment and engagement with the product as well as production process rather than the significance of the product itself. The heavyweight model lays emphasis on contributions to the product. More importantly, it pays attention to the behaviours and contributions of peers, and it is committed to maintaining and sustaining the route and viability of the community. As for the lightweight model, there is peer production by small, discrete, similar units without interconnection and interaction.

Most Web 2.0 application/tools are able to accommodate both lightweight and heavyweight features. For instance, in a Web 2.0 Learning Management System, learners can contribute simple, similar creation of entries for a glossary in a lightweight peer production manner. At the same time, they can also join the discussion, study contributions from peers and give comments as well as ratings to each other to engage long-term with other community members in a heavyweight peer production manner.

2.4.2 Typical Social Software for Web 2.0 and its Uses

Web 2.0 technologies are embedded in the tools and systems, namely, social software. Mejias (2005) outlines social software broadly and embraces both Web 1.0 and 2.0 technologies. McLoughlin and Lee (2007, p. 666) classify the social software into ten categories and each category is further illustrated with concrete examples. Moodle is listed as one example of a Learning Management System (LMS). Each category is dynamic and constantly evolving via adding new features to existing products or creating novel products (Mejias, 2005).

When it comes to practice, the use of social software in e-learning can be a solo of one particular type of social software. It can also be an orchestra of several types of social software. Meanwhile, the delivery of Web 2.0-enriched teaching and learning can be

realized through the sole use of Web 2.0 social software as well as via the combination of Web 1.0 and Web 2.0 social software.

As for the relationship between Web 2.0 tools and Learning Management Systems such as Moodle and MOOC, on the one hand, Web 2.0 tools can be used quite independently of an LMS. On the other hand, they can also be incorporated within or run parallel to an LMS. Despite the claim of LMS as a Web 1.0 tool, it has gradually evolved to embody Web 2.0 features in various ways, such as MOOC and Moodle. Likewise, according to McLoughlin and Lee (2007), LMS has moved into a new generation with deep incorporation of Web 2.0 applications. For example, Paulin and Haythornthwaite (2016) classified MOOC into xMOOC and cMOOC. “x” stands for extension with xMOOC as the extension of a traditional course which is a teacher-centric knowledge transmission model. “c” stands for Siemens’ (2005) ideas about connectivism which is a learner-centric knowledge creation and sharing model. In short, the Web 2.0 technologies become an impetus for LMS to be more open, interactive, customizable and collaborative.

In practice, there is generally a hybrid combination of classical e-learning, Web 2.0 services, and face-to-face activities (Marzano, Lubkina, & Siguencia, 2016). Mchichi and Afdel (2012) utilize a Moodle platform complemented by Web 2.0 tools such as Open Meetings to facilitate communication as well as interaction and to reduce the dropout rate caused by technical problems and isolation. In O’Connell’s research (2016), an online MA course is delivered via the combination of Blackboard and various social tools such as forums, Twitter, Adobe Connect, and Google Hangouts, which favour participatory learning experiences. Miller (2006) hosts informal discussions to clarify course topics and explore the course in a deeper depth after the weekly lectures. The discussions are recorded and shared through a series of podcasts. In this way, the lecturer and learners could co-produce content with the help of a Web 2.0 tool, podcast.

2.4.3 Pedagogical Implications of Web 2.0

The pervasive penetration of Web 2.0 e-learning technologies is interwoven with the evolution of pedagogies. McLoughlin and Lee (2008, p. 15) propose the notion of “pedagogy 2.0” which they define as “a framework that aims to focus on desired learning outcomes in order to exploit more fully the affordances and potential for connectivity enabled by Web 2.0 and social software tools”. They further extract the essential guiding principles of formulating effective learning environments, including (1) learners generating micro units of content in favour of thinking and cognition augmentation, (2) dynamic curriculum open to learner input and co-production, (3) multiple opportunities of communication with multi-faceted forms of media, (4) situated and contextualized learning processes, (5) media-rich, interdisciplinary, informal and formal resources global in reach, (6) scaffolds for students from peers, teachers, experts and communities, and (6) authentic, personalized and experiential learning tasks oriented by learners’ needs, choice and ideas.

Three key elements characterize pedagogy 2.0: participation, personalisation and productivity (McLoughlin & Lee, 2008). These three elements reflect learners’ progressive engagement in building the e-learning environment. Participation in the communication, collaboration, connectivity and community is a starting point to engage in the e-learning. Personalisation implies that learners’ involvement in the e-learning moves to a deeper level with control on learning process, content and learning

management. Ultimately, learners generate learning content for the e-learning environment and make considerable contribution to knowledge creation and innovation. Figure 2.1 Illustrates the key elements of pedagogy 2.0.

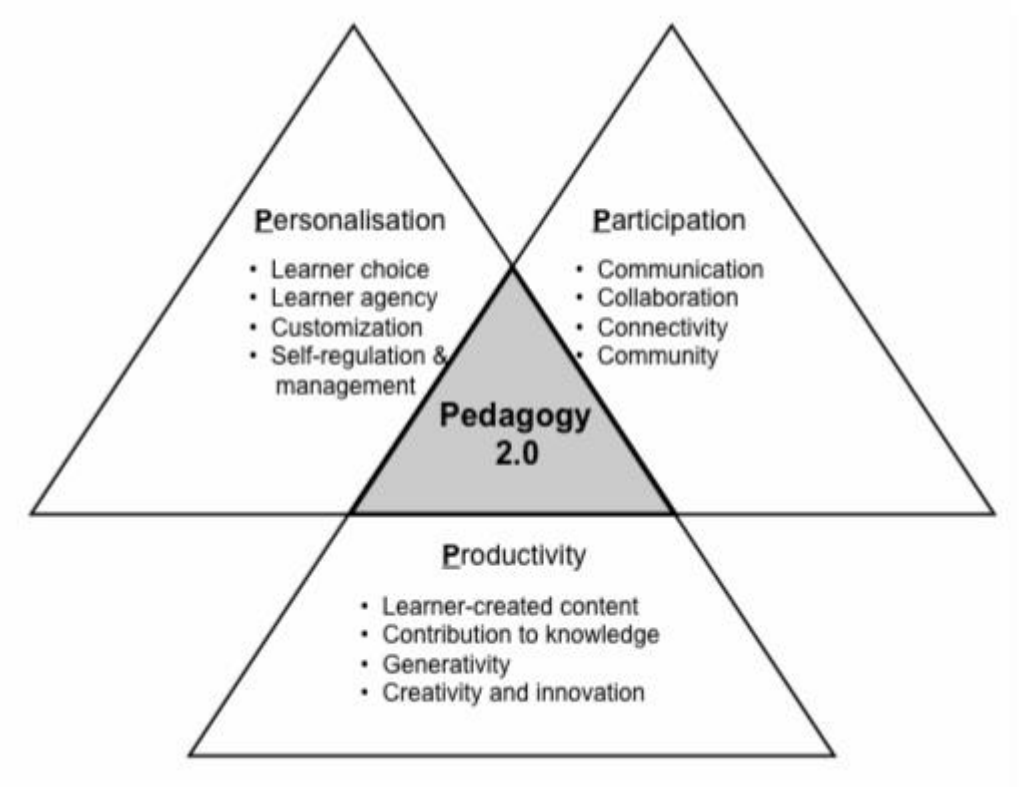


Figure 2.1 The key elements of pedagogy 2.0 (McLoughlin & Lee, 2008)

2.4.4 Web 2.0 Applications/tools in Language Learning

It is widely accepted that there is a naturalistic link between language learning and Web 2.0 tools as language is a medium for the Web to make acquittances and build a community (Thomas, 2009). Web 2.0 technologies are socially interactive in nature which can contribute significantly to language learning (Guetl, Chang, Edwards, & Boruta, 2013). Web 2.0 technologies can contribute to all aspects of language learning including speaking, listening, reading, writing, grammar, pronunciation, vocabulary, cultural and linguistic competence.

Specifically, there are two pathways for Web 2.0 applications/tools to provide support in language learning. On the one hand, language learning can be facilitated by online accessible and usable systems allowing content creation, sharing, search and recommendation as well as (a)synchronous communication. On the other hand, specific language tools/applications are conducive to language learning, such as online dictionaries, thesauri, spell and grammar checkers, natural language processing, speech-text directional conversion, assessment and feedback tools. Each of these Web 2.0 applications/tools attempts to facilitate one specific area of language learning. It is necessary to select, combine and integrate them to avoid working as solos. To this effect, Guetl et al. (2013) develop an integrated e-learning environment with combination of Web 2.0 technologies and some language learning tools. This e-learning environment features three use scenarios: (1) learning English in an open learning community; (2) learning English in closed and formal classroom-like learning communities and (3) learning English with self-organized learning groups.

After a review of 44 studies on the use of Web 2.0 tools in language learning, Luo (2013) recaps the benefits of Web 2.0 tools for language learning, including promoting affective learning, enhancing collaborative learning, fostering learning community, augmenting performance and supporting metacognitive learning. Challenges of using Web 2.0 for language learning are also revealed, including technical issues of long loading time, large file size and low Internet speed, additional care needed for bringing Web 2.0 to formal learning occasions, learners' information overload, maintaining an equal contribution and other institutional barriers.

The Web 2.0 technologies amplify the use of the participatory approach and the interaction approach in Deaf young adults' literacy attainment in the e-learning environment, and reinforce learners' participation, personalisation and productivity as well as interaction. Web 2.0 tools not only convey learning content but also serve as a means for interaction and communication. The latter function facilitates the removal of the potential isolation effect caused by traditional e-learning. In contrast with the solid evidence base of the effective role of Web 2.0 in education, its role in Deaf people's learning is barely tapped into.

2.5 E-LEARNING ECOSYSTEM MODELS AND FRAMEWORK

The e-learning environment, the SLEND, for Deaf young adults' literacy attainment needs to be constructed under the theoretical umbrella of the interaction and participatory approaches as well as the purposeful use of supportive technologies discussed in Sections 2.2, 2.3, and 2.4. This calls on conceptual change in all stakeholders for concerted actions incorporating all relevant components to address the learning complexities. A holistic approach to the e-learning ecosystem (ELES) is likely to encapsulate these components to build a sustainable and efficient learning environment.

2.5.1 Definitions of Ecosystem

The term "ecosystem" was coined by Tansley (1935), and its definition was refined by Willis (1997, p. 270) as "a unit comprising a community (or communities) of organisms and their physical and chemical environment, at any scale, desirably specified, in which there are continuous fluxes of matter and energy in an interactive open system". In a similar vein, the Encyclopaedia Britannica defines an ecosystem as a "complex of living organisms, their physical environment, and all their interrelationships in a particular unit of space". Guetl and Chang (2008a, p. 55) state, "In a generalized view ecosystem is classified by living and non-living components and all their interrelationships in specified physical boundaries". These three definitions all point to the nature of an ecosystem, that is, it is comprised of biotic and abiotic components as well as a specific environment in which the biotic and abiotic components interact.

2.5.2 Models of e-Learning Ecosystem

Although the concept of ecosystem originates from biology, it has been transferred into different fields since its inception, such as e-learning. There is no universal definition of an e-learning ecosystem. The understanding of e-learning ecosystems varies depending on different models of e-learning ecosystems.

Brodo (2006) delineates the e-learning ecosystem for organizational business learning as "the term used to describe all the components required to implement an eLearning solution", namely, content providers, consultants, and infrastructure (see Figure 2.2).

Content providers develop corresponding branded, commodity and custom learning content (business terms) for a particular setting: classroom-based, online or blended learning. Diverse consultants specialized in strategy, compensation, information technology and implementation provide support in development and implementation of the learning process. The infrastructure refers to the management, delivery and tracking of e-learning including a learning content management system (LCMS) to enable efficient management of the process of training and management, a content delivery system for Internet-based learning, and some tools to convert existing knowledge into learning content.

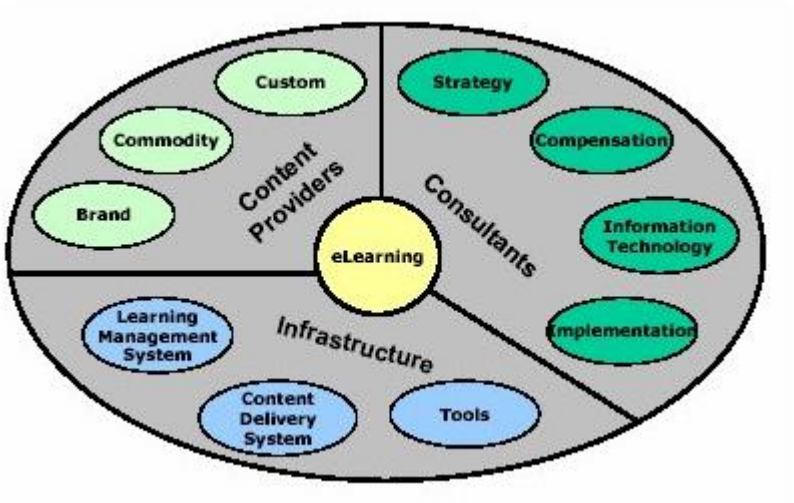


Figure 2.2 Brodo's (2006) e-learning ecosystem model

It is noteworthy that the content providers and consultants not only represent the biotic component of the e-learning ecosystem, but also relate to the abiotic components of content and consultation service respectively. The three main components of this e-learning ecosystem including content providers, consultants and infrastructure are more generic and applicable to other e-learning contexts, whereas some of the sub-components are more specific to the content of the organizational business e-learning. For example, the branded, commodity and custom content is restricted to the business e-learning model.

Nikolaidou et al. (2010) adds a dimension, content consumers (learners), to the existing model proposed by Brodo (2006). This is a crucial addition as learners are an indispensable part of any e-learning ecosystem. Therefore, in their model, there are four categories: content providers, content consumers, consultants and e-learning infrastructure. However, this addition does not change the nature of the conceptualization of the model from the perspective of organizations. Learners are consumers of the content developed by content providers with support from consultants and they are not independent to make choices of tools and content.

Chang and Guetl (2008b) outline an (e-)learning ecosystem (see Figure 2.3) including abiotic, biotic component, learning boundaries and conditions constantly influenced by internal and external factors. This model is created to “address the use of new technologies and tools, incorporating new learning approaches, adaptable to a variety of learning styles, and is responsive to the learning conditions” (Guetl & Chang, 2008b, p. 3). This model is developed in a generic view with a one-size-fits-all assumption. It is

expected to be applied to face-to-face classroom teaching and/or e-learning. Although it has been further elaborated for e-learning (Chang & Guetl, 2007) and knowledge management (Tan & Chang, 2008) in the small-and-medium sized enterprises, the application in other domains is limited.

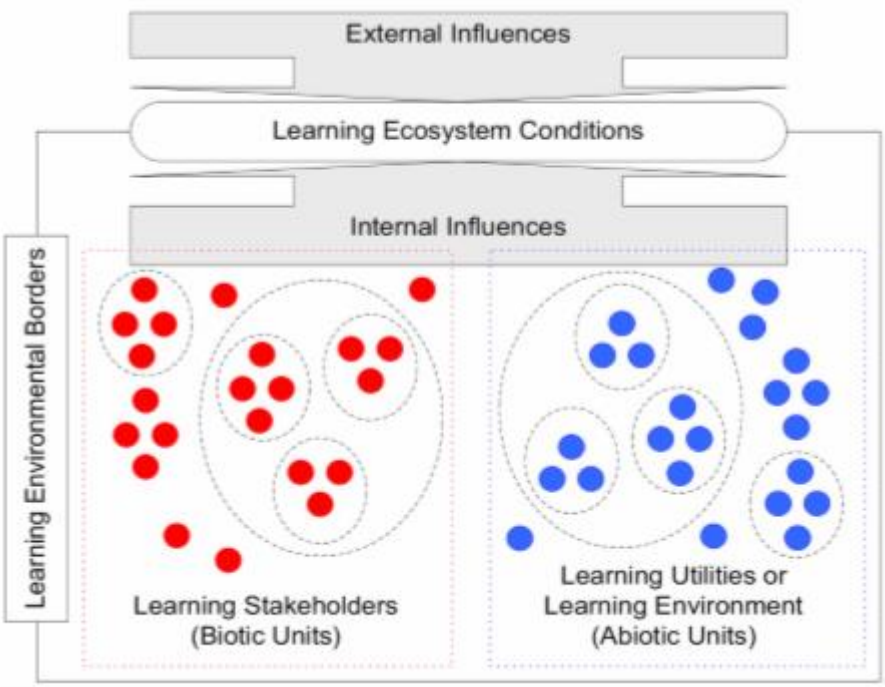


Figure 2.3 Simplified representation for the（e-）learning ecosystem (Chang & Guetl, 2007)

In Chang & Guetl's e-learning ecosystem (2007, 2008a, 2008b), the biotic component "learning communities and learning stakeholders" includes teachers, tutors, content providers, instructional designers and pedagogical experts, which is a combination of Brodo's (2006) and that of Nikolaidou et al. (2010): content provider, consultants and content consumers. The learning communities can either be individual or groups of individuals with synchronous and asynchronous interaction and cooperation. The abiotic component branches out into two categories of "learning utilities or learning environment": content/pedagogical aspects (content) and technologies/tools (technologies). In addition, another essential component of this model is learning ecosystem conditions which are dynamic and ever-changing as a result of external and internal influences such as evolution of knowledge, educational goals, learning tasks, cultural and sociological aspects, and expectations by society, private industry and business organizations, the government, public service and non-for-profit organizations. External influences comprise economic dynamics, domain knowledge, competition and technology advancements (Nyhan, Cressey, Tomassini, Kelleher, & Poell, 2003). Cultural and sociological influences, funding, business strategies and management support are examples of internal influences (Chang & Guetl 2007).

2.5.3 Web 2.0 and e-Learning Ecosystem

After reviewing nine ecological e-learning models, Guetl and Chang (2008a) conclude that technology-assisted learning has shifted from the e-learning 1.0 era to e-learning

2.0 era. To be more specific, it is a shift from content-centred, centralized and static learning systems to people-centric approaches with the characteristics of "blurring roles of teachers and students, the collaborative nature of learning, transfer of pre-existing knowledge to recipients, strong focus on content sharing, syndication, reuse and re-purposing, adaptation as well as personalization" (Guetl & Chang, 2008a, p. 58). They point out the primary dimensions of an e-learning 2.0 environment which are partially reflected in each reviewed model, including the learning content, learning process, learning community, organizational and technological aspects. In compliance with the three main components of the information systems: people, technologies and services, the learning content together with learning process constitute 'services', the learning community and organizational aspects refer to 'people', while the technological aspects correspond to 'technologies'.

So far, no adjustment to the e-learning ecosystem models (see Figure 2.3) has been undertaken to accommodate Web 2.0 technologies and cover the five main dimensions falling into three components of information systems. This is partially because Guetl & Chang's e-learning ecosystem model is originally intended to be generic as a panacea. However, when it comes to the practical application of this model in any specific domain, exemplifying/instantiating is inevitable and essential. There is a gap in the deliberation on how this model can be realized to build an e-learning ecosystem in specific domains. In fact, Guetl and Chang (2008a) also indicate that further research resides in building a framework through integrating current e-learning ecosystem models, and in developing guidelines for incorporating each main dimension in any specific model.

2.5.4 A Theoretical Framework of e-Learning Systems

To pave the way for introducing a theoretical framework of e-learning systems, Aparicio, Bacao, and Oliveira (2016) summarize the dimensions of an e-learning system, including stakeholders and elements of an e-learning system. They provide an exhaustive list of stakeholders: customers (students and employers), suppliers (educational institutions, accreditation bodies, teachers, content and technology providers), professional associations (teachers' association), special interest groups (students' commissions), board and shareholders (education ministry). In line with Dabbagh's (2005) theory-based framework, Aparicio et al. (2016) explicate the elements of e-learning systems as pedagogical models in e-learning, instructional strategies and learning technologies. They (2016, p. 300) further state:

> *These three components enable the linkage between who (open learning, distributed learning, or communities of practice, among others) is participating in the learning process, with the way in which these features interact (collaborating, articulation, reflecting, exploring) and the technologies through which the communication occurs (synchronous, asynchronous, communication tolls, course management tools, among others).*

Based on the aforementioned dimensions of e-learning systems, Aparicio et al. (2016) propose a theoretical framework comprised of people, technologies and services. People (E-learning systems stakeholders) employ technologies to interact with e-learning services (e-learning activities). Technologies (E-learning technologies) create an enabling environment for both direct and indirect interaction among stakeholders with learning activities. E-learning services incorporate all the activities underlying various

pedagogical models and instructional strategies. The holistic e-learning systems' theoretical framework is further illustrated in Figure 2.4.

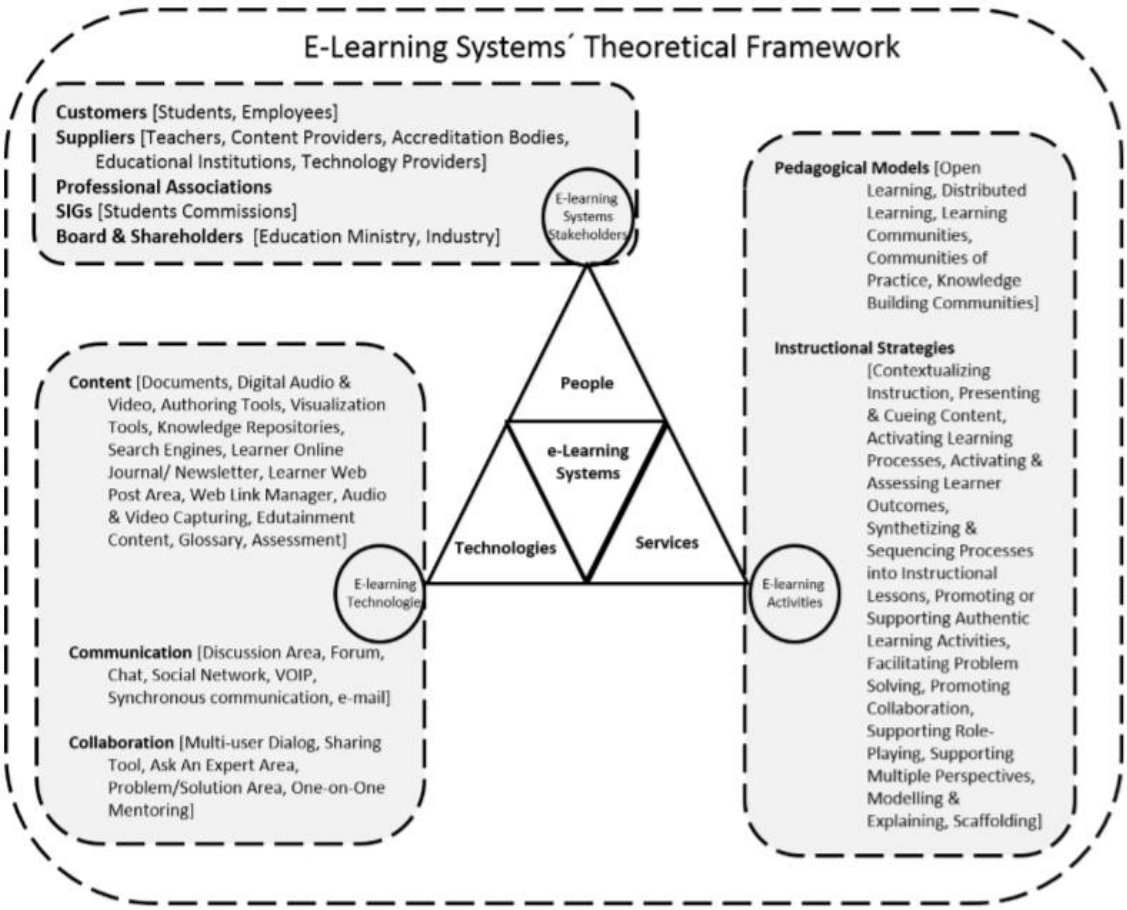


Figure 2.4 A holistic theoretical framework for e-learning systems (Aparicio, Bacao, & Oliveira, 2016, p. 302)

This guiding framework is somewhat aligned with the e-learning ecosystems summarized in 2.5.2. They share the same dimensions of e-learning systems: people, services and technologies, and vary in the translation of three dimensions into practice. A comparison of these models is presented in Table 2.2.

Table 2.2 A comparison of the dimensions of the e-learning ecosystems models

Dimensions	Theoretical framework (Aparicio et al. ,2016)	E-learning ecosystem model (Guetl and Chang, 2007)	Brodo's model with addition from Nikolaidou et al. (2010)
People	E-learning systems stakeholders	Learning communities and other stakeholders	Content providers, consultants and content consumers
Services	E-learning activities	Pedagogy/content-related learning utilities	Services in relation to content providers, consumers and consultants
Technologies	E-learning technologies	Technologies	Technologies

Both the ELES models and framework discussed above are generic in nature and do not specify the context that they reside in. It is believed that there is no one-size-fits-all model or framework, and that the models and frameworks might vary depending on the resources available, especially through the specific sub-components of each dimension. Taking the low-resource context for Deaf young adult learners' English literacy attainment for example, the lack of qualified teachers, customized learning resources and the low-tech environment have different implications for conceptualisation and construction of an ELES. Bearing the generic/universal models and framework in mind, the current research aims to explore a guiding framework for a particular ELES situated in a low-resource context and incorporating the interaction and participatory approach.

At the same time, the research is also an instantiation and application of the ELES models in the specific domain of Deaf young adults' literacy attainment. In this way, the current research can fill the gap of lack of application of the ELES models to specific domains discussed in Section 2.5.3 Furthermore, the current research is also dedicated to examining the efficiency of the SLEND in terms of both learner experience and learning outcomes. In this way, it adds more evidence to the research area, as there is a dearth of evidence-based research for Deaf adult English learning in India, especially a lack of assessment of learning outcomes to determine the effectiveness of e-learning platforms for Deaf learners.

In summary, Chapter 2 explicates the Deaf adult learning context in India including large Deaf community with a rising public status and low literacy rate, limited access to education, constrained resources, as well as the potential learning opportunities as a result of the advances in technology. The interaction approach and the participatory approach are proposed for this specific context to promote learner-centred language acquisition. The participative Web 2.0 facilitates and amplifies the interaction and participatory approaches in e-learning. It is under these conditions and assumptions that the SLEND is to be conceptualised and constructed as an interactive and participatory e-learning ecosystem, from which a guiding framework on Deaf young adult learners' English literacy attainment can be potentially yielded.

CHAPTER 3 RESEARCH METHODOLOGY

From the review in Chapter 2, it can be seen that the theoretical evolution in adult learning, Second Language Acquisition, literacy and curriculum converges to reinforce an interactive and participatory learning environment for adult literacy learning. The penetration of the participative Web 2.0 technologies affords participation, personalization and productivity of e-learning 2.0. The existing universal e-learning ecosystem models shed light on the construction of an effective e-learning environment for Deaf young adult learners' English literacy attainment. In India, Deaf young adults' ownership of computer and mobile devices is increasing along with the use of the Internet, which catalyses the integration of Deaf learning innovation with technology. The review of the current situation in India, including the technological advances and constrained resources, sets the low-resource context in which the e-learning environment is situated. The review further identifies the gap of an interactive and participatory e-learning ecosystem in a low-resource context for Deaf young adults' English literacy attainment.

As the development of the effective e-learning environment for Deaf young adult learners' English literacy attainment is an innovation, there are no models to be copied or replicated. Instead, it is more emergent and exploratory. From an action research angle, it aims to set up a model of "best practice", which might be ever changing, yet relatively stable for adapted replication. My research has a special focus on the exploration of the development of the SLEND as well as its context of delivery into an effective and enabling e-learning system which amplifies learners' interaction and participation. To be more specific, the investigation is targeted at the design concept, learner experience and learning outcomes regarding the SLEND. Meanwhile, it is underpinned by the transformative paradigm to address social justice and human rights for the Deaf young adult learners during the process of evaluation.

In this Chapter, I start with an explanation of the methodological framework, developmental evaluation. Then I present sampling of participants, mixed methods for data collection, corresponding data coding and analysis, followed by the transformative ethical considerations pertinent to the overall research. In the end, I elaborate the resources shared from the P2P Deaf Literacy project for the current research.

3.1 DEVELOPMENTAL EVALUATION

Patton (1996) argued that the world of evaluation is larger than formative and summative. He proposed a third dimension of developmental evaluation, which has been used in project evaluation in different fields.

3.1.1 Definition and Rationales

Patton (2011, p. 30) defines developmental evaluation as follows:

> Developmental Evaluation supports innovation development to guide adaptation to emergent and dynamic realities in complex environments. Innovations can take the form of new projects, programs, products, organizational changes, policy reforms, and system interventions ... Patterns of change emerge from rapid, real time interactions that generate learning, evolution, and development – if one is paying attention and knows how to observe

> and capture the important and emergent patterns. Complex environments for social interventions and innovations are those in which what to do to solve problems is uncertain and key stakeholders are in conflict about how to proceed.

In a similar vein, Wilson-Grau (2015) interprets developmental evaluation as "evaluation for the development of an innovation". To be more specific, the projects appropriate for the developmental evaluation approach tend to prioritise continuous progress, adaptation and prompt feedback. So far as the P2P Deaf Literacy project is concerned, in general, it aims to develop a e-learning platform to improve Deaf learners' English literacy, although it has no detailed pre-defined tools and mechanism. At the same time, as an innovative project, there is no previous successful model to follow and the work to be reached is emergent. Therefore, an evaluation from a developmental angle fits well into this circumstance.

Developmental evaluation is not restricted to any specific method. According to Patton (2011), it can include any kind of data, design, and focus. For the current study, due to the evaluation proceeding in parallel with the design, implementation and development of the SLEND, it is expected to include both quantitative data and qualitative data with an experimental design. Both processes and outcomes are at the core of the developmental evaluation.

3.1.2 Developmental Evaluator

As mentioned in Patton's definition, the prerequisite for capturing patterns of change to generate development is "if one is paying attention and knows how to observe and capture the important and emergent patterns". This implies that the evaluator is key to success of Developmental Evaluation and the selection of the evaluator is decisive.

Aligned with the Developmental Evaluation Tool #2 (Gamble, 2008), *a checklist* for assessing who might be an appropriate developmental evaluator, I am qualified for the role of developmental evaluator. As a full-time PhD student, I am available to commit to the role of Developmental Evaluator all the time. Meanwhile, I have good knowledge and experience of online learning platform development and English language teaching, and I work with Deaf communities closely. As a key coordinator between the UK technical and pedagogic team and Deaf field team in India, I am close enough to each team and have my independent critical thinking towards the project development. Furthermore, I am comfortable with the change and uncertainty during the whole process of the wider project. I work with the entire project team to move forward the development of the SLEND platform by assessing and adapting to the changes and uncertainty.

In addition, I also meet the criteria of being a developmental evaluator established by Patton (2011): (1) being a member of the project team; (2) being in collaboration with other project colleagues for the continuous development and adaption of the SLEND platform, and (3) especially with a keen eye on unexpected emerging results. As a developmental evaluator, I vigilantly watched the project, analysed emerging results, brought them for project team discussion, contributed to data-driven reflection and decision making during the whole project cycle.

However, as a student member of the project team, I am not the decision-maker with power in hand. I can only influence the rest of the team with the feedback and findings

from the field. In this sense, my role as a developmental evaluator is imperfect as Patton (2011) asserts the need for a rather powerful developmental evaluator to ensure prompt corresponding action taken. The limitation of my role as a developmental evaluator is further elaborated in Section 7.4.

3.1.3 Summative vs Formative vs Developmental Evaluation

As stated at the beginning of this chapter, developmental evaluation is different from traditional evaluation methods and enlarges the evaluation world from a developmental angle. A clear understanding of the differences among summative, formative and developmental evaluation can facilitate the arrangement of evaluation, such as when and how to evaluate. Leonard, Fitzgerald, and Riordan (2015, p. 3) depict the differences among summative, formative and developmental evaluation vividly in three figures (Figure 3.1, Figure 3.2, and Figure 3.3). Summative evaluation happens after the planning and implementation/action of a project and formative evaluation is in parallel with the implementation/action, whereas developmental evaluation embarks on the very beginning stage of a project, namely, the designing stage or conceptualizing stage. More notably, by engaging at each stage of a project, developmental evaluation advances evolution. In this context, it takes forwards the development of the SLEND.

Figure 3.1 The Process of Summative Evaluation

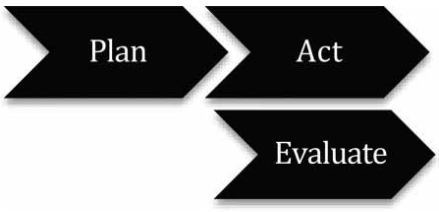


Figure 3.2 The Process of Formative Evaluation

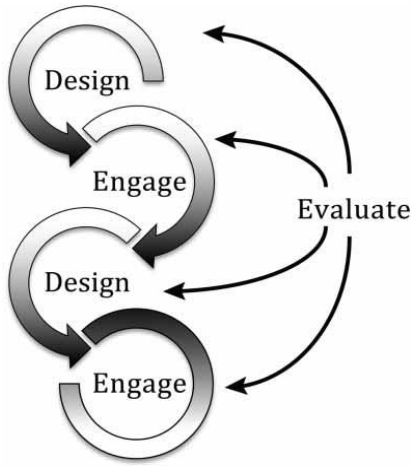


Figure 3.3 The Process of Developmental Evaluation

Leonard et al. (2015) further point out that both summative and formative evaluation have pre-set goals. On the contrary, developmental evaluation has no specific fixed aims available and seeks to formulate them in the process. It continues to ask what works for a particular group of people under certain circumstances. It welcomes improvement although with more interest in systemic change. It admits revised and emergent modelling (Patton, 2011). These characteristics make developmental evaluation an exceptionally unusual methodology in the current study as well as in the field of Deaf education, as in most cases if not all, only final model is presented as if everything is crystal clear at the very beginning.

Foote (cited in Patton, 2016) portraits the difference among summative, formative and developmental evaluation along a spectrum (see Figure 3.4). From the horizontal axis, with traditional evaluation (intervention-focused) at one end and organizational consulting at the other end (actor-focused), developmental evaluation has been positioned at the overlapping area of evaluation and consulting, whereas summative and formative evaluation fall into the area of evaluation. That is to say, in nature, developmental evaluation is a mix of evaluation and consulting. From the vertical axis, it indicates that summative evaluation is defined, formative is less defined, and developmental evaluation is dynamic. The role of developmental evaluation has been positioned as “dynamic reframing”.

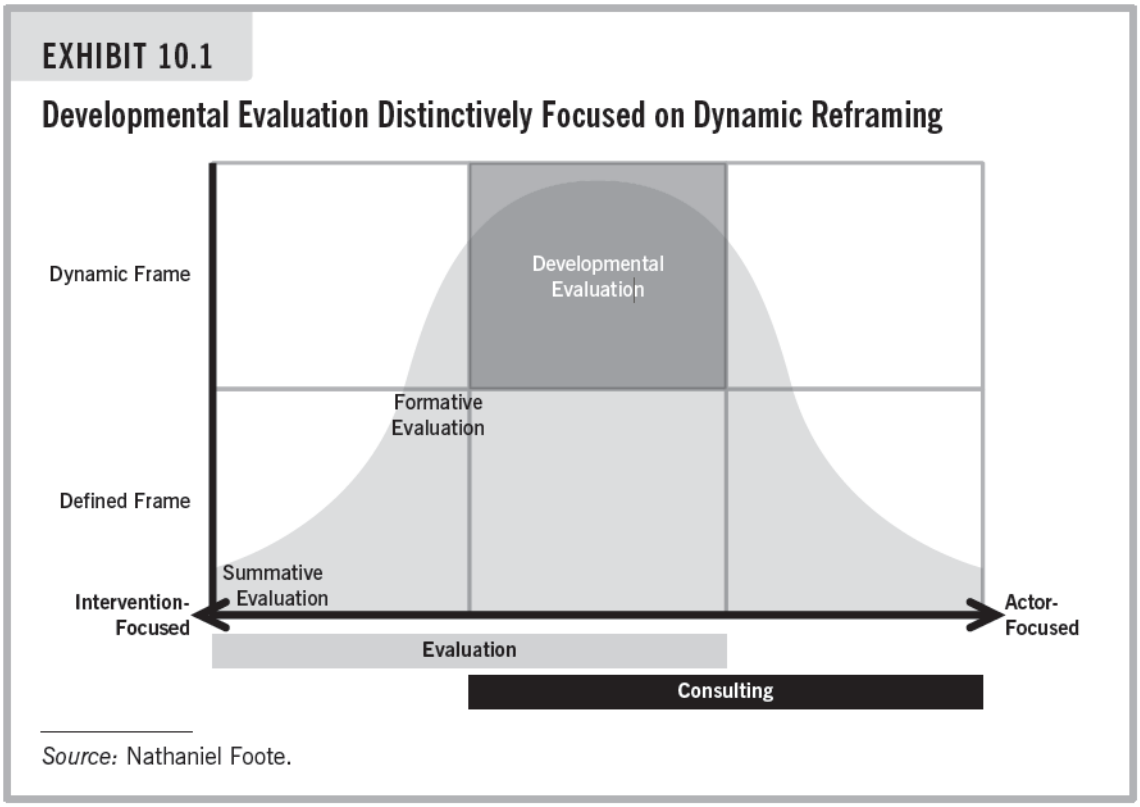


Figure 3.4 Developmental Evaluation Distinctively Focused on Dynamic Reframing (Foote, cited in Patton, 2016, p.7)

Concerning the piloting nature of the P2P Deaf Literacy project, the evaluation of the SLEND is a dynamic reframing process, with a focus on *"use of evaluation processes to support interventions or empower participants" (Patton, 1996, p. 131)*. To be more specific, the evaluation aims to support the development of the SLEND. Meanwhile, the developmental evaluation with both intervention-focused and actor-focused angles, enables the participants to articulate their ideas, influence and benefit from the development. In this regard, the participants are heard and empowered.

3.1.4 Developmental Evaluation in the Current Research

Developmental evaluation engages at each stage of the process of developing the SLEND, including the conceptualizing, designing, developing and implementing stage. Figure 3.5 illustrates how it has been positioned in the process. It is worth noting that, unlike the normal project cycle that ends with implementation, the development of the SLEND is a recurring cycle, which reflects the facts that there is no fixed model to follow for this innovative project and that developmental evaluation allows constant adjustments to the development of the SLEND.

Therefore, the developmental evaluation, instead of being put at the end of the project cycle as summative evaluation or positioned at a certain stage as formative evaluation, interweaves with each stage to facilitate development. In this way, problems can surface, and instant feedback/suggestions can be provided to refine each stage. Changes responsive to the issues raised by the current research are integrated into the dynamic model of the SLEND.

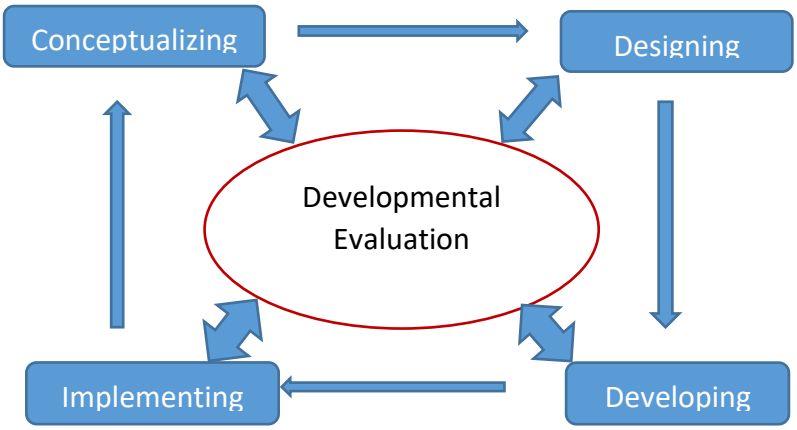


Figure 3.5 Developmental Evaluation in the Process of the Development of the SLEND

Aligned with the overarching research question and three sub research questions specified in Section 1.4, the developmental evaluation of the SLEND, is realised through three dimensions: design concept, learner experience and learning outcomes. Figure 3.6 summarizes the evaluative dimensions and methods utilized in the research. Each sub research question aims to address one dimension with mixed methods. The findings emerging from these three sub research questions help to address the overarching research question, namely, in what ways an interactive and participatory e-learning ecosystem in a low-resource context can be conceptualised and constructed. Detailed description and justification of the use of each method is specified in Section 3.3. Each dimension of evaluation ultimately contributes to the development of the SLEND and its context of delivery.

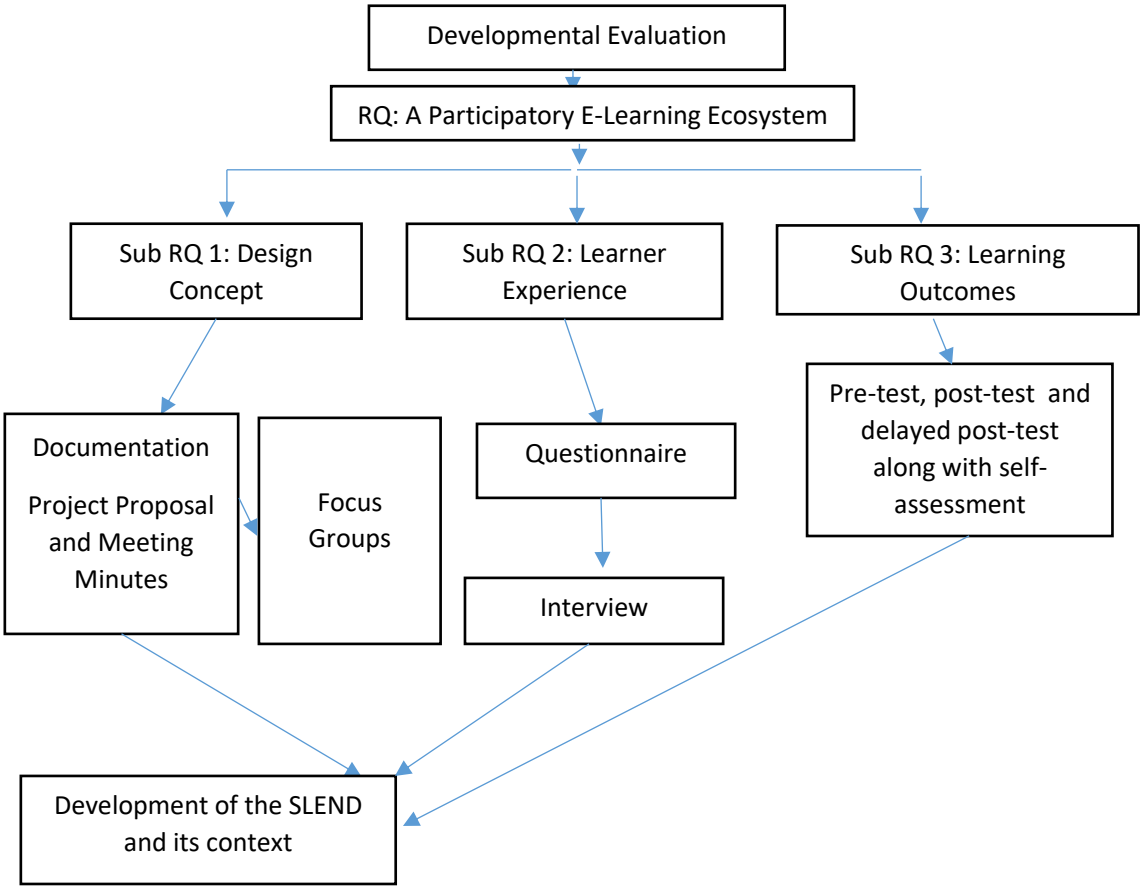


Figure 3.6 Evaluative Dimensions and Methods of the Current Research

3.1.5 Single-Case Design

The developmental evaluation of the SLEND adopts a Single-Case Design (SCD) (Kazdin, 1982) despite the popular practice of "treatment group" and "control group" in empirical studies. There is no control group during the developmental evaluation of the SLEND. The SCD is unusual in most research, yet understandable and recognized in the field of special education study. It is approved for use in special education research by the US Department of Education / Institute of Education Sciences after a panel was assembled (Kratochwill, et al., 2010) to review literature for the *What Works Clearinghouse*[8]. This review was trigged by another review conducted by Horner et al. (2005), which shows SCD can generate evidence-based practices. The review done by Horner et al. considers SCD with rigorous principles and guidelines as an alternative scientific manner of evidence-based research, primarily due to the small pool of potential participants.

The recognition of SCD in Deaf education research is proposed by Luckner & Handley (2008). They reviewed a pool of 964 articles relevant to literacy study and found only 22 articles met the criteria set up by What Works Clearinghouse (Valentine & Cooper, 2004), "a description of the intervention, a control group, data related to literacy as a dependent variable, and a sample statistically independent of those in other studies". However, despite the use of SCD, these studies in Deaf education are still productive. Therefore, they propose to modify the criteria. Later as Cannon and Guardino (2012) further explain in their study, with the decreased number of Deaf participants, it is common to utilize single-case design in the experimental research to discover evidence-based strategies. Furthermore, the use of SCD is not only for practical consideration, but also for ethical reasons. Exposing the Deaf participants to a learning situation which might cause both psychological and learning-barrier hazards is against the beneficence of the participants (see more about participants' beneficence in Section 3.5.2).

3.1.6 Transformative and Deaf-led Developmental Evaluation

As the developmental evaluation in this study is situated in the context of Deaf communities and interacts with Deaf participants, it is equally important to follow the research frameworks appropriate for the Deaf communities and participants. Transformative framework proposed by Mertens (Mertens, 2007; Harris, Holmes, & Mertens, 2009) pursues social justice and human rights for the frequently marginalised, in this regard, the linguistic and cultural minority of Deaf communities. It calls for axiological, ontological, epistemological and methodological assumptions in Deaf research. By applying the transformative paradigm to evaluation, credible evidence obtained from the consideration of human rights and social justice in the research for the marginalized can increase the validity of the evaluation (Mertens, 2013).

The transformative framework is extrinsic to the Deaf communities as it is more general and adapted from existing frameworks for other oppressed groups. There are also some intrinsic frameworks, rooted in the values and beliefs of the Deaf communities and Deaf participants, such as Deaf-centred research paradigm (Sutherland & Rogers, 2014), Deaf friendly research ethics (Harris, Holmes, & Mertens, 2009; Singleton, Martin, & Morgan,

[8] The What Works Clearinghouse (WWC), as an initiative of U.S. Department of Education's National Centre for Education Evaluation and Regional Assistance (NCEE), was established within the Institute of Education Sciences (IES) and aims to utilize rigorous and relevant research and its results to promote quality education.

2015) and Deaf led research framework (O'Brien, 2017; Kusters, De Meulder, & O'Brien, 2017).

Underpinning these intrinsic frameworks, research principles and guidelines are proposed to guide the entire research process. Harris, Mertens, and Holmes (2009, p. 115) suggest a set of "Sign Language Communities' Terms of Reference Principles" (SLCTR). Sutherland and Rogers (2014) insist that data collection from Deaf communities should be visually, linguistically, and culturally appropriate, by using visually reliant tools, together with rethinking the role of Deaf researchers, the adaptions of instruments, and use of information technology. Based on a one-day workshop with seven participants from various Deaf communities in the United Kingdom, O'Brien (2017, p. 67) summarized four preliminary principles: the primacy of sign language, self-determination, identity preservation, and community development. The current study strictly adheres to these principles and guidelines under the research frameworks favourably developed for the Deaf Communities (see more details in Section 3.5).

3.2 PARTICIPANTS AND SAMPLING

A wide array of stakeholder roles are selected as the participants of the research, including Deaf and hearing academics, Deaf research assistants, Deaf peer tutors and Deaf learners. The selection of the participants is 'cognizant' of Deaf cultures and abides by the Deaf cultural norms, beliefs, and practices. The participants are primarily from the Deaf communities as the study values the insights of the members of the Deaf communities. Following the first principle of SLCTR (Harris, Holmes, & Mertens, 2009, p. 115), "The authority for the construction of meanings and knowledge within the Sign Language community rests with the community's members." Deaf participants with different roles as technician, senior researcher, research assistants, peer tutors and learners are involved. The last three groups of participants are the key participants in the current research. They are both users and developers of the SLEND; therefore, their point of view is crucial to the evaluation.

At the same time, the Deaf research assistants and peer tutors are deeply involved in data collection and translation. This reflects the axiological consideration of this research, which not only values the views of the Deaf participants, but also emphasizes their inclusion in the process of preparation and implementation of data collection. It ensures that their stance is integrated into the research from the preparation stage. The involvement of Deaf research assistants and peer tutors in the research team indicates that the research is with Deaf people instead of on them (Young & Ackerman, 2001). Deaf Indian research assistants, peer tutors and young adult learners are directly included in the research, whereas UK researchers (both hearing and Deaf) are indirectly involved in terms of using the documents representing their design concept.

3.2.1 Research Assistants

Three research assistants were selected by following strict staff recruitment procedures. The information for recruitment of research assistants was advertised online and prospective candidates were interviewed. They played three important roles as research staff, SLEND developers and learners of English at the same time. It is their role as developers that this research is interested in and for which they are considered as participants. These three research assistants have received a bachelor's degree. They

are referred to later as research assistant A (RA_A), research assistant B (RA_B), and research assistant C (RA_C). They are all male and fluent Indian Sign Language users. They are also active members of the Deaf Communities in India.

RA_A possesses good skills of English, computer and Indian Sign Language. He was the key contact person between other research assistants, peer tutors and me. He was responsible to convey information and instructions from me to his peers, guide his peers to collect data, and develop SLEND, etc. At the same time, he was responsible to collate data from the field and upload data to the shared Google Drive folder.

RA_B and RA_C also have good knowledge of English, computer and Indian Sign Language. They were responsible to guide the peer tutors, develop SLEND, conduct field observation, and facilitate data collection and translation, etc. RA_B is particularly specialized in technology and computers skills. Therefore, he spent more time in developing English learning materials on the SLEND, especially at the initial developing stage.

3.2.2 Peer Tutors

Following the same recruiting procedures as those for research assistants, five Deaf peer tutors were selected. They are also members of the Deaf communities in India and excellent users of Indian Sign Language. They are identified as peer tutor A (PT_A), peer tutor B (PT_B), peer tutor C (PT_C), peer tutor D (PT_D) and peer tutor E (PT_E). Four of them are male and one is female. Their age range was from 24 to 30 years old.

Besides ISL skills, four of them held the degree of BA in Applied Sign Language Studies and one of them was pursuing BA in Computer Application. Concerning computer literacy, three of them were good users, one basic user and one excellent user. Four of them sat the pre-test of English mapped to the CEFR A1-A2 levels for the Deaf learners and received scores of 35, 46.5, 46.5 and 60.5. Therefore, they differed in English language proficiency even though all their performance was above the average performance of Deaf learners. In addition, three of them had English teaching experience for different periods, two years, half a year and one week. The other two peer tutors had no teaching experience.

In view of their education background, skills and work experience, the research assistants and the research can foresee the personalised problems facing the peer tutors in the field and provide corresponding support in advance to ensure smooth project operation, better learning experience and outcomes. Meanwhile, the background information about peer tutors might explain their contributions to the intervention as well as potential differences of learning achievements at each centre.

After the initial training workshop in June 2015, they were relocated to five different areas, Coimbatore, Indore, Palakkad, Thrissur and Vadodara. They were responsible for working with their peer learners, collecting real life English materials, developing learning materials, implementing them on the SLEND and collecting research data. As they were working with the Deaf young adult learners directly, they played a crucial role in interacting with the learners on behalf of the UK researchers, and research assistants. Most of the feedback on the SLEND and the course from the learners was collected by the peer tutors. Meanwhile, they were also the essential SLEND developers as the learning continued. They were tasked with collaborating with the learners and

maintaining the development of the SLEND in a sustainable way. In this sense, they were service users and service providers interchangeably.

3.2.3 Young Adult Learners

Criterion sampling was used for recruitment of young adult learners. Only young adult learners who meet the predetermined criteria of importance can be recruited (Patton, 2001, p. 238). In this research, the recruitment of Deaf young adult learners of English literacy was operated based on the following criteria:

- Good ISL skills;
- Basic level of English;
- Basic computer skills and smart phone skills;
- Age between 18 and 28 years old.

It is expected that all the young adult learners are from five different areas of India: Coimbatore, Indore, Palakkad, Thrissur and Vadodara.

There were several standard procedures to go through regarding the recruitment. It began with the advertisement through ISL video in the five targeted areas. The use of ISL video is a Deaf-friendly way to disseminate information as it considers the primacy of sign language proposed by O'Brien (2017). Then recruitment posters with selecting criteria and project information were sent to the target groups and individuals by WhatsApp or Facebook. Following up with the online publicity, an on-site event was held at each of the five areas. During this event, peer tutors introduced the project to the potential participants and dealt with their enquiries. After that, Deaf young adults who were interested in the course and were determined to apply filled in an application form. Finally, peer tutors informed the Deaf young adults who filled in the application form to attend an interview. Decisions of final participants were made according to the criteria mentioned above. The enrolled Deaf learners also spread the words to their Deaf friends about the research and the course. By way of the snowball effect, more eligible participants joined in the course later.

When the team embarked on the intervention at the beginning of September 2015, there were 57 Deaf young adult learners joining in the online English literacy course. However, due to family issues and other engagements as young adults, some of them could not be away from home for a long period and had to leave the course. 43 learners continued to participate to the end of the intervention at the end of March 2016, with 6, 12, 10, 9 and 6 learners for Coimbatore, Indore, Palakkad, Thrissur and Vadodara respectively. To ensure confidentiality, each learner was assigned a code with the format of C_S1. C as the initial of Coimbatore stands for the learning centre they belong to, while S1 refers to their number within Coimbatore Centre. All the codes for the 43 learners were created accordingly.

Information on participants' heterogeneity obtained from the application form was gathered for further data interpretation with a view to understanding their performance better. According to Kyle (2015), huge heterogeneity in terms of language skills, language backgrounds and audiological factors could affect reading and literacy development.

3.2.4 The Intervention

The intervention course lasted for 7 months from September 2015 to March 2016, with two-hour laboratory collaborative learning and two-hour classroom learning each day, five days a week excluding holidays. It is worth noting that the intervention overlaps with the development of the SLEND. Unlike the general practice that the intervention course is available before the intervention, the development of the course materials embarks alongside the intervention. The physical learning centres were located at local Deaf-run centres or Deaf schools in Vadodara, Thrissur, Palakkad, Indore and Coimbatore (see Figure 3.7). Vadodara and Indore are in central and western India, while Palakkad, Thrissur and Coimbatore in South India.

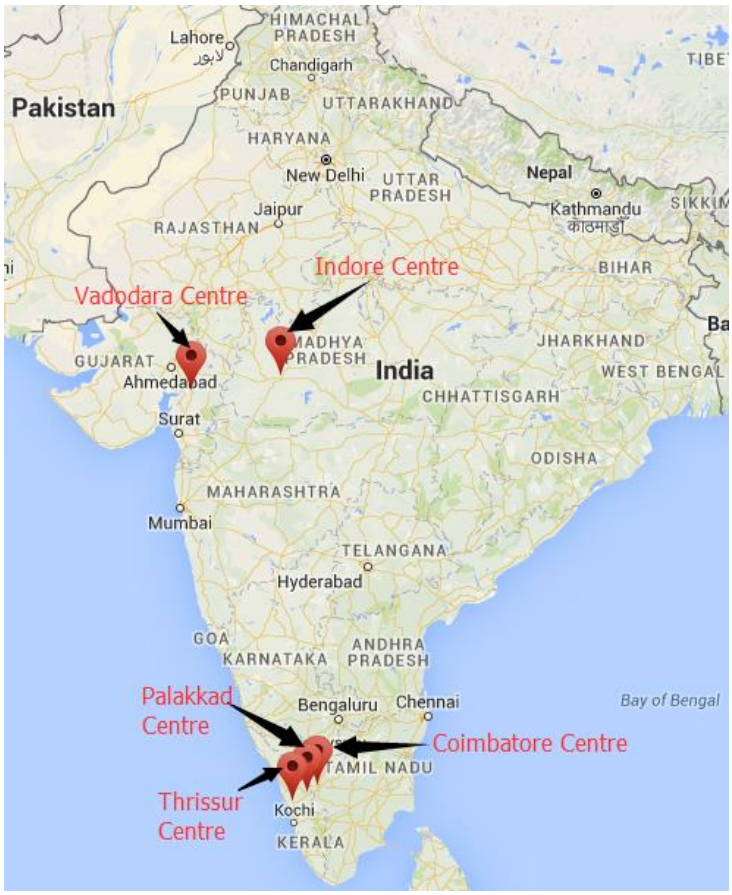


Figure 3.7 Location of Five Learning Centres in India

These five learning centres were equipped with facilities such as computers and laptops, even though not everyone was entitled to have a computer or laptop. The details of available devices and Internet status at each centre are elaborated in Section 3.6.2.

3.2.5 Participants-Researcher Relationship and Collaboration

As a hearing person, I am not a member of the Deaf communities in India. According to Mertens (2013), most members of the Deaf communities are suspicious of evaluators and researchers due to inappropriate treatment and oppression during the research. To clear the mutual prejudice and misunderstanding, this calls for the epistemological considerations under the transformative framework. It poses the question of 'how to build the trusting relationship between one non-member and the community' similarly concerned in previous research (Mertens, 2010).

As mentioned above in Sections 3.2.1 and 3.2.2, the Deaf research assistants and peer tutors were the participants as well as research facilitators assisting me in research. I maintained close communication with one of the Deaf research assistants (RA_A) in the field, which formed a one-to-one work relationship. The communication between us was made through email, WhatsApp chat and Skype chat to ensure instant and efficient communication and better understanding. Instructions and guidance were disseminated to the other two research assistants later by RA_A, and finally reached the peer tutors or learners respectively through research assistants' coordination.

The use of "one of their own" to conduct data collection tends to produce rich and validated data. This is justified with the argument that Deaf people generally open up to a Deaf researcher more easily (Sutherland & Rogers, 2014). Deaf learners feel comfortable to communicate with their peers and provide more feedback as a 'trusting relationship' (Mertens, 2012, p. 807) is established between them. Meanwhile, the hearing researcher who keeps his/her distance from learners has the 'objectively neutral' (Mertens, 2012, p. 807) stance to develop instruments and analyse data. Actually, the eclectic model of 'the hearing researcher spearheads research design and data analysis, and steps back from data collection; while Deaf research assistants/peer tutors provide feedback on research design and conduct data collection' seems to ease the tension between being objective and being deeply involved with the community flagged up by Mertens (2012).

This efficient communication mechanism also compensated for the researcher's absence from the field to a great extent. In fact, as I lack ISL skills, online written communication is proven to be more efficient and effective than face-to-face communication. At the same time, my absence in the field does not necessarily mean that data collection is at the risk of lack of validity. Harris et al. (2009) propose an equalized partnership between the hearing and the Deaf with each of them contributing their specific knowledge to the research. Normally, hearing researchers have specialized knowledge of the subject area, whereas Deaf researchers have linguistic and cultural knowledge.

Meanwhile, a feedback mechanism was set up for research assistants and peer tutors to report problems surfaced in the field and finally allow me to adjust instruments, data collection, platform development and intervention. The participants were invited to give feedback on the design of the instruments used for data collection. During their trial on the instruments, Deaf research assistants and peer tutors provided some Deaf-friendly techniques to ensure that the instruments were more accessible for the Deaf learners. For instance, in the Likert Scale Questionnaire, they suggested it is easier to understand if smiling faces and sad faces are used alongside the text description. They further pointed out the statements in English might be difficult for the Deaf learners to understand. Therefore, each statement is accompanied by a video with explanation in ISL (see Figure 3.8). In doing so, the primacy of sign language is conserved (O'Brien, 2017), and the adaptation of instruments by using information technology is applied (Sutherland & Rogers, 2014).

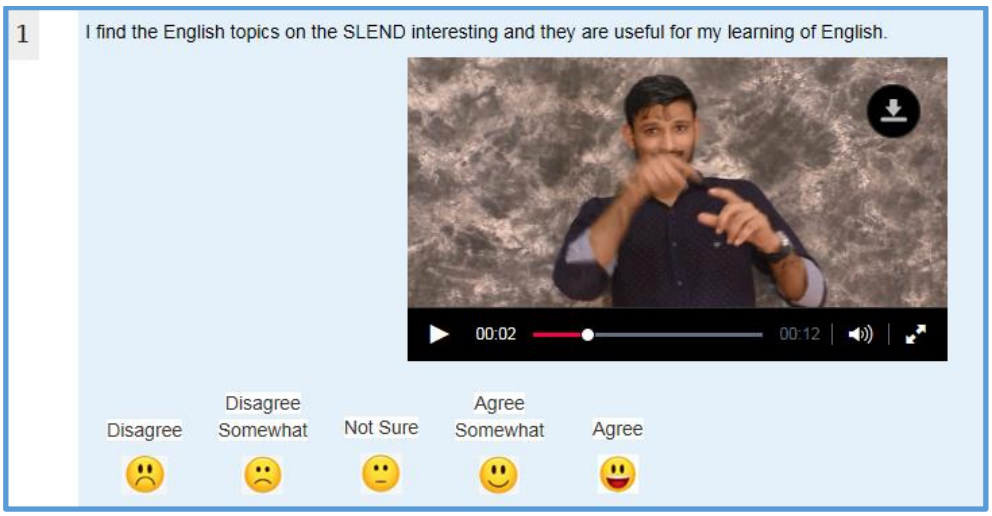


Figure 3.8 An Example Statement with ISL Video Explanation

3.3 MIXED METHODS FOR DATA COLLECTION AND TRANSLATION

Mixed Methods is employed to collect data with both sequential and parallel design. Both transformative paradigm and developmental evaluation entail mixed methods for research and evaluation (Mertens, 2015; Patton, 2011). This section starts with the introduction to the research methodology of mixed methods followed by the justification and elaboration of the use of each method for data collection.

3.3.1 Introduction to Mixed Methods

As an increasingly utilized methodology for the empirical studies in different disciplines recently, Mixed Methods can capture multi-perspectives from different stakeholders to ensure research breadth, depth and validity (Ivankova, 2015). To be more specific, both qualitative and quantitative mixed methods (Bryman, 2012) are employed during the developmental evaluation of the SLEND. The research findings can be triangulated to ensure research validity with mixed methods design. Another justification for utilizing mixed methods is that neither quantitative nor qualitative on their own could address the sub research questions adequately (Johnson & Turner, 2003).

Developmental Evaluation endorses a sequential design of data collection (Patton, 2011). That is to say, the data collection is divided into different stages. What has been found from the previous stage decides the methods and instruments used in the next stage. The sequential design of data collection can enhance credibility of findings (Mertens, 2013).

Mertens (2007) emphasizes the respective strength of qualitative dimension and quantitative dimension in the context of the transformative framework. The former one is to reflect the community views, whereas the latter one is to show outcomes beneficial to the Deaf community. Mertens (2015) further proposes three transformative mixed methods design: parallel, sequential and cyclical. For the last two designs, they share the similarity that subsequent information gathered from the current data collection is the determinant of how to move the research to next level.

So far as the current study is concerned, the data collection for the evaluation of the design concept, learner experience and learning outcomes is a combination of parallel and sequential design. Figure 3.9 illustrates the sequential and parallel design of data

collection for the three sub research questions. Specifically speaking, sequential data collection was utilized within and between sub RQ1 and sub RQ2. Within sub RQ1, the findings from the initial analysis of the documents became the prompts for next-stage focus group discussion. After data collection of sub RQ1, the data collection of sub RQ2 ensued. The key characteristics identified through sub RQ1 comprised the key responsive issues to be addressed for the data collection of learner experience in sub RQ2. Within sub RQ2, after a quantitative analysis of learner experience, some emergent achievements, problems and concerns arose, a qualitative follow-up interview was conducted for learners to justify and explain the quantitative findings. At the same time, the data collection for sub RQ3 proceeded in parallel with data collection for sub RQ1. Within data collection for sub RQ3, the standardized tests and self-assessment questionnaire were in parallel with each other, and reflected the sequential design in terms of pre-, post-, and delayed test and self-assessment.

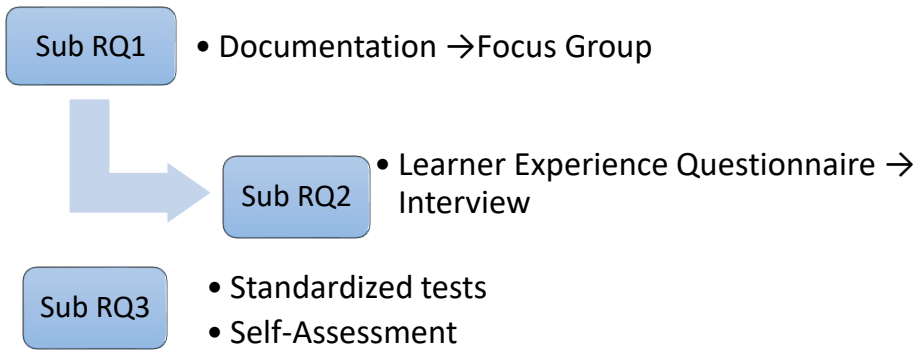


Figure 3.9 The Sequential and Parallel Design of Data Collection

The concurrent and sequential steps of data collection for each sub research question have been illustrated in the timeline in Table 3.1 in comparison with that of the development of the SLEND.

Table 3.1 Comparison of the timeline between development of the SLEND and the implementation of the current research

Timeline	Development of the SLEND	Current research
February 2015	Not started yet	Documentation of meeting minutes from February 2015 to July 2016 (sub RQ 1)
June 2015	Not started yet	1st round of focus groups with research assistants and peer tutors (sub RQ 1)
September 2015	Development of the SLEND started. The development of SLEND completed in March 2016 when the intervention with learners ended.	Pre-test and pre-intervention self-assessment (sub RQ 3)
January 2016		Collecting data on learner experience through a questionnaire (sub RQ 2)
March 2016		Collecting data on learner experience through group interviews with learners (sub RQ 2) 2nd round of focus groups with research assistants and peer tutors (sub RQ 1) Post-test and post-intervention self-assessment (sub RQ 3)
June 2016	N/A	Delayed post-test and delayed post-intervention self-assessment (sub RQ 3)

In the next few sections, each method used for data collection is introduced in detail. This includes the rationales for the choice of each method, its strength and potential weakness together with the operation of data collection under each method.

3.3.2 Documentation

Documentation or similarly termed as document analysis is a qualitative research method for a systematic review or evaluation of documents, both printed and electronic copies (Glenn, 2009). It can work as a sole method in the research. However, at many occasions, it functions as a complement to other research methods and makes its own contribution to triangulation of research methods.

In the current study, it takes the latter form. The documentation of the project proposal and the meeting minutes serves two purposes that are outlined by Glenn (2009, p. 30): tracking change and development; and verifying findings or corroborating evidence from other sources. Alongside focus groups, the method of documentation is employed to uncover the characteristics of the SLEND. Two types of documents were utilized: the project proposal and project meeting minutes. These documents reflect both the product and process of how UK researchers contribute to the development of the learning platform and its context. In this sense, the utilization of documentation is commensurate with the core values of developmental evaluation which pays close attention to change and development instead of improvement (Patton, 1996).

Meanwhile, the findings, namely, the characteristics of the SLEND identified from document analysis were compared with those from focus groups to provide contradictory or corroborating insights.

The project proposal for the application of the grant for the P2P Deaf Literacy project was the document submitted to the ESRC and DFID, in which the initial key characteristics of the SLEND were summarized. These concepts were further discussed by the UK researchers and recorded in the meeting minutes. The project meeting was held on a monthly basis and sub-group meetings took place whenever needed. In the end, 13 documents of project meeting minutes and four documents of sub-group meeting notes have been collected. The first document was from February 2015 while the last document was from July 2016.

Glenn (2009, p. 31) concludes that documentation encompasses the advantages of "efficient method, availability, cost-effectiveness, lack of obtrusiveness, stability, exactness, and coverage". The use of documentation in the current research did show these advantages. For example, I had full access to the meetings and received these documents through email immediately after the meetings. In terms of data collection, it is efficient and cost-effective. At the same time, as all the researchers involved in the research projects have a busy schedule, collecting their viewpoints through documents seems to be the least obtrusive way. More importantly, the project meetings and project proposal covered the whole span of the project, and provided concise, stable information. In this way, it is unlikely to exclude key information during the long process of project operation.

Nevertheless, documentation is by no means flawless. One of the concerns is whether what has been documented is actually what has happened. Atkinson and Coffey (1997, p. 47) argue, "We cannot, for instance, learn through records alone how an organization actually operates day-by-day." However, this does not necessarily preclude the use of documentation. Instead, as Atkinson and Coffey (1997, p. 47) further suggest,

> … That strong reservation does not mean that we should ignore or downgrade documentary data. On the contrary, our recognition of their existence as social facts alerts us to the necessity to treat them very seriously indeed. We have to approach them for what they are and what they are used to accomplish.

The current study is fully conscious of the potential mismatch of what being discovered in the documents with what being implemented. Therefore, from time to time, what was implemented on the platform was brought to supplement the document analysis. Instead of perceiving the mismatches as problems, they were dealt with as challenges providing interesting, inspiring thoughts for platform development.

3.3.3 Focus Groups

Research assistants and peer tutors involved in this research are part of the local Deaf communities as well as the key developers and users of the SLEND platform. Their evaluation of the concepts of the SLEND proposed by UK researchers and their own point of view of the design concepts of the SLEND were elicited through the method of focus groups. Focus groups are usually a small group of discussion with guided questions or checklists. They are suitable to understand the unaddressed and unforeseen responses from the Deaf learners; besides, focus groups breed group interaction, peer

support and cultivate a relaxing atmosphere for communication (Balch & Mertens, 1999).

To track the development of their perception and viewpoints, two rounds of focus groups were carried out. Each round had two focus groups: one for research assistants and one for peer tutors (four focus groups in total). The rationale for more than one round of focus groups discussion was due to the development of their viewpoints and perception alongside the actual implementation of the SLEND. The first round of focus groups was conducted at the stage of initial design and ahead of the implementation in June 2015. The second round of focus groups for research assistants took place in January 2016 and the second round for peer tutors in April 2016. Both rounds of focus groups were prompted by discussion guide. The discussion guide for the first round (see Appendix 1) was based on the initial analysis of the documents and centres on the critical characteristics of the SLEND. The prompts for each focus group were derived from UK researchers' proposal of the key characteristics. As for the prompts of the second-round focus group discussion (see Appendix 2), it was enriched with more findings regarding the characteristics such as "Deaf-Led implementation", "Emergent syllabus mapped to the CEFR Benchmarking"; with more evaluative prompts such as advantages and disadvantages of the SLEND; and with under-discussed points such as multimedia materials. Participants tend to comprehend the concepts and ask for clarification at the first-round focus groups, while during the second-round focus groups, they produce more thoughts and feedback.

The environments of the focus groups are crucial in order to elicit robust data. According to World Health Organization (2011, p. 169), the "enabling environments", physical, social and attitudinal, can foster participation and inclusion. When it comes to the operation of focus groups for the Deaf learners, an enabling environment refers to physically Deaf-friendly environment, socially accepted moderators and Deaf-valued discussion. To maximize visual contact for reading sign language, the focus groups took place in an open area with sufficient light. All the participants including the moderator sat in a circle to ensure that everyone could see each other. The seats were adjusted in consideration of the contrast between the colour of participants' clothes and of the background.

The prerequisite for being a qualified moderator for the focus groups is that he or she is socially accepted by the Deaf communities and is a member of the particular community. Only in being so, the moderator can play an essential role of clarifying, facilitating, and monitoring discussion in focus groups (Balch & Mertens, 1999). Two moderators (members of the P2P Deaf Literacy project) presented during the first round. They are all experts in Deaf Education and Sign Languages with more than 20 years of experience in Deaf research, fluent in Indian Sign Language and considered as members of the Deaf communities. One is hearing from the UK and the other one is Deaf from India. The second round with research assistants was moderated by the hearing moderator from the first round, while the second round with peer tutors was moderated by one of the research assistants.

The Deaf research assistants and peer tutors are considered as experts on the topic of the development of the learning platform, as Balch and Mertens (1999, p. 267) suggest, "The topic is what they think, feel or do". Therefore, they were encouraged to express their own ideas freely in ISL after the discussion cues introduced. The moderators acted

carefully to avoid leading or driving the discussion; instead igniting the topic and watching carefully.

Both rounds of focus groups were filmed. The data were translated from Indian Sign Language to English by research assistants and peer tutors. Each of them was assigned some clips of videos and they completed the translation independently. Their translation was firstly cross-checked by themselves and then collated by me and another experienced proof reader from the UK side. The proof reader is a native speaker of English and has many years of experience in assisting Deaf students in the UK. She is especially experienced in understanding and correcting Deaf English which is referred as L2 interlanguage of the Deaf learners by Svartholm (2010). It is the developmental language with typical patterns produced by Deaf learners while they learn a second language. The Deaf research assistants and peer tutors translated the data from ISL to English. Unclear points were clarified with the research assistants to avoid misunderstanding and misinterpretation. Their English is considered as Deaf English with mistakes that Deaf people are inclined to make. It is worth noting that the quotes from the data in the coming chapters are original English used by the Deaf. It needs flagging up that there are errors in their English translation.

In short, to address sub research question 1, documentation and focus group were used for identifying/evaluating the key characteristics of the SLEND from the point view of UK researchers. UK researchers' reflection of their previous experience and knowledge together with their analysis of Indian Deaf young adults' needs, comprise the design concepts of the SLEND. Through focus groups, a relaxing discussion environment is created to elicit the perception and thinking of Deaf research assistants and peer tutors. In this way, the conceptualization of the SLEND is critically reviewed and ready for the next phase of the design. This procedure also addresses the preference for "drawing upon multiple (at least two) sources of evidence" in qualitative research (Glenn, 2009).

3.3.4 Likert-scale Questionnaire on Learner Experience

Likert-scale is named after Dr. Rensis Likert (1932) who developed this technique as the measurement of attitude. As a commonly-used means to measure attitude, a Likert scale is formatted as 'a range of responses to a given question or statement' (Cohen, Manion, & Morrison, 2000). The optimal number of response alternatives for a scale has been debated ever since the instrument was put in use. By reviewing a number of studies, Cox (1980) identifies the factors affecting the choices of response alternatives, and concludes, "there is no single number of response alternatives for a scale which is appropriate under all circumstances." Even though a universal number is impossible, Cox (1980) makes some recommendations for future research practice: First, a scale with two or three response alternatives is generally considered as inadequate because it does not transmit sufficient information. Respondents are very likely to struggle with making options. Second, more than nine response options might be exhausting and fruitless. Third, an odd number is preferable in that it gives respondents the chance of being neutral. Fourth, comprehensible instructions and interpretation are helpful to enable respondents to make their choices.

Following Cox's recommendations, the Likert-scale learner experience questionnaire (see Appendix 3) in the current study utilizes the traditional design of Likert scales with five types of response (Cohen, Manion, & Morrison, 2000), from 5 = agree, 4 = somewhat agree, 3 = unsure, 2 = somewhat disagree, to 1 = disagree. The questionnaire consists of

24 statements to evaluate learners' experience with the SLEND. It covers their specific experience with characteristics of the SLEND and its context which are initially identified from the analysis of sub RQ 1. Meanwhile, it focuses on learners' general experience and their feedback on the key elements of the SLEND platform.

The Likert-scale questionnaire on learner experience was trialled with the research assistants. Their feedback is primarily about English language used in the questionnaire. The language used in the questionnaire tends to be abstract and complicated for Deaf learners from the research assistants' point of view. They managed to rewrite some of the sentences. Based on their feedback, all the statements in the questionnaire were revised and changed to short sentences with simple words. Deaf-friendly visual expressions, such as smiling and sad faces were used to indicate to what extent they agree or disagree with the statement. The use of facial expressions, as a visual technique, resonates with the call for visual methodologies and visually reliant tools (O'Brien & Kusters, 2017; Sutherland & Rogers, 2014). Some sentence structures followed exactly the research assistants' rewriting. In this way, it also addresses Cox's recommendation of comprehensible instructions. The research assistants further commented that some notions were novel to them, for instance, the CEFR. Thus, more explanation was provided to the statement to facilitate understanding.

Finally, the learner experience questionnaire was translated into Indian Sign Language by the research assistants. The ISL video was provided to each learning centre for a unanimous interpretation. 44 learners completed the Learner Experience Questionnaire in February 2015, one month ahead of the end of the intervention.

3.3.5 Semi-structured Interview

In accord with the sequential aspect of the research design, the interview with learners that followed the learner experience questionnaire was conducted at the end of the intervention in March 2015 to further explain and justify learners' responses to the learner experience questionnaire. Semi-structured interviews were selected as the means of data collection due to two primary considerations proposed by Bernard (1988). First, there might be only one chance of interviewing the respondents. Second, several interviewers are used in the field to conduct the interviews. A semi-structured interview with a relatively clearer structure is expected to ensure a safe and consistent collection of intended data conducted by several interviewers. These two primary considerations are matched with the interview background in the current study. The interviews were planned to be held only once and to be conducted by five peer tutors from five learning centres. Thus, the semi-structured interviews were adopted for the five peer tutors to conduct one-off interviews with learners at each centre.

No universal definition of a semi-structured interview has been found. It is commonly agreed that it is a technique to collect qualitative data with a list of well-planned questions in advance. Flexibility is a distinctive feature of semi-structured interviews comparing to their structured counterpart. The flexibility is two-fold: Open-ended questions enable respondents to freely express their point of view, which can generate rich data; the interview is flexible in terms of rewording the questions for better conveyance of information and straying from the listed questions for probing (Barriball & While, 1994). The flexibility for probing can ensure the reliability of the data. Meanwhile, probing maximizes the interaction between the interviewer and the

interviewee, which helps to build up the sense of rapport and reduce the risk of generating socially accepted answers (Patton, 1990).

For the current interview, the total of 11 open-ended questions (see Appendix 4) were derived either from the concerns revealed from the results of the learner experience questionnaire or from other current concerns. For example, concerns over low satisfaction with the use of multimedia materials, mobile access and the CEFR benchmarking arose after an initial look at the data of learner experience questionnaire. Corresponding questions 5, 9, 10 to further explore learners' experience and point of view were asked in the interview. Meanwhile, as the evaluation progressed, there was increasing interests in how learners coped with some key characteristics of the SLEND such as real life English, use of sign language, and peer tuition. These emergent concerns were developed into questions in the interviews. In this way, the data collection of learner experience is commensurate with the sequential research design underpinning the paradigms of both developmental evaluation (Patton, 2011) and transformative mixed methods (Mertens, 2015).

44 learners across five learning centres were divided into groups of three to four interviewees to take the interview. In total, there were 14 interview groups. The idea of group interview instead of individual interview was initiated by the research assistants and peer tutors who are members of the Deaf communities. They suggested that Deaf learners are more comfortable and more likely to share their views without reservation within a group. I respected their insightful thinking and gave consent to their suggestion. The format of the group interview bore some resemblance to the focus groups. However, unlike focus group discussion, there was no discussion among interviewees and the interviewees took turns to answer the prepared questions. The five peer tutors as the actual actors of interviewing were entitled to tweak the questions and add probing questions when necessary. The questions for the interviews were in English and all the interviews were conducted in ISL, the language that both interviewers and interviewees were comfortable with.

The entire interviewing process was filmed for translation later and future potential reference. The peer tutors were responsible for translation of the interviews at their learning centre. The research assistants checked the translation in the end and modified any potentially misinterpreted content which might cause misunderstanding. I read through the English interview transcripts and asked the research assistants for clarification whenever needed.

It is worth mentioning that initially I attempted to observe learners' experience through Peer Tutors' weekly reports. After checking the first-month of data, it became apparent that the data was subjective in terms of peer tutors' thinking. It is not fair and scientific to assess learners' real experience from peer tutors' subjective reporting. At the same time, there is a risk that peer tutors might filter the information through his/her lens. More importantly, it was also against the transformative paradigm by excluding learners from exploring their experience. Therefore, the Peer Tutors' weekly reports were replaced by the group interview with learners.

3.3.6 Standardized tests (pre-, post- and delayed tests)

Learning outcomes is another essential pillar to evaluate the effectiveness of the SLEND platform and its context. With the commitment to evidence-based practice in

Education[9], the effect of the intervention on learners' English literacy was first scrutinized by standardized tests mapping to the CEFR A1-A2 levels. The use of standardized tests aims to provide solid objective evidence on the efficiency of the SLEND platform and its context.

In addition to the traditional quasi-experimental design of "pre-test and post-test" proposed by Campbell and Stanley (1963), a delayed post-test enables detection of the retention of learning, which is an essential outcome of "robust learning"[10] (Koedinger, Corbett, & Perfetti, 2012). To examine the long-term retention of learning, studies at the Pittsburgh Science of Learning Centre (PSLC) argue that a retention test is necessary besides immediate post-test. Regarding the interval between the end of intervention and the delayed post-test, this should be at least as long as the time of the intervention. However, as for empirical research practice, there is no strict adherence to this rule of thumb and the interval varies. In the current study, the delayed post-test was carried out 70 days after the intervention ended. Therefore, the interval was shorter than the interval of intervention (seven months). This is due to the availability of the participants. 70 days was the longest interval that could be practically attained.

These pre-, post-, and delayed post-test papers (see Appendix 5, Appendix 6 and Appendix 7) were designed and benchmarked against the same CEFR level: CEFR A1-A2 levels. Before putting into use, they were tried out by an Indian expert of Deaf education, and representatives from the research assistants and peer tutors. The test papers were revised in accordance with the feedback and suggestions. For example, the test papers included more content relevant to what learners and peer tutors had learnt on the SLEND, such as railway tickets, signs and notices.

All the tests were devised on the SLEND platform and all the participants did the tests online. The pre-test took place before the learners started the course. The post-test was conducted at the end of course and the delayed-test was held 70 days after the course. Before learners sat the tests, peer tutors were asked to try the test. In this way, they were familiar with the content and also the technical procedures. When learners took part in the tests, each peer tutor at each centre could act as an invigilator as well as a facilitator. Absence of their technical support might lead to learners' loss of test results and failure in the tests due to technical problems. This can potentially confound the data and affect the validity of the tests. For instance, learners might achieve lower score due to limited skills in technology rather than English literacy.

Pre-test had the largest number of 57 respondents, and the number dropped to 43 for post-test and 17 for delayed post-test respectively. The reference answers and marking criteria were provided for the purpose of guiding marking(see Appendix 8, Appendix 9 and Appendix 10). All the markings took place online and the Moodle system automatically recorded the marking history. As I was the only marker for all the three tests, I took two actions to ensure marking reliability besides agreed reference answers and marking criteria: First, I adopted the item-level marking considered as more reliable

[9] According to Shavelson & Towne (2002), current education policy lays great emphasis on evidence-based practice (or research-validated practice). The concern of doing so is that practices with inadequate empirical support could cause waste of investment and put learners' interests in danger. Standardized tests are one of the persuasive techniques to prove the effectiveness of the intervention with solid evidence.

[10] According to Koedinger, Corbett and Perfetti (2012), different leaning processes can lead to knowledge change which generates different robust learning outcomes: longer retention, further transfer and better future learning.

than the whole script marking. With the help of the default feature of Moodle platform, all the respondents' answers to each item were shown automatically together for easier comparison, which enabled individual marker's level marking. Second, I went through the scripts twice and made necessary corrections to the markings. If new alternative answers emerged, I always reviewed the previously marked and checked if the same or similar answers appeared unnoticed before. If marking errors existed, I marked again and adjusted the scores. The Moodle platform has recorded the history of overrides and marking comments for later review. In this way, I made sure that marking was consistent to the greatest possible extent. After the marking, the final mark for each learner was exported from the Moodle platform automatically in the format of an Excel spreadsheet and ready for next-stage calculation and analysis.

3.3.7 Likert-scale Questionnaire on Self-assessment of English Literacy

Similar to the intention of replacement of peer tutors' weekly report with direct interviews with learners, self-assessment of English literacy skills enables learners to speak on what they have accomplished with the intervention. This echoes with the emphasis on learner agency underpinning the transformative paradigm. As Lindgren & McDaniel (2012, p. 346) explain,

> The notion of agency as contributing to cognitive processes involved in learning comes primarily from the Piagetian notion of constructivism where knowledge is seen as 'constructed' through a process of taking actions in one's environment and making adjustments to existing knowledge structures based on the outcome of those actions … Giving students the sense that they have control and the power to affect their own learning is one of the great challenges of contemporary education.

To be more specific, transformative learning and evaluation entitles learners to self-assess what they have achieved in English literacy. This explains the inclusion of learners' self-assessment in evaluating learning outcomes in complement with standardized tests.

The same format of Likert-scale questionnaire as the one used for learner experience was employed for learners' self-assessment of English literacy. The rationales for adopting five response alternatives can be referred to in Section 3.3.4. This self-assessment questionnaire (see Appendix 11) consists of 16 statements regarding learner's English literacy. These 16 statements are adapted from the descriptors of English proficiency at the levels of CEFR A1-A2 (2001) to accommodate to the context of Deaf learners' English literacy attainment. Each statement represents a particular literacy skill.

Alongside the standardized tests, learners self-assessed their English literacy three times, namely, pre-intervention self-assessment before the intervention, post-intervention self-assessment at the end of the intervention and delayed self-assessment 70 days after the intervention. When learners completed each test, they were directed to the web page of self-assessment. They filled in the questionnaire online with ISL instructions and assistance from their peer tutor. The questionnaire was in English and ISL. The ISL translation of the questionnaire was played to facilitate learners' understanding of the statements in the process of self-assessment.

57 learners completed the pre-intervention self-assessment questionnaire. This number decreased to 41 and 16 for post self-assessment and delayed post self-assessment. All

the data relating to self-assessment were exported from the Moodle platform to an Excel spreadsheet. Any information exposing learners' identity was removed to ensure confidentiality.

In summary, under the paradigm of transformative and developmental evaluation, the current study adopts the concurrent and sequential mixed methods for data collection. Each method is interconnected either with one another within each sub research question or between the sub research questions. The methods, instruments and data for each sub research question as well as the role and location of the stakeholders in data collection are summarized in Table 3.2.

Table 3.2 Methods, instruments and data for three sub research questions as well as the role and location of the stakeholders in data collection

Research Questions	Methods	Instruments	Data	Role and location
Sub RQ 1	Documentation	N/A	Project proposal: one document	Developed by researchers in the UK
			Meeting minutes: 20 documents	Researchers including myself joined in the meetings in the UK
	Focus group	First round of prompts Second round of prompts	Discussion transcripts: four documents	I developed the prompts for discussion. Deaf peer tutors and research assistants participated in the discussion in India. Peer tutors and research assistants translated the ISL video into English transcripts verified by me and a professional proofreader.
Sub RQ 2	Likert Scale Questionnaire	Learner Experience Questionnaire	44 submitted questionnaires	I developed the questionnaire. Peer tutors and research assistants gave feedback on the instrument and developed ISL explanation videos for the questionnaire. Learners answered the questionnaire on the SLEND platform with assistance from their peer tutors.
	Interview	Interview question list	14 interview transcripts	I developed the interview question list. Peer tutor carried out the group interviews with learners in five learning centres in India. Peer tutors and research assistants translated the ISL video into English transcripts

				verified by me and a professional proof-reader.
Sub RQ 3	Standardized tests with self-assessment questionnaire	Pre-test paper and self-assessment questionnaire	43 submitted test answers 41 submitted questionnaires	Another researcher and me developed the three test papers reviewed by a Deaf researcher and a hearing researcher. The Deaf research assistants trialled the three test papers and gave their feedback. Learners and peer tutors took the three tests on the SLEND platform. I developed the reference answers to tests as well as the marking criteria, and marked all the test papers. I developed the self-assessment questionnaire reviewed by the Deaf research assistants and peer tutors. Learners answered the questionnaire on the SLEND platform with assistance from their peer tutors.
		Post-test paper and self-assessment questionnaire	43 submitted test answers 41 submitted questionnaires	
		Delayed post-test paper and self-assessment questionnaire	17 submitted test answers 16 submitted questionnaires	

Notes: Due to dropouts, data of participants who are absent from filling in learner experience questionnaire, post-test and post self-assessment are excluded from the research.

Due to the piloting nature of the wider P2P Deaf Literacy project, there is no special arrangement of formal piloting for the current research. However, it is worth mentioning that each instrument and method was informally piloted to ensure the validity, reliability and practicality. First, all the instruments were discussed and revised by the wider P2P Deaf Literacy project members with different expertise of Deaf education, sign Language, the CEFR, literacy, TESOL and language testing. I addressed their comments and feedback correspondingly. Several rounds of communication took place before the instruments were finalized. Second, the learner experience questionnaire, interview question list, standardized tests and self-assessment questionnaire were trialled with Deaf research assistants and peer tutors who are considered as Deaf young adult learners' peers. Based on their performance results[11] and feedback after the trial, the instruments were revised, especially with Deaf-friendly and Deaf-centred techniques, such as smiling faces, ISL explanation videos, use of short and simple sentences, etc.

3.3.8 Deaf-led Implementation of Data Collection and Storage

The data collection was led by Deaf research assistants and peer tutors in the field under my direct guidance and monitoring. There used to be great ethical concern regarding my absence from the field, which was pointed out by the Ethics Committee when I

[11] In fact, Deaf research assistants and peer tutors' performance data is initially supposed to be included in the study. However, after comparing their performance with that of the learners, they are considered as outliers as most of them perform extremely well. In the end, their performance is excluded from the data.

applied for the ethics approval. In fact, the supervisory team and myself assessed the risk at the very outset of my research. It was unanimously agreed that my absence can be compensated for by the assistance from the research assistants and peer tutors. I cooperated with the research assistants and peer tutors and built trusting a relationship between learners and them to facilitate data collection. At the same time, most of the data were collected through the SLEND platform, for example, learner experience questionnaire, pre-test, post-test, delayed-test and WhatsApp group chats. The documents used for data collection with detailed instructions were available to the research assistants as well as peer tutors.

Together with the detailed instructions, there were systemic trainings[12] provided for all the three research assistants and five peer tutors. During the training, they received training with ethics, pedagogy, research methods, platform development guide, etc. The trainers were the Principal Investigator and Co-Investigator of the Peer-to-Peer Deaf Literacy project. During the fieldwork, if emergent problems or questions arose later in the process of data collection, research assistants and peer tutors could always resort to email, WhatsApp and Skype communication and sought advice from me. Meanwhile, one co-investigator of the wider project who is originally from India, spent half of his work time in India to supervise, guide and support the work of the Deaf research assistants and peer tutors.

Under guidance and support, the research assistants and peer tutors collected and stored all the raw data from the field, both electronic data and paper-based data. The data were securely, ethically stored and protected in the field concerning the local situation at the first place. Later, all the electronic data and some scanned paper-based data were required to be uploaded to the Google Drive folder created and monitored by myself. UK researchers, research assistants and peer tutors in the field have access to the folder. Any modifications to the documents have been recorded by the system automatically.

3.4 CODING AND ANALYSIS

Data coding and analysis is introduced in the sequence of sub research questions. As for sub research question 1, thematic analysis of the qualitative data collected from documentation and focus group is employed to evaluate the key characteristics and features of the SLEND through the reflection of UK researchers, Indian Deaf research assistants and peer tutors. For sub research questions 2 and 3, statistical quantitative analysis is administrated with supplementary qualitative analysis.

3.4.1 Thematic Analysis for Sub Research Question 1

Those that have emerged as the key characteristics of the SLEND during platform development are of great interest to this research. Thematic analysis is used to capture the developers' view from the P2P Deaf Literacy project proposal, meeting minutes and focus group discussion. Even though thematic analysis is not considered as a typical approach, most qualitative analysis approaches, such as grounded theory, critical discourse analysis, qualitative content analysis, and narrative analysis, have the element of search for themes (Bryman, 2012). Bryman searched for 'thematic analysis' with Web

[12] There are two systemic training events: The two-week initial training took place at the National Institute of Speech and Hearing (NISH) in India in June, 2015; the one-week follow-up training took place in November, 2015.

of Science in 2010 and it turned out that there is a great increase on the figure of hits produced. This suggests that thematic analysis is gradually accepted as an independent way to analyse qualitative data. In this research, the characteristics of the SLEND are viewed as the themes in the thematic analysis.

To develop a thematic code, Boyatzis (1998, p. 29) points out there are three ways: "(a) theory driven; (b) prior data or prior research driven, and (c) inductive or data driven". As this research adopts a developmental approach and the query for the characteristics of the SLEND is an ongoing and exploratory process, no theory, prior data or research can be referred to. Therefore, the thematic analysis in current study adopted an inductive approach. The themes were derived from and based on the data available. Meanwhile, the development of the themes had bottom-up and top-down preferences at different situations. For example, through a bottom-up approach, the theme of sign bilingualism was identified from the project proposal and meeting minutes. It did not come to an end when it is identified. In fact, through a follow-up top-down approach, it was taken as a prompt to elicit more data in terms of how sign bilingualism was reflected in the platform development.

The sources of the data are determined by the sampling to some extent. Boyatzis (1998) emphasized that the data to be coded must represent a subsample of two or more specific samples. In other words, themes are recommended to be developed from different perspectives of constituencies. As far as the current study was concerned, there were two subsample groups: the UK researchers as one group, and the research assistants as well as the peer tutors as the other group. They were the key designers and developers of the SLEND platform. The project proposal and meeting minutes were the source of data with UK researchers' reflection, while focus groups generated the views and evaluation of research assistants and peer tutors. The integration of their viewpoints is of great importance for exploring the key characteristics of the SLEND.

Another feature of the thematic analysis for sub research question 1 is that there was a repetitive interplay between the collection and analysis of the data. It started with the data collection of the proposal of the P2P Deaf Literacy project, and the meeting minutes by May 2015. Based on these data, an initial stage of data analysis was conducted to identify the characteristics/themes. These initially identified themes generated the prompts for two rounds of focus group discussion, one round at the conceptualization stage and the other round at the implementation stage. After that, data generated from focus groups were analysed to enrich and further interpret the characteristics/themes. Therefore, the characteristics of the SLEND platform are subject to change and to be enriched during the process of inquiry.

In accordance with the developmental nature of this research and the interplay of data collection and analysis, the coding was conducted through two phases of descriptive coding. As illustrated in Figure 3.10, the first phase (the dotted boxes) utilized the data (project proposal and meeting minutes) collected by May 2015, whereas the second phase focused on the data (focus groups and meeting minutes) collected after May 2015. The second-phase data collection was prompted by the initially identified characteristics from the first phase. No codes were pre-defined, and all emerged from the data to capture the characteristics of the SLEND. Among the codes, the development of the superordinate codes of "sign bilingualism; Deaf-led implementation; CEFR benchmarking" tends to follow a top-down trait and they were identified at the initial-

stage coding of the project proposal; whereas "peer-to-peer interaction; real life English; Web 2.0 technology-enhanced provision; continuous training and support" were more bottom-up and distilled from subordinate themes emerging at the later stage of coding. For the whole coding process, QSR Nvivo 10 was utilized to store, code data and develop themes.

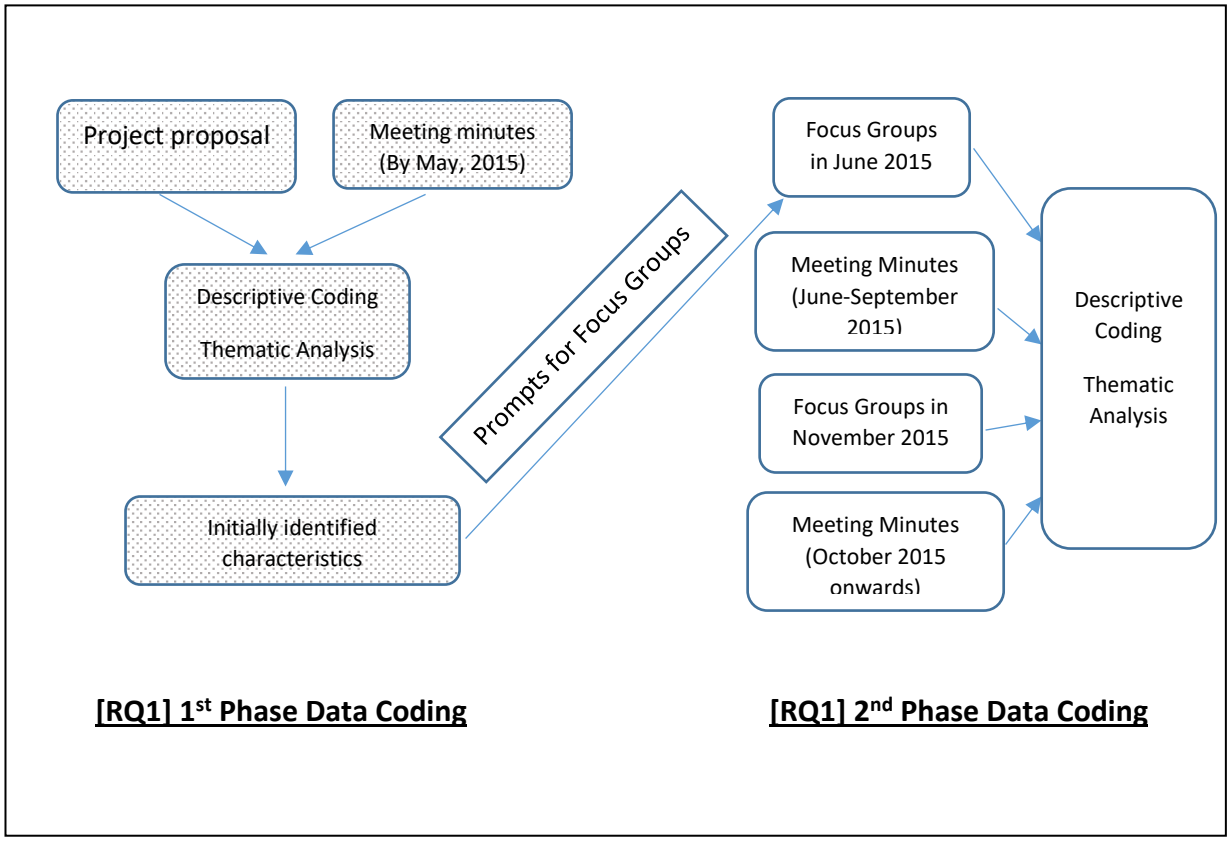


Figure 3.10 Coding Procedures for Identifying the Characteristics of the SLEND and its Context

The major codes developed from the first phase coding were: Deaf-led, sign bilingualism, peer interaction, functional literacy, Web 2.0 technology-enhanced, CEFR benchmarking, English in real life elements, training and support. In the end of the first phase coding, the codes of "functional literacy" and "English in real life elements" were merged into "real life English". "Web 2.0 technology-enhanced" and "Deaf-led" were modified as "Web 2.0 technology-enhanced provision" and "Deaf-led implementation" to maintain consistency of expression among the main codes. A new category "learner-created content" was separated from real life English due to its prominence in the data.

Each main theme code was composed of several sub-codes and further interpreted through the sub-codes. The main codes throughout the coding process are presented in Table 3.3. By adapting Boyatzis' definition of a "*good code*" (1998, p. 53)[13], each code compromises three elements: a name, a definition, and indicators.

[13] Boyatzis (1998, p. 53) summarises the five elements of a quality code as: 1. A label (i.e., a name) 2. A definition of what the theme concerns (i.e., the characteristic or issue constituting the theme) 3. A description of how to know when the theme occurs (i.e., indicators on how to "flag" the theme) 4. A description of any qualifications or exclusions to the identification of the theme 5. Examples, both positive and negative, to eliminate possible confusion when looking for the theme.

Table 3.3 The Main Codes Emerged from the Thematic Analysis for sub RQ1

Main codes	Definitions and explanations	Indicators
Deaf-led implementation	It refers to any action, activity or concept relevant to teaching, learning and research initiated, led or conducted independently by the Deaf learners, peer tutors, research assistants and academics.	Deaf-led
Sign bilingualism	It refers to face-to-face or online communication where Indian Sign Language is used for teaching and learning of English.	ISL, sign language, ISL videos, signing, sign language variety/variant
Peer-to-peer interaction	It covers the support, tuition, knowledge sharing, feedback and collaborative learning among Deaf learners, peer tutors and research assistants during the intervention	Peer, peer-to-peer, collaborative learning, group learning
Real Life English	It refers to the learning content and materials collected by learners and their peer tutors from their real-life literacy practices.	Real life, ethnography, clock activity, Freirean
Learner-created learning materials	It focuses on how real-life raw resources are processed into learning materials shared with peers. It differs from the main code real life English which answers "what to learn and teach". Instead, it addresses "how and who". Although the term employed is "learner", it means learners as well as peer tutors.	Learner-created, topics produced by learners/peer tutors, recording in-class discussion/video explanation, updating/uploading materials to the SLEND
Web 2.0 technology-enhanced provision	It comprises all the technologies used for teaching, learning and communication in the intervention. Those for their personal use irrelevant to the intervention is excluded.	Platform, video, online, Whatsapp, picture, photo, mobile phone, laptop, computer, Internet, access
CEFR benchmarking	It points to the teaching, learning, assessment and testing mapped to the CEFR.	CEFR (A1-A2), benchmarking, descriptors, literacy proficiency
Training and support	It includes the training and support provided to Deaf research assistants and peer tutors in multiple ways with diversified content. Besides formal training and support, informal occasions such as email, Skype enquiries are also counted.	Training, support, workshop, user guide, enquiry

To ensure the reliability of thematic qualitative analysis, it is imperative to maintain consistency of judgment among views over time and events (Boyatzis, 1998). As the researcher was the only coder, there was no issue of inter-rater reliability. The qualitative data was generated and analysed progressively. To ensure the judgment consistent over time, the researcher frequently retrieved the previous documents and reviewed the existing analysis. Necessary adjustment was made concerning emergent situations.

3.4.2 Data Analysis and Coding for Sub Research Question 2

The data of learner experience collected through the Likert-scale questionnaire was analysed quantitatively, while qualitative analysis of the interview data further explained the quantitative findings. There has been a 60-year 'great debate' on the analysis of the Likert-scale data, especially in relation to the nature of the response categories, ordinal or interval, which decides the way to analyse them, parametric statistics or non-parametric statistics correspondingly (Carifio & Perla, 2008). From a conservative view of point, Likert scales are ordinal data in nature, and must resort to non-parametric analysis (Jamieson, 2004). Whereas with a liberal view (Knapp, 1990), some research (Pell, 2005; Carifio & Perla, 2008) tends to treat the ordinal Likert scales as interval data and encourages the use of parametric statistics.

Among those who support parametric analysis of Likert scales, some (Sullivan & Artino, 2013) claim that parametric analysis is possible provided that the data are normally distributed. Otherwise, a description of the frequency distribution of responses is likely to be more helpful than simply describing the means. However, Norman (2010) challenges the requirements of normal distribution and big sample size for parametric analysis of Likert scales, and argues with empirical evidence that parametric statistics such as ANOVA, Pearson Correlations can be used with Likert-scale data which are more likely to be non-normally distributed.

At the same time, there is a call for the differentiation from Likert-type and Likert-scale data (Boone Jr. & Boone, 2012). Clason and Dormody (1994, cited in Boone, Jr. & Boone, 2012) identify that if the researcher has the attempt of combining the responses of a series of questions/statements, they are Likert scale data. On the contrary, if they are single non-composite questions/statements, they are viewed as Likert-type data. The Likert-scale questionnaire used in the current research is to investigate learner experience of the SLEND. All the statements work together to reflect their experience as a whole and several statements are combined to reflect their experience of a particular trait/characteristic of the SLEND. Thus, they are considered as Likert-scale data not Likert-type data.

In this regard, the Likert-scale questionnaire data are treated as interval data. The analysis of the Likert-scale data in the current study looks at the Central Tendency (Mean) and Variability (Standard Deviation) as Boone Jr. and Boone (2012) suggested. When it comes to statistical tests, both sample size and distribution of data are taken into account. The distribution of the data decides the statistical tests used. If it is normal distribution, parametric tests are used. Otherwise, non-parametric tests are employed.

At the first stage of quantitative analysis of learner experience questionnaire, descriptive statistics such as means, median, and standard deviation were calculated for the responses to each statement. Those statements with lower means (lower than 4) formed the base of questions for the interview. Within each statement, means for each group was also displayed. Several statements for the same characteristic/theme were analysed and reported holistically. For the later stage of analysis, statistical correlation tests were used to detect the association between responses to each characteristic/theme and responses to the holistic statements, for example, the relationship between learners' responses to the factor of "sign bilingualism" and their responses to the holistic experience; and the association between the characteristics/themes, for instance, the relationship between the experience of sign

bilingualism and the experience of Web 2.0 technology-enhanced provision. This correlation analysis was expected to shed some light on the relationship between the key characteristics of the SLEND established in sub research question 1.

The interview data were analysed with the assistance of the software, QSR Nvivo 10. With the function of auto coding in Nvivo, each question was auto coded as a node[14]. The answers to the questions were coded under each node (see Figure 3.11). As the interview was to further explore the reasons behind positive or negative experience of the SLEND, it was explorative in nature. Meanwhile, the justification, explanation and suggestions for each question were probed.

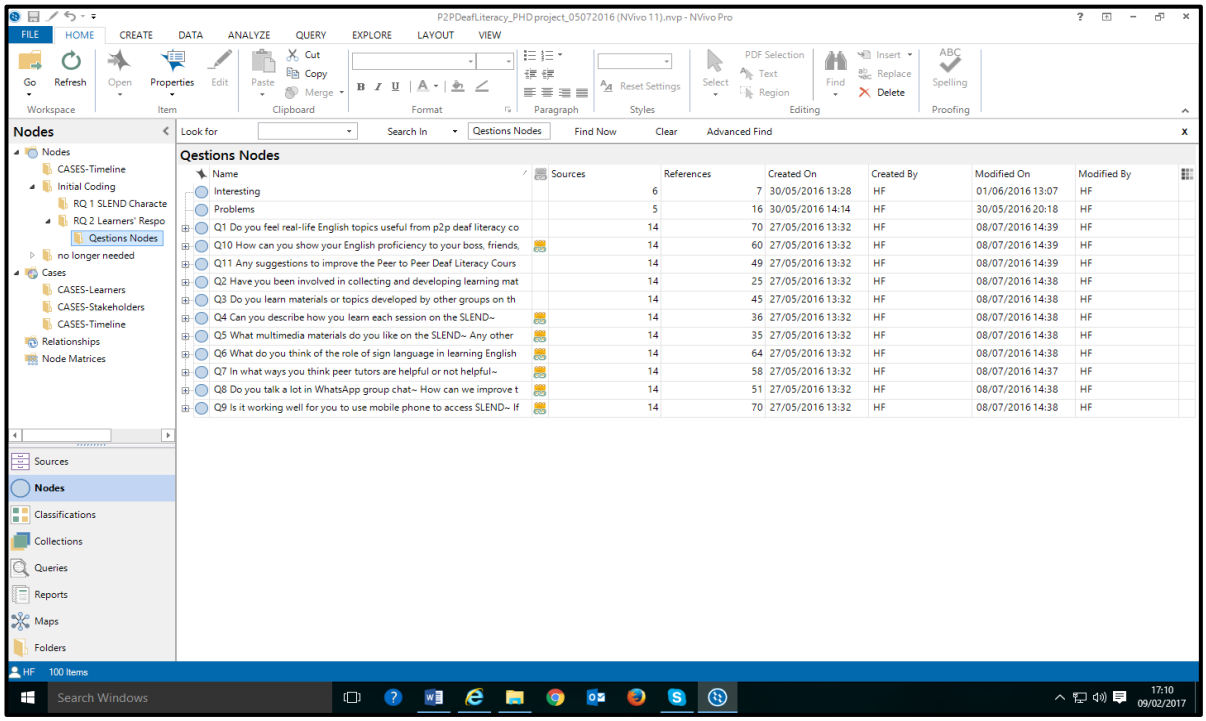


Figure 3.11 Auto-Coding of the Interview Data with Questions as the Nodes in NVivo

The analysis of the interview data was a combination of two techniques: quote-search and "unitizing-categorizing". Folkestad (2008, p. 4) considers "quote-search" as "using quotes from interview as illustrative or confirming examples". For example, learners felt that real life English materials were useful for instant application and provided examples. Their narration of these examples was quoted to confirm their positive experience with the characteristics of real life English of the SLEND.

However, the sole analysis of data through quotes is problematic. Folkestad (2008) proposes a more sophisticated technique of "unitizing-categorizing", which are the first two parts of the four elements by Erlandson et al. (1993). In the current study, "unitizing-categorizing" was the main analytic technique supplemented with quotes. By means of the auto-coding function in Nvivo, all the interview scripts were unitized according to questions. For example, all the scripts for question 1 were regarded as unit 1. Within each unit, the content was categorized as: number of positive comments, Justifications, number of negative comments, argument/suggestion. Table 3.4 displays an example of how the data were organized and analysed.

[14] A node corresponds to a code in the Nvivo.

Table 3.4 Qualitative Analysis for the Group Interview to the Learners

Questions	Positive Comments	Justification	Negative Comments	Argument/ Suggestion
1. Do you feel real life English topics useful from P2P Deaf literacy course? Why?	33 references	○ Real-life instant application. ○ New learning experience. ○ Acquiring new knowledge and improving English literacy. ○ Avoiding real-life problems and removing communication barriers.	0	--

Seeing from the table, there were 33 references regarding the positive experience of real life English. The effectiveness of real life English was justified by the interviews with a summary of "real-life instant application, new learning experience, acquiring new knowledge and improving English literacy, avoiding real-life problems and removing communication barriers". No negative comments were found as well as suggestions. The rest of the interviews followed the same procedures and formats.

Despite the separate analysis of learner experience questionnaire and the interview, the findings from these two methods were integrated and reported together in Chapter 5. As further justification and explanation to quantitative findings of learner experience, the findings of the interview were presented when corresponding findings from the questionnaire were discussed.

3.4.3 Quantitative Statistical Data Analysis for Sub Research Question 3

It is worth mentioning that the self-assessment data is Likert-scale, similar to the learner experience data with five response alternatives. Each response from disagree to agree is assigned a number from one to five accordingly. As discussed in Section 3.4.2, Likert-scale data are dealt with as interval data rather than ordinal data in the current study, which allows the operation of corresponding statistical tests.

With the assistance of SPSS, quantitative statistical analysis was carried out for the standardized tests and self-assessment of English literacy. A series of statistical tests were included in the process, such as descriptive statistics, t-test, ANOVA, and correlation tests. The descriptive statistics was to describe the sample and the measures of learners' performance at each test and their self-assessment. It provided the basic features of learners' performance and self-assessment, such as mean score, standard deviation and distribution of data. It also laid the solid foundation for next-phase statistical analysis. For example, the choice of parametric tests or non-parametric tests depend on whether the data of learners' performance or self-assessment scores are normally distributed.

To compare learners' performance in standardized tests and self-assessment over time, both t-tests and ANOVA were employed. The former one was to compare the means

between pre-test/pre-intervention self-assessment and post-test/post-intervention self-assessment with a relatively larger sample, while the latter one was to compare the means among pre-, post- and delayed-tests/self-assessment with a small sample. This is because the number of participants decreased at the delayed post-test and self-assessment. ANOVAs were also administrated to compare the performance and self-assessment among the five learning centres. Accordingly, the t-test results revealed that the short-term effectiveness of the intervention, while the ANOVAs uncovered learners' retention of learning in relatively longer term and also the centre difference in performance as well as self-assessment.

Furthermore, correlation tests were used between tests, self-assessment and learner experience. For normally distributed data, Pearson Correlation test was conducted, whereas Kendall's tau test for non-normally distributed data. In this way, the correlation tests can investigate the consistency of standardized tests, self-assessment and learner experience. The results informed congruence and deviation of different sources of data.

Table 3.5 summarises the descriptive statistics and statistical tests (Field, 2009; Laerd Statistics, 2018) used to examine the data of learner experience and learning outcomes in sub RQ 2 and sub RQ 3.

Table 3.5 A summary of descriptive statistics and statistical tests used for sub RQ 2 and sub RQ 3

Name of Tests	Purpose of the tests
Descriptive statistics	To explore the central tendency by elaborating N, Minimum, Maximum, Mean and Standard Deviation (SD).
Shapiro-Wilk test (for small sample size)	To examine the distribution of data (normal distribution or non-normal distribution) and prepare for the statistical tests.
Paired-samples t-test (parametric)	To compare performance/self-assessment before and after intervention with the same group of learners and normally distributed data.
Wilcoxon Signed-ranks (non-parametric)	To evaluate performance/self-assessment before and after intervention with the same group of learners and non-normally distributed data.
One-way repeated ANOVA (parametric)	To compare performance/self-assessment before intervention, immediately after intervention and delayed after intervention with the same group of learners and normally distributed data. Bonferroni post hoc test ensues to locate the difference if significant difference found in one-way repeated ANOVA.
Kruskal-Wallis test (non-parametric)	To evaluate performance/self-assessment before intervention, immediately after intervention and delayed after intervention with the same group of learners and non-normally distributed data. Mann-Whitney post hoc test ensues to locate the difference if significant difference found in Kruskal-Wallis test.

Mixed Factorial ANOVA (parametric)	To compare performance/self-assessment (before and after intervention) between subjects (five learning centres).
Pearson correlation test (parametric)	To detect the consistent or inconsistent relationship between standardized tests and self-evaluation, or between performance and learners' attributes with normally distributed data.
Kendall's tau correlation test (non-parametric)	To detect the consistent or inconsistent relationship between standardized tests and self-evaluation, or between performance and learners' attributes with non-normally distributed data.

3.5 TRANSFORMATIVE ETHICAL CONSIDERATIONS

The inclusion of the community members in the research and hearing their "voice" is the first step of axiological assumption. The ethical consideration of their wellbeing and benefits ensues. Viewing ethics from a transformative lens, Harris, Holmes and Mertens (2009) point out that both broad codes of ethics and specific cultural codes need addressing during research. They introduce the three dimensions of respect, beneficence, and justice in the broad sense of ethics in the U.S. They further define the specific application of ethics in research with the Deaf community. For example, they define 'respect' as 'the cultural norms of interaction within the Sign Language community and through the hearing and deaf worlds'. Beneficence is seen by them as 'the promotion of human rights and increased social justice' (Harris, Holmes, & Mertens, 2009, p. 109).

The current research profoundly adheres to the general codes of ethics by the university and the specific cultural norms within the Deaf community in India. In principle, data collection took place until the ethical approval had been granted from the University. Ethics is highly considered for this research with consent, confidentiality, right to information and participants' beneficence.

3.5.1 Consent, Confidentiality and Withdrawal

To ensure that Deaf participants understood the research they were engaged in, an information sheet and a consent form in English were provided. As most participants' English level was limited, the consent form and information sheet were explained further to the participants in ISL in the field. Following Kusters's (2012) practice in gaining consent in sign language, the participants can either sign the consent in ISL or give consent in writing. By ensuring access to the input and output of information through the language that they feel comfortable, the "respect" (Harris, Holmes, & Mertens, 2009) for the Deaf participants and the primacy of sign language (O'Brien, 2017) was realized.

All the participants were anonymized. The coding document was kept in a separate file with different password. A pseudonym was used when introducing crutial individual data. Their personal information and data collected from them (test performance, answer to questionnaire, etc.) were kept confidential. Their own information and performance were provided at their request. Whenever the participants were quoted or referred to, the corresponding code was used without exposure of participants' real

identity. The code is a combination of the first letter of the name of the group that they belong to and a number, such as V_S1. It refers to the student, No.1 from the Vadodara Centre. Only I have access to the document recording the assigning of the code to each learner. Learners are not exposed when using the quotes of translation of their answers to the interview questions.

Participants were free to withdraw at any time and they did not have to give a reason. Due to their other engagements in life and the relatively long-term intervention, there were 14 participants who withdrew at the beginning of the intervention and they were excluded from the data.

3.5.2 Beneficence for Participants

Beneficence for participants is another concern of the current research under the transformative paradigm. The research assistants and peer tutors benefited from the research in terms of capacity building and paid academic work. Capacity building included both formal training, and informal training such as guidance provided during work. They continuously acquired knowledge and practiced skills in the areas of English Language, research methods, pedagogy and technology. What is equally important is that they were offered an academic position with a payment consistent with local salary levels. This was of great opportunity for them to gather academic work experience, boost their further academic career development and job application. For instance, one of the peer tutors managed to receive a job offer as an English tutor at school after the intervention.

As for the beneficence to the Deaf young adult learners, first, they had access to a free curated English literacy course to improve their English. Second, they received a certificate after completion of the course. It indicates their English learning outcomes benchmarked against an internationally recognised standard, the CEFR. This incentive motivated Deaf learners by benefiting their further education and future employment. Third, by taking the course, they engaged in a Deaf community to share their knowledge, information, problems, and to practice their Indian Sign Language and computer skills. Finally, each of them received a stipend as to compensate for their expenditures caused by joining the course.

More importantly, the ultimate beneficence for the Deaf participants is that they were given the equal rights to research, to work and to learn. They were entitled to be heard in the whole process of developmental evaluation of the SLEND built for their community. In this sense, the human rights and social justice for the Deaf community were addressed.

3.5.3 Specific Ethical Considerations for Work with Deaf Communities

Besides the aforementioned ethical considerations, the current study also takes specific ethics in relation to Deaf communities into account. Deaf ontologies (Deaf ways of being) and Deaf epistemologies (Deaf ways of knowing) are reflected in the methodological processes. According to Kusters, De Meulder and O'Brien (2017), the experience of being deaf is crucial to the ontologies of both research participants and researchers, which acknowledges the significance of the engagement of the Deaf participants and the reflection of Deaf ways of being and knowing. Similarly, Harris, Holmes, and Mertens (2009, p. 115) develop the ethical research of the Deaf community into an overarching theoretical framework, "transformative paradigm", and propose a set of "Sign Language

Communities' Terms of Reference Principles" (SLCTR). The ethical practice of the current research abides by some aspects of the SLCTR.

The recruitment of Deaf participants presented in 3.1.5, especially for the roles of research assistants and peer tutors resonates with SLCTR #1, "The authority for the construction of meanings and knowledge within the Sign Language community rests with the community's members." (ibid.: p.115).

The current study employed a variety of visual methods and techniques, such as facial expressions, ISL explanation in learner experience questionnaire, acceptance of signed consent (Section 3.3.4) and the circular layout of chairs (Section 3.6.2). These techniques reflect SLCTR # 2, "Investigators should acknowledge that Sign Language community members have the right to have those things that they value to be fully considered in all interactions". (ibid.: p.115)

The developmental evaluation of the SLEND for Deaf young adult learners' English literacy development proactively engaged the Deaf community in the whole process of the research, in terms of collecting their comments on the instruments before research, encouraging them expressing their viewpoints during evaluation and engaging them in data translation and clarification after evaluation. The full-process engagement follows SLCTR # 3, "Investigators should take into account the worldviews of the Sign Language community in all negotiations or dealings that impact on the community's members". (ibid.: p.115)

The evaluation of the SLEND centres around the perception of the design concept by the Deaf participants, the experience of Deaf learners and their learning achievements. That is to say, how a potential best-practice for Deaf young adults' English literacy development in India is constructed should be acknowledged by the target users from India. This is in line with the SLCTR # 5, "Investigators should ensure that the views and perceptions of the critical reference group (the sign language group) is reflected in any process of validating and evaluating the extent to which Sign Language communities' terms of reference have been taken into account. (ibid.: p.115)

In short, Deaf ways of being and knowing were considered at each procedure of the research, such as sampling, instrument design, data collection, data analysis and ethical considerations.

3.6 RESOURCES

Shared resources from the wider P2P Deaf Literacy project guarantee the smooth research operation. This includes both human resources and physical resources. They account for my absence from the field in person and increase the efficiency of the current research.

3.6.1 Shared Human Resources

The first group of shared human resources that benefit my research are the UK researchers with expertise in the areas of Sign Language and Deaf Studies, English literacy, the CEFR, language testing, and Moodle platform development. They contributed to the conceptualization and design of the SLEND. They were indirectly involved in the current research with their viewpoints reflected in the project proposal

and the meeting minutes. Their efforts to the wider project laid solid foundation for my research.

The second group of shared human resources are the recruited Deaf research assistants and peer tutors in India. They were directly involved in this research and dedicated to data collection, translation, and participation. With their assistance, it was not necessary for me to go to the field, which helped to relieve the research financial burden. As ISL was outside my areas of expertise and it was impossible for me to become part of the Deaf community in a short period of time, their assistance in data collection and translation was crucial to ensure the simultaneous data collection at five learning centres.

3.6.2 Learning Centres, Facilities and Equipment

The current research relies on the learning centres and facilities used for the wider P2P Deaf Literacy project, namely, five physical learning centres located at the local Deaf NGOs/school from different areas in India. They offered space for classroom learning, laboratories and Internet for on-line learning. The physical classrooms had a Deaf-friendly layout, circular display of chairs to ensure full view of all the peers. In addition, the learning centre were also the venues in each area for the Deaf communities to gather and communicate.

According to the analysis of the current technology situation in India in Section 2.6.5, it is evident that ownership of computers or laptops was still low when the intervention took place. Even though ownership of mobile phones was slightly higher, connectivity to the Internet was still low, which means that learners' access to the SLEND through mobile phone was not promising. Therefore, learning centres with a variety of facilities and equipment such as white boards, computers, laptops and cameras were useful, even though it was not guaranteed that everyone could have one computer or laptop. The details of available devices and Internet status are shown in Table 3.6.

Table 3.6 Available Devices and Internet Status at Each Learning Centre

Learning Centre	No. of Learners	No. of Computers and Laptops	Learning Centre Internet connection (Yes or No, and estimated speed)	No. of Learner with Mobile Phones	No. of Learner with personal Laptop/ Computer	No. of Learner with access to the SLEND after class	Computer&Laptop to Student Ratio
Coimbatore Centre	**6**	**1** Computer	Yes, average	**7** mobile phones (no access to SLEND)	**3** Laptops	**6** students	**4:6**
Indore Centre	**12**	**3** Computers and **1** Laptop	Yes, average	**11** mobile phones (cannot open all videos on the SLEND)	None	**11** students	**4:12**
Palakkad Centre	**10**	**3** Computers	Yes, slow speed	**2** Mobiles	None	**10** students	**3:10**
Thrissur Centre	**9**	**2** Computers	Yes, average speed	**1** tablet (use SLEND) and **8** mobile phones (no access to SLEND)	**3** Laptops	**5** students	**5:9**
Vadodara Centre	**6**	**2** Computers and **2** Laptops	Yes, good internet	**4** mobile phones (no access to exercises)	None	**6** students	**4:6**
Total	43	14	--	33	6	38	--

Note: Most of the laptops and computers are not owned by peer tutors and learners. The P2P Deaf Literacy project team and the learning centre owned by the NGOs or school provide the devices.

Table 3.6 reveals several informative points: First, each centre varies slightly in the number of computers and laptops available, with a range of three to five. Second, most of the learners have mobile devices, however, not advanced enough to access the SLEND or exercise on the SLEND. Third, due to the big difference in the number of learners at each centre, the computer and laptop to student ratio differs considerably. Due to a small number of learners at the Coimbatore and Vadodara Centre, the computer and laptop to student ratio is the highest as 4:6. On the contrary, the Indore and Palakkad Centre have a rather low ratio, 4:12 and 3:10 respectively resulted from the big number of learners. The Thrissur Centre is in the middle with a ratio of 5:9. Fourth, all the five centres have Internet access. The Vadodara Centre owns the best Internet connection, whereas the Palakkad Centre has the slowest Internet. The Internet connection at the rest three centres are average. According to Egbert and Yang (2004), the characteristics of 'low-tech' settings include no or slow Internet connection, and a low computer to student ratio. In this case, it seems that the technological circumstances at each centre are more likely to fall in the 'low-tech' situation. Only the Vadodara Centre tends to be

'non-low-tech' with its good Internet connection and relatively higher computer and laptop to student ratio. Therefore, in terms of physical situation/technological infrastructure during the intervention, the Vadodara Centre compares favourably to other centres.

In summary, the current research adopts the theoretical framework of developmental evaluation with substantial transformative considerations. Underpinning these approaches, a sequential and parallel mixed-method design addresses the systematic inquiry of the development of the SLEND through the angle of transformative developmental evaluation. The evaluation is conducted to three dimensions of the SLEND: design concept, learner experience and learning outcomes, so as to scrutinize how an e-learning ecosystem maximizes interaction and participation among learners. The findings of each dimension are reported in the next three chapters accordingly.

CHAPTER 4 EMERGENT CHARACTERISTICS OF THE SLEND

Within the framework of the overarching RQ, sub RQ 1 is focussed on the conceptualisation of the interactive and participatory e-learning system. In response to sub RQ 1, Chapter 4 presents the emergent characteristics at the core of the design concept of the SLEND. The inquiry is based on the viewpoints of the UK researchers, Deaf research assistants and peer tutors in the field elicited through reviewing the project proposal, project meeting minutes and conducting focus groups respectively. The data was collected, coded and analysed thematically in two phases (see details of data collection and coding in Sections 3.3.2, 3.3.3 and 3.4.1). The initial findings of the first phase of coding became the prompts for the second-phase data collection. This Chapter first reveals the characteristics of the SLEND as they have emerged from the data, and then identifies how each characteristic is mapped into the key components of the e-learning systems.

4.1 KEY CHARACTERISTICS

Applying the coding scheme introduced in Section 3.4.1 to the analysis of the data, a number of themes have emerged. Table 4.1 provides a summary of the characteristics with the number of references from UK researchers, research assistants and peer tutors based on the data analysis conducted in Nvivo. The characteristics of the SLEND alongside the sub-characteristics arising from the data are deliberated in the following sections.

Table 4.1 A Summary of the Characteristics of the SLEND

Characteristics	No. of references from Peer Tutors	No. of references from Research Assistants	No. of references from UK Researchers	Total
Deaf-led Implementation	4	0[15]	16	20
Topic-based real life English	25	13	12	50
Learner-created Content	20	10	9	39
Sign Bilingualism	20	19	7	46
Peer-to-peer interaction	36	35	7	78
Web 2.0 Technology-enhanced Provision	13	25	37	75
Emergent Syllabus Mapped to the CEFR	8	7	8	23
Continuous Training & Support	10	9	19	38

4.1.1 Deaf-led Implementation

In line with the participatory approach which places learners at the centre, the SLEND develops within a Deaf-led context, with all round Deaf involvement in implementation of teaching, learning, research and dissemination. The Deaf-led implementation ensures the active participation of Deaf learners and the agency of Deaf learners which are very likely to be absent from traditional ways of teaching and learning with Deaf learners. A succinct declaration is made in the project proposal,

> "Taking recent views on empowering approaches to deaf communities such as in Ladd (2003) seriously, the conclusion must be that radical educational change are best driven from within deaf communities; this motivates the project's 'Deaf-led' approach, attending to Deaf learners, community teachers, and local trainers, all dynamically interacting within a learning and research community." (p.1)

In other words, the development of the SLEND is for and by the Indian Deaf community. The operation of the project is consistent with the Deaf-led approach.

The all-round Deaf involvement in implementation was further specified at the project meeting in February 2015. The P2P Deaf Literacy project was in partnership with the National Institute of Speech and Hearing (NISH). The intervention took place at four NGO centres and one Deaf school. Three Deaf research assistants and five Deaf peer tutors

[15] Due to the late identification of the characteristic of "Deaf-led", it is not included in the focus groups for the research assistants.

were expected to work with Deaf learners. In this way, all levels of Deaf communities closely engaged in the P2P Deaf Literacy project. Meanwhile, the all-round Deaf involvement was realised through the comprehensive engagement of the Deaf participants at all stages of the research process, from learning, teaching, research, to dissemination, etc.

The UK researchers further explained the crucial role of Deaf academics and communities at the project meeting in March 2016, "…The unique aspect of our project in comparison to these is that ours is deaf-led. Other projects were not knowledgeable/confident about pulling their target groups/communities into the research like we have with our research. In our project, the hearing academics are just filling the gaps while the Deaf academics and Deaf community are doing the main work." The Deaf-led approach hands over the leading role from hearing academics to Deaf academics, and contrasts with the traditional pattern summarized by Kusters, De Meulder and O'Brien (2017), in which Deaf researchers play the assisting and bridging roles and provide support in terms of sign language, and Deaf culture. Napier and Leeson (2016) refer to the hearing academics as "elephant in the room". They further point out that even for hearing academics who align themselves with Deaf communities and values with their long-term engagement in the Deaf community, there is a possibility that they may exercise hearing privilege in the research.

That is to say, a Deaf-led approach does not rule out the collaboration with hearing people. In fact, the majority of the UK research team are hearing researchers. They played a leading role in initiating the P2P Deaf Literacy project, including project application, bidding for funding, creating the design features, analysing and publishing research results. Hearing researchers' contribution and facilitation is necessary and important especially when the concerned Deaf communities did not have relevant experiences and skills. In other words, the collaboration with hearing researchers is part of the Deaf-led strategy to empower Deaf communities, not to discourage them.

Due to the late identification of Deaf-led as one of the characteristics, it was not mentioned during the focus groups in June 2015. Peer tutors discussed the characteristic of Deaf-led during the second round of focus groups in January 2016. Comparing to the UK researchers' view, Deaf peer tutors reflected more on how they felt about Deaf-led implementation, whereas UK researchers focused on how to execute Deaf-led implementation (see Figure 4.1). Firstly, in the context of Deaf-led research and learning, peer tutors felt comfortable. For example, PT_C reported during the Focus Group for peer tutors in January 2016, "Deaf led taught the materials and they learn comfortable English." Secondly, during the same event, PT_A, PT_D and PT_E reiterated good communication through sign language because of the Deaf-led context. They were able to solve problems and encourage peer learning through sign language. Finally, during this focus group, PT_A mentioned that peer learners were surprised at the Deaf-led development and sharing of learning materials. He further commented that he had no experience of Deaf teachers teaching English to him before during the January focus group discussion.

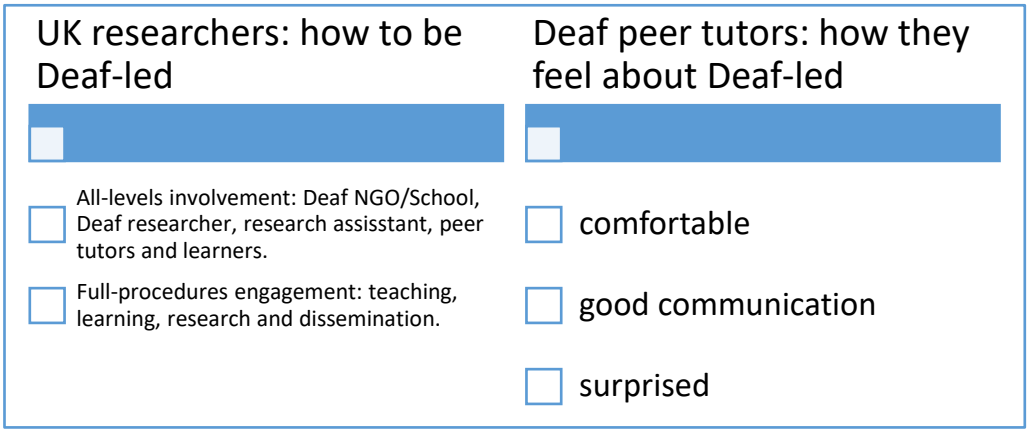


Figure 4.1 A Summary of Reflection on Deaf-led Implementation by the UK Researchers and the Deaf Peer Tutors

4.1.2 Topic-based Real Life English

Learning content in respect of English literacy is "relevant to Deaf learners' life and engages them" (p.2 of the project proposal), as pointed out by UK researchers. This is in line with the suggestion of using natural, authentic English for functional literacy development from Marschark et al. (2002). Real life English not only motivates learners to participate in learning, but also creates more opportunities for Deaf learners to output/use English which facilitates language acquisition based on the notion of the interaction approach in SLA.

In the March meeting minutes, it was suggested that each learning session should be a real-life topic and each topic can consist of several sub-topics. The peer tutors and research assistants also underlined the importance and usefulness of learning real life English. They pointed out during focus group discussions in June 2015 that real life English had a focus on learners' real needs with the ultimate purpose of boosting communication in daily life. During the focus group discussion for the peer tutors in January 2016, PT_B commented that learning real life English enables the Deaf learners to have access to information which is available to hearing people. During the same focus group discussion, PT_E emphasized, "Real life English is an excellent concept for Deaf students."

A combination of literacy approaches has been employed to develop the real life English content. An ethnographic technique, Clock Activity or Clock-Face Activity (Ivanic, Edwards, Satchwell, & Smith, 2007; Satchwell, 2006), was introduced to the research assistants and peer tutors during the training workshop in June 2015. Street (2016) mentions that the ethnographic approach fits in well with the new theoretical paradigm and can better capture the 'social practices', to be more specific, the local uses and meanings of literacy. Under the circumstances of the present research, ethnography aims for Deaf young adult learners' real practice and authentic language, which is a mix of modalities, languages, cultures, and multimedia underpinning the multi-literacies approach. In this way, instead of imposing certain fixed literacy practices from hearing peers, the special needs of the Deaf group are taken into consideration, and the learning content is generated by Deaf learners, derived from their real life.

The clock activity is an activity to describe daily activities on a drawn clock face, which underpins a social practice view of literacy and underlines the participation/engagement

of students in defining their literacy practices and events (Satchwell, 2006). The harnessing of the literacies of which students privately think highly can have a positive effect in education (Ivanic et al., 2007).The peer tutors put the clock activity to use to elicit learners' literacy practices at the outset of the intervention in September 2015 (see Figure 4.2 for an example sample of Clock Activity).

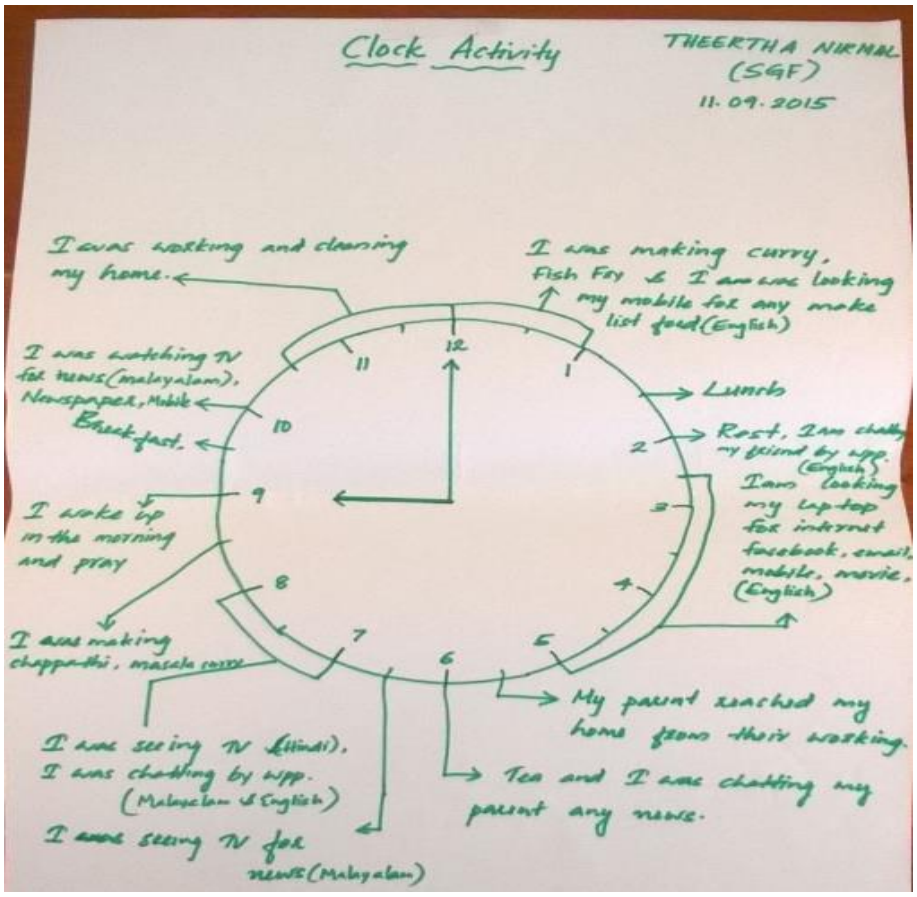


Figure 4.2 An Example Sample of the Clock Activity

At the same time, a Freirean approach was recommended in the wider P2P Deaf Literacy project proposal, which has previously been used in literacy attainment in developing countries successfully (Archer & Goreth, 2004), but not with Deaf communities. The Freirean approach to literacy (Freire, 1921-2007) reflects the viewpoint of Ladd (2003) by basing adult literacy attainment on learners' cultural and personal experience. In the current context, it acknowledges Deaf learners' proactive role in English literacy development. It is named after the Brazilian educator Paulo Freire, and viewed as a learner-centered approach by Anorve (1989), and a participatory approach by Jurmo (1987). It has been widely and successfully used in the Global South for native and second language literacy education. In industrialised countries, such as in the US, it has been used for community-based informal education for literacy development in native English, ESL and other languages.

From the participatory view of the Freirean approach, learners are entitled to choose learning topics or collect materials from the real world. Therefore, the learning materials are "deeply contextual" reflecting a distinctive feature of the Freirean approach (Chacoff, 1989, p. 49).

With the integration of the Clock Activity and the Freirean approach, a list of real-life topics emerged before and during the intervention. By the end of the intervention, there were 46 sessions on the SLEND (see Table 4.2). Real life English covers a wide array of topics such as forms, notices, signs, tickets, in the bank, at the station, in the library, zoo, poster, restaurants etc. Figure 4.3 is an example of real life English material for the topic of "Hostel Relieving Application".

Table 4.2 A List of Learning Sessions Developed on the SLEND

Sessions	Title	Developed by
Session 1	Things we don't do on campus	UK Researcher as an example session
Session 2	In the Library	Research Assistants as an example session
Session 3	Walking around the railway station	Vadodara Centre
Session 4	Green Bio-Toilet	Research Assistants as an example session
Session 5	Zoo	Research Assistants as an example session
Session 6	Application form	Thrissur and Vadodara Centre
Session 7	In the bank	UK Researcher as an example session
Session 8	Poster	Palakkad Centre
Session 9	Bill of retail invoice	Thrissur Centre
Session 10	Documents	Vadodara Centre
Session 11	Notice	Coimbatore Centre
Session 12	Preposition	Research Assistants
Session 13	Green tea	Palakkad Centre
Session 14	Domino's Pizza	Research Assistants
Session 15	Railway ticket	Indore Centre
Session 16	Signs	Research Assistants
Session 17	Missing[16]	
Session 18	Strictly	Thrissur Centre
Session 19	Hostel relieving application	Palakkad Centre
Session 20	Important information for all	Coimbatore Centre
Session 21	The short stories	Palakkad Centre
Session 22	Strictly prohibited	Thrissur Centre
Session 23	Caution notice	Thrissur Centre
Session 24	Advance & Registration fee receipt	Palakkad Centre
Session 25	Road signs and markings	Indore Centre
Session 26	Chartered bus	Indore Centre
Session 27	Identity card	Research Assistants
Session 28	Notice own risk	Thrissur Centre
Session 29	Station is electrified with 25000 volts	Thrissur Centre
Session 30	To stop train pull chain	Thrissur Centre
Session 31	Application for replacements of SIM card	Indore Centre

[16] This missing section is due to the fact that the five learning centres were developing the sessions concurrently on the SLEND platform and might count the number wrong.

Session 32	Cheque	Palakkad Centre
Session 33	No overtaking	Thrissur Centre
Session 34	Withdrawal form	Palakkad Centre
Session 35	Instructions (IDENTITY CARD)	Palakkad Centre
Session 36	Electric Switch Room	Indore Centre
Session 37	Indian Railways Passenger Reservation	Indore Centre
Session 38	Timetable of the class	Coimbatore Centre
Session 39	The lists of cloak and porterage…	Vadodara Centre
Session 40	Use your card safely	Coimbatore Centre
Session 41	Map of Gujarat, India and world	Vadodara Centre
Session 42	ID proof bus	Palakkad Centre
Session 43	Writing letter	Thrissur Centre
Session 44	Length	Vadodara Centre
Session 45	Bag deposit	Indore Centre
Session 46	Weight and capacity	Vadodara Centre

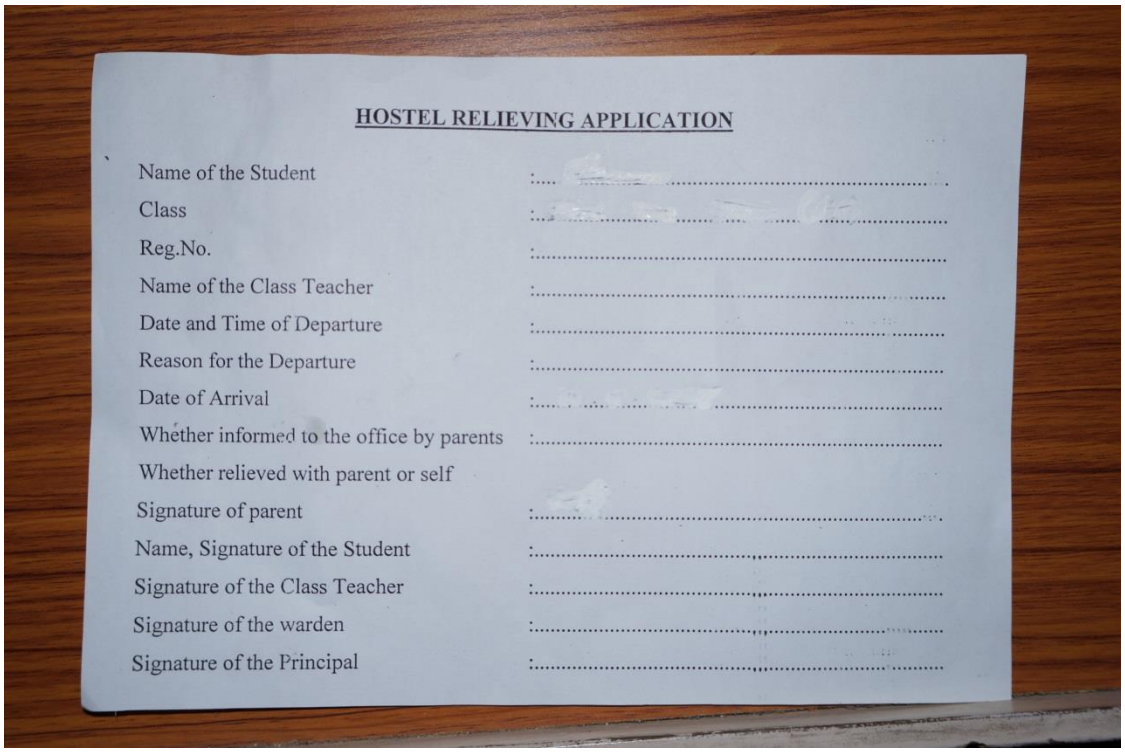


Figure 4.3 An Example Sample of Real Life English Materials

A closer examination of the topics reveals that there is a repetition of topics. For instance, sessions 11, 16, 23, and 28 are all about notices and signs. Instead of viewing this repetition as a problem, alternatively, it could be a good sign of diversity of learning materials concerning the same topic. A better option could be grouping the topics. In fact, the UK researchers proposed to group topics during the January project meeting as more topics were developed on the SLEND. However, the grouping was not implemented since topics kept emerging and the SLEND was more dynamic. A further grouping strategy is needed for future projects.

The UK researchers sketched the structure of the SLEND course in a sub-group meeting in April 2015. It was conceptualised as four parts (see Figure 4.4): overall introduction (including personal introduction area), glossary, topic area (English in real life) and grammar distillation area (including bilingual resources and vicarious learning via filmed grammar sessions taught by peer teachers).

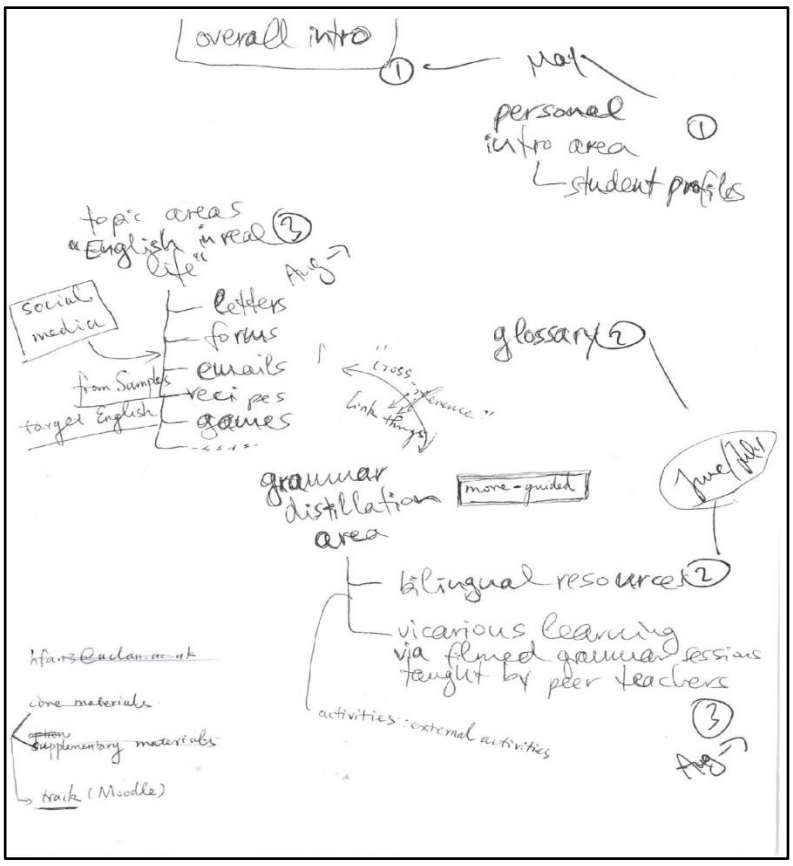


Figure 4.4 A Sketch of the Main Components of the SLEND by the UK Researchers

After consultation with the field team, the UK researchers further developed their design concept. They integrated topic area, grammar distillation area and glossary into each session. In other words, in each session, there are real-life learning materials, vocabulary, grammar and the like. During the project meeting in June 2015, the structure flow of each learning session was conceptualised as illustrated in Figure 4.5. It started with language samples from real-life situations including explanation videos in ISL, then proceeded to ISL videos of the discussion about the topic, vocabulary and grammar of the session, namely, the recordings of discussion in real classroom at each centre. After that, it was an in-depth learning of both grammar and vocabulary with corresponding follow-up exercises. Each session was supposed to conclude with a self-assessment in the form of Can-Do statements.

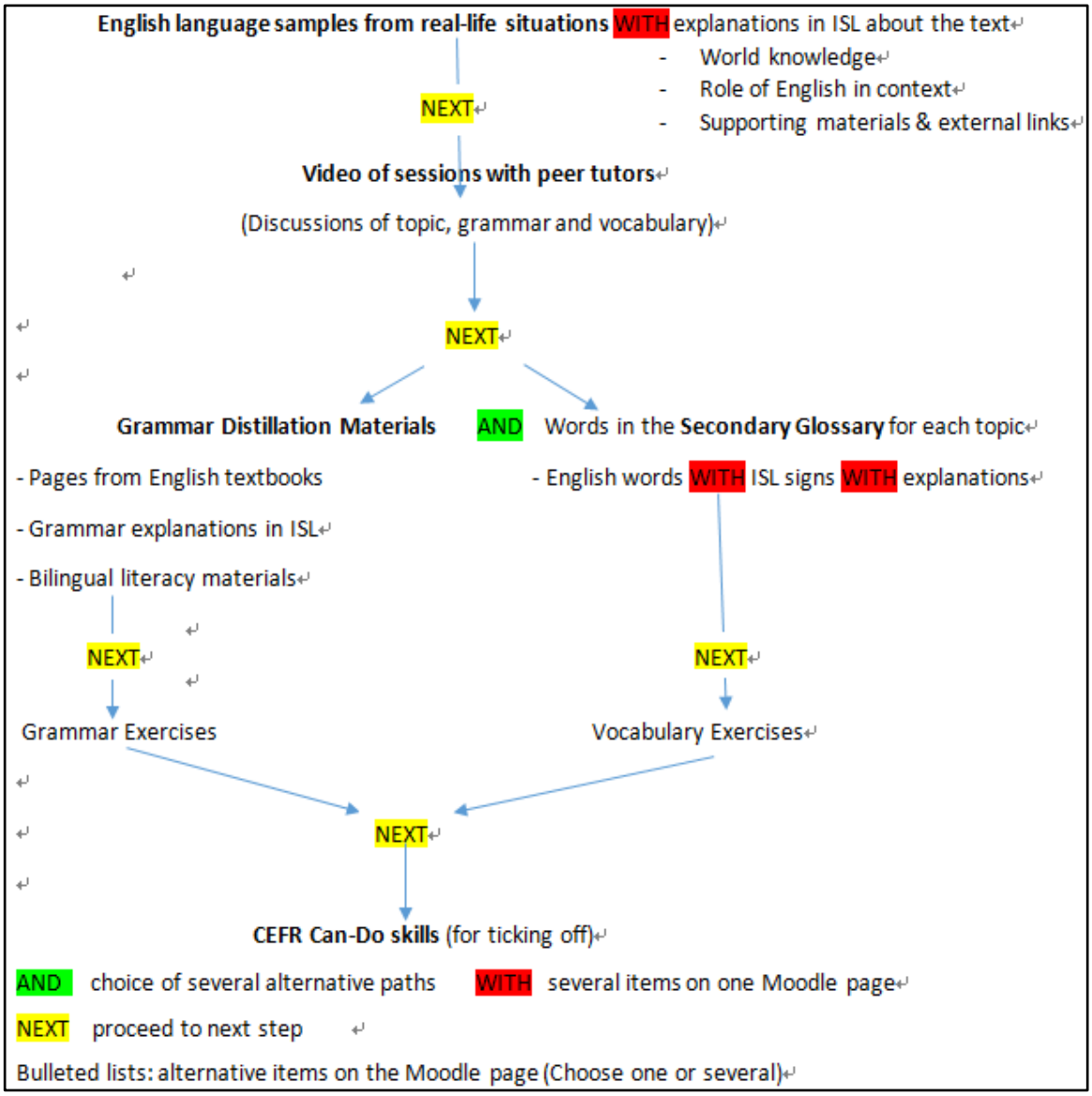


Figure 4.5 Structure Flow of Each Learning Session

To assist in developing learning sessions on the SLEND platform by peer tutors and learners, a template of a learning session was developed by the research assistants and the UK researchers (see Figure 4.6). The elements in the template generally followed the logic mentioned in Figure 4.5, with slight changes to their sequence. Instead of offering alternative paths, all elements of a session are in a linear structure.

Figure 4.6 A Template of Learning Session: Form Filling, Developed in September 2015

In practice, the peer tutors adjusted the steps on the template with the guidance of the research assistants and UK researchers. Comparing Figure 4.6 to Figure 4.7, several changes can be identified. Peer tutors used a new title to vividly reflect the learning content at each step. At the same time, they removed the last step of self-assessment with Can-Do statements. The reason for skipping the final step is further explained in Section 4.1.7. More importantly, useful language was used to replace grammar. The rewording reflected the evolution of the conceptualisation advanced by developmental evaluation. At the project meeting in October 2015, UK researchers expressed their strategies in introducing grammar. As meta-linguistic skills crucial to learners' English language learning, the UK team suggested that learners and peer tutors learn the grammar emerging from the real-life materials. Instead of separating grammar from vocabulary, they encouraged learners and peer tutors to identify sentence patterns/phrases in which both grammar and vocabulary are embedded.

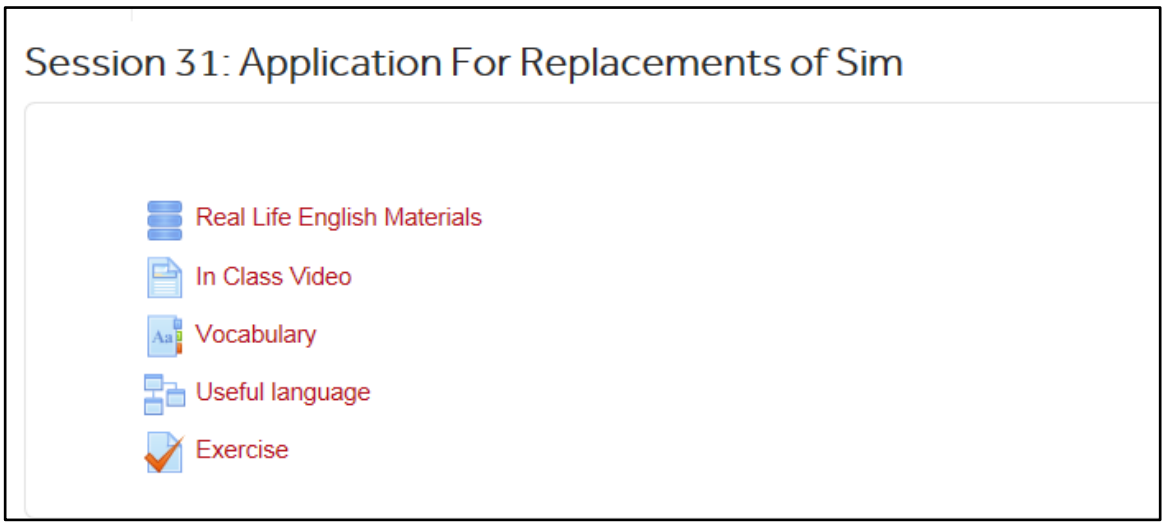


Figure 4.7 A Learning Session Developed by Learners and Peer Tutors in November 2016

4.1.3 Learner Content Creation

Besides the fact that learners can decide on the choice of topics, another feature is that learning materials were developed by the users themselves, namely, the peer tutors and learners. It was made clear in the project proposal by the UK researchers that learner-created content is of primary concern. As for implementation of the rule of "learner-created" materials, they further emphasized the role of the peer tutors and learners

during the project meeting in October. One UK researcher expressed her concern, “If the RAs (research assistants) do too much uploading, the peer tutors will get used to this and perceive it as being the RAs' job and lose a sense of ownership. This has to be balanced with the peer tutors' abilities to do the uploading.” This concern was passed to the field immediately to avoid contaminating the rule of “learner-created”.

As shown in Table 4.2, the five learning centres contributed to the 36 sessions out of a total of 46 sessions. That is to say, users of the SLEND uploaded the majority of learning content. It can be concluded that learners created the learning materials by working together with their peer tutors. In this way, learners and peer tutors are exposed to the inductive approach of “learning by doing” (Nunan, 1999, p. 51).

Peer production, a feature of the Web 2.0 e-learning (see more in Section 2.4.1), exists not only within each centre but also between centres. Within each centre, each learner works with their peers as a group to produce learning materials. They also share with other centres the learning content they have developed to foster peer production between centres. The peer production on the SLEND is primarily heavyweight as it focuses on the contribution to the learning content, as well as on the behaviours and contribution of peers (peer feedback, ratings, and comments) and the viability of the SLEND.

4.1.4 Sign Bilingualism

Concerning bilingualism for the Deaf communities, sign language is considered as the first language (L1) of Deaf learners and the dominant language used in the hearing community is recognized as the second language (L2) for Deaf learners (Mayer, 2009). Similarly, Gregory, Smith and Wells (1997) define bilingual education of Deaf learners as “an approach to employ both sign language of the deaf community and the written/spoken language of the hearing community”. According to Gregory, Smith and Wells (1997), the aims of bilingualism are not only to enable Deaf learners to achieve linguistic competence and literacy skills with access to a wide curriculum, but also to hold a positive view of their identity.

For the current intervention, sign language is proposed as the language of instruction, which is reflected in the title of the project proposal and the naming of SLEND emphasizing “sign language to English”. During the focus group discussion in June, one peer tutor reiterated the importance of sign language to English by pointing out,

> “Sign bilingualism is important for Deaf because deaf students use sign language (which is first language) and they use the written language (which is second language). If they did not acquire first language, hardly they would hinder second language development. Deaf own sign language. ”[17] (PT_C, from PT Focus Group in June 2015)

During the project meetings, the idea of sign bilingualism has been developed into specific features. ISL, seen as the 1st language of Deaf learners, was the language of instruction on the SLEND and in its context. Both face-to-face communication and video explanation were in ISL for the Deaf learners. Face-to-face communication was mainly used during the class learning sessions and after-class communication, whereas ISL

[17] The quotes from focus group discussions are in the form used by research assistants who translated the ISL videos into English. Their English, which often includes non-standard expressions, has not been altered here.

videos were filmed and uploaded to the SLEND for each session (see Figure 4.8). ISL videos are used to explain real life English materials (see Figure 4.9) and to explain the vocabulary in the Glossary. In-class videos of discussion of subject matter/content as well as grammar and vocabulary in the physical classroom were recorded and uploaded for shared learning. These videos appeared with English text and/or pictures. ISL video explanation was potentially associated with each part of the learning procedure. According to the Input Hypothesis (Krashen, 1985), the use of L1 (in this context, Indian Sign Language) to explain subject-matter information and to understand abstract ideas can be of great benefit for making English input more comprehensible.

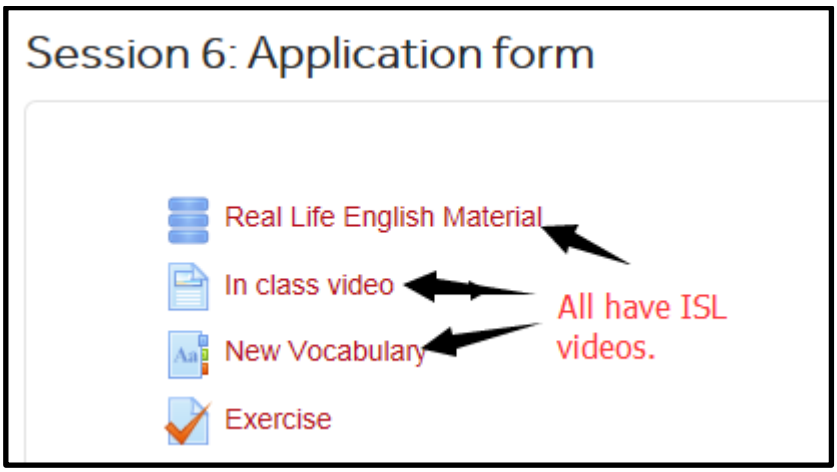


Figure 4.8 Key Components in Each Learning Session with ISL Video Explanation

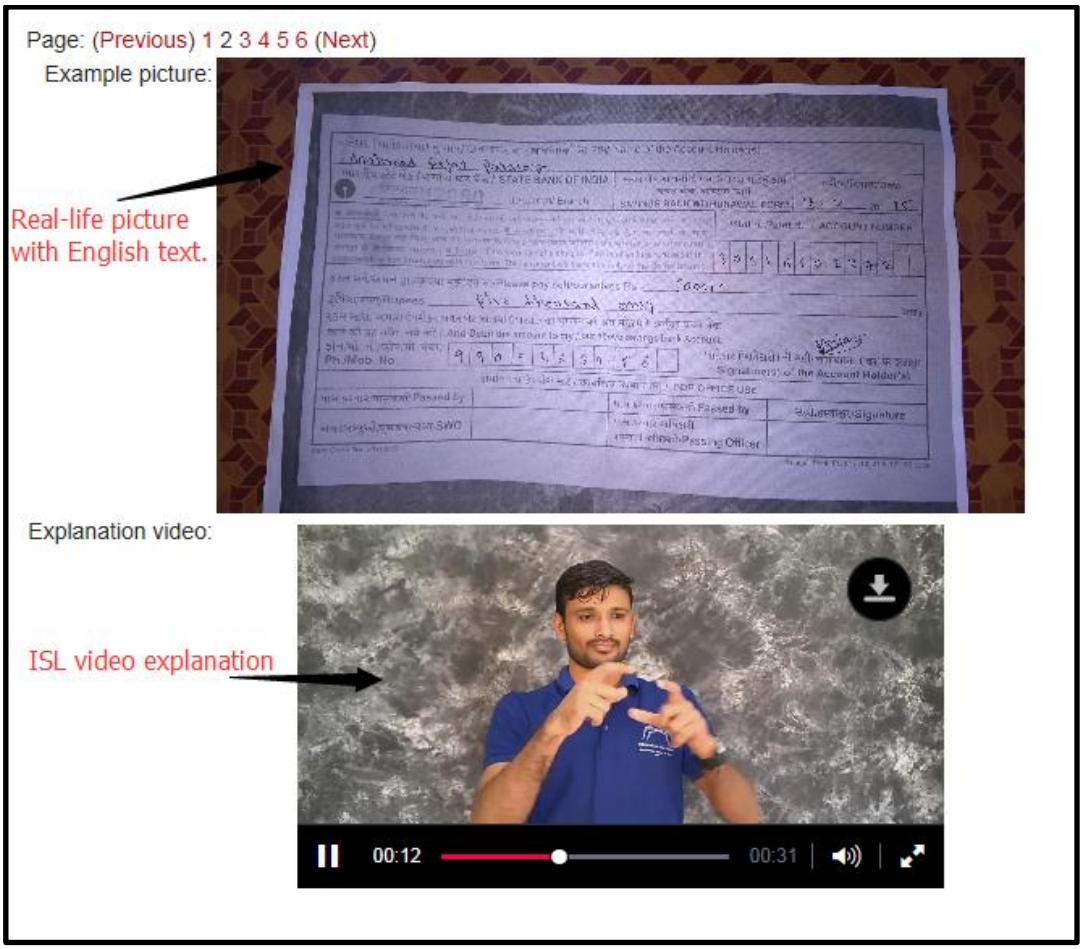


Figure 4.9 An Example Entry of Real Life English Materials with ISL Video Explanation

During the focus group discussion for the research assistants in June 2015, RA_A raised the issue of differentiation between Indian Sign Language (ISL) and Signed English (SE)[18]. He explained that Indian Sign Language and English have their own language structure. It is essential to adhere to each language structure rather than mixing them in the way of Signed English. This clearly conveys the message of using Indian Sign Language rather than Signed English on the SLEND and in its context. This is in accord with the call of sign bilingualism replacing Total Communication, yet rejecting the merit of SE in English language teaching proposed by Power, Hyde and Leigh (2008) and the potential of SE in scaffolding learning and teaching (Swanwick, 2016).

Unlike their attitude towards SE, research assistants, peer tutors and the UK researchers all seem to hold a positive stance towards sign language variants. According to a status report by Zeshan (2007), Indian Sign Language includes many dialects derived from different regions. As learners were from five learning centres distributed over Western, Central and South India, it is therefore not surprising that learners used some regional sign language variants on the SLEND. She also points out that regional dialects share the same grammatical structures with ISL and differ to some extent in vocabulary. She further concludes that ISL variants are mutually comprehensible in face-to-face communication.

However, in the P2P Deaf Literacy project, most regional varieties appear online from different learning centres. The interaction is primarily between learners and online learning materials in regional varieties rather than face-to-face communication. Learners need facilitation to comprehend learning materials in regional variants of ISL. Both RA_A and RA_C reported their observation on the random use of sign language variants on the SLEND. Some learners had trouble with understanding the different signs used by other centres and sought help from peer tutors. Peer tutors managed to explain the difference to them and solved the problems. For example, RA_C mentioned in the 2nd round focus group in January 2016 that some learners at the Indore Centre failed to understand some signs from Kerala. Their peer tutor managed to explain these signs to the learners as this peer tutor is a native user of the Kerala sign language variant. The peer tutor is knowledgeable about several regional dialects of Indian Sign Language.

So far as the UK researchers were concerned, during the project meeting in January 2016, they were struck by learners using different sign language varieties to learn English, and it emerged that learners improved their English literacy as well as sign language literacy. The UK researchers did not restrict the use of sign language variants and insisted that the use of ISL as language of instruction does not rule out the natural use of sign language variants. There was no suppression of sign language variants. To avoid misunderstanding and confusion caused by regional dialects, recommendations have been made for future relevant projects in the project policy report (P2P Deaf Literacy Project Team, 2016), such as adding a training module of regional variation in ISL, providing guidelines to share materials from different regions and allocating the peer tutor/trainer to the region corresponding to their ISL dialects skills.

In this way, the bilingual approach employed in the P2P Deaf Literacy project adopts a "soft standardization" (Dotter, 2006, p. 116). Learners are not oppressed and compelled

[18] Zeshan and Panda (2017) define Signed English or Sign Supported English as output of signing modified and co-produced together with spoken language, namely, English in the context of India.

to give up their variants. Neither research assistants, peer tutors nor UK researchers ban the use of sign language variants and learners using variants are not discriminated against. That is to say, within sign bilingualism as a key characteristic of the SLEND, ISL variants are recognized as the standard language of instruction.

More importantly, this is not limited to the variants used by the five learning centres. With the potential expansion of the P2P Deaf Literacy project in India, it is open to all the dialects of ISL. In this regard, the P2P Deaf Literacy project utilizes a broader definition of ISL by Zeshan (2007, p. 1), as "the group of sign language dialects that are used within the territory of the Republic of India". In so doing, embracing sign language variants strengthens the employment of the bilingual-bicultural model which has a special focus on maintenance of Deaf learners' own language and cultures. The use of sign language varieties as language of instruction and communication is the choice of learners, which strengthens learner agency and personalisation. Meanwhile, the use of sign language empowers Deaf learners and is conducive to active participation, productive content creation and innovation.

In summary, by advocating Deaf-led and sign bilingualism, the SLEND is inclined to a maintenance model of bilingualism (Plaza-Pust & Morales-Lopez, 2008). This model is in consideration of both literacy and maintenance of Deaf culture. It is deeply rooted in the anthropological view of deafness, which is labelled as Deafhood by Ladd (2003) and embraces Deaf community minority status as both linguistic and cultural. At the same time, the use of ISL as L1 testifies to the Input Hypothesis (Krashen, 1985) and allows more comprehensible English input.

4.1.5 Peer-to-Peer Interaction

In this context, peer-to-peer interaction refers to any communicative activity occurred between learners and between learners and their peer tutors, where there is minimal or no participation from external groups of people. The findings from the data goes beyond the three forms of peer interaction: collaborative learning, co-operative learning and peer tutoring/tuition, proposed by Philp (2014).

Using peer tuition is a feature of the SLEND which is emphasized in the project title. This is in line with previous studies that recommend the use of Deaf peer tuition (Herring-Harrison, Gardner III, & Lovelace, 2007; Cannon & Guardino, 2012; Sahasrabudhe, 2010; Denmark, 2013). In the project proposal, UK researchers further point out the recruitment of Deaf peer tutors, which ensures peer tuition to take place. In the research proposal, the UK researchers clearly defined peer tutors as,

> "…those without a professional teaching background but with relevant informal experience. They will be supported with training, online materials, and learner-generated content, working from a Freirean perspective…"

Besides the benefits of peer tuition for the learners, the UK researchers believe that it is also a good chance for the peer tutors to improve their professional tuition skills and English skills. For instance, during the project meeting in October 2015, one UK researcher pointed out, "It could be useful to sit with the learner to identify what they understand and don't understand from the text, and this is an important skill to develop in the peer tutors." She further added that peer tutors are not obliged to be in a know-all position. Peer collaborative learning mechanism encourages the peers to

complement each other to close knowledge gaps. In addition, earlier in the project meeting in March 2015, the UK researchers brought in peer review by encouraging learners to review and rate the learning materials developed by their peers. Figure 4.10 summarises the conceptualisation of peer-to-peer interaction by the UK researchers.

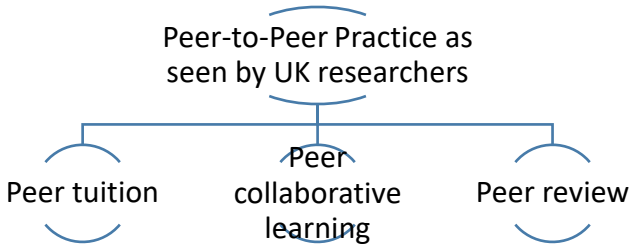


Figure 4.10 The Conceptualisation of Peer-to-peer Interaction on the SLEND and in its Context by the UK Researchers

From the stance of peer tutors and research assistants, there are many more aspects of peer-to-peer interaction. This is probably due to the fact that they are the practitioners and have direct experience of peer-to-peer interaction unlike the UK researchers. Taking a close look at the output of data analysis from NVivo (see Figure 4.11), it seems that the research assistants and peer tutors painted a more detailed picture of peer-to-peer interaction from their own experience, with 71 references out of 78 in total (see Table 4.1). The research assistants and peer tutors not only evaluate how important peer-to-peer interaction is, but also express in what ways it can be realised.

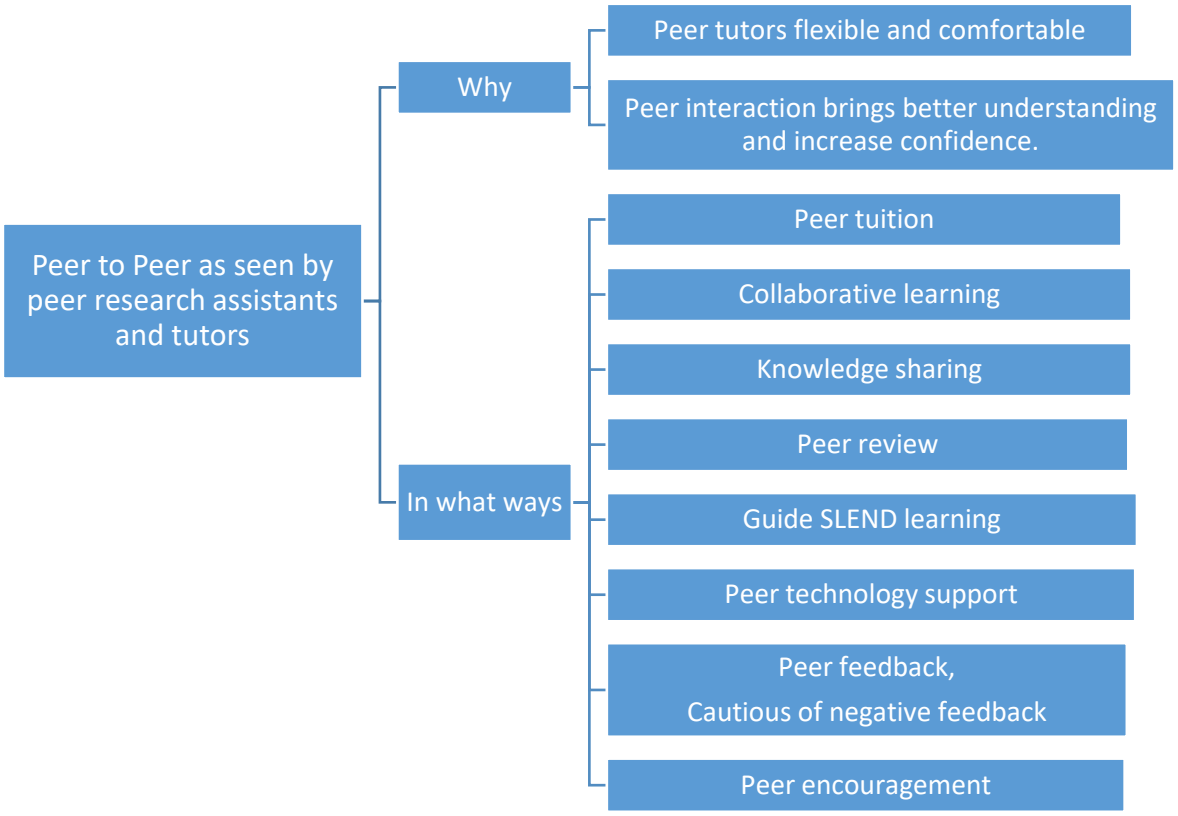


Figure 4.11 The Interpretation of Peer-to-peer Interaction on the SLEND and in its Context for the Deaf Research Assistants and Peer Tutors

Peer-to-peer interaction helps to raise Deaf learners' confidence in learning and communication. They were more confident to communicate with their peers. For example, RA_C pointed out the psychological concern of Deaf learners during January focus group discussion, "Deaf students are fear to ask hearing students but Deaf students are possible to confident to ask to Deaf teacher because they felt same life." During the focus group discussion in June 2015, RA_B mentioned that it is easier for the Deaf learners to communicate with their peer tutor rather than the hearing teachers they had before. Freer communication and better understanding via sign language offered them more confidence to initiate communication.

As for in what ways peer-to-peer works, similar to the UK researchers, the peer tutors and research assistants acknowledge peer tuition, collaborative learning and peer review as the essential components. For example, RA_A stated during the focus group discussion in June 2015 that peer tutors and learners with different background and skills were able to share and benefit from collaborative learning. As for peer tuition, instead of being unidirectional, it is actually bidirectional to the peer tutors' understanding. The two-way interaction is considered to be supportive of language learning. PT_C talked about his own experience during focus group discussion in January 2016,

> "Tutor and students discussed about learnt more. Tutor had learned new anything from student for example vocabulary and grammar. Students have discussed and tried to ask peer tutor so tutor did not know it then he tried to read dictionary and google search etc. Then he explained to them clearly. It help him learned with English well."

Clearly, the peer tutor also learnt from the learners directly through peer learners' tuition and indirectly via seeking answers to the questions posed by learners. In terms of peer-to-peer assisting areas, the peer tuition is not restricted to English teaching and learning. It includes technology, SLEND operation and sign language. Another dimension of peer-to-peer interaction is collaborative learning across centres. Each learning centre is responsible for development of certain learning sessions. They benefit from the collaboration and communication from each other.

In addition, peer tutors receive support from the peer research assistants from time to time including teaching, learning, research and administration. During the RA focus group discussion in January 2016, RA_B mentioned that he explained to the PTs through WhatsApp group chat about integrating the learning materials about No/Don't into one learning session. RA_C told the story how he guided the PTs to make real life English learning more interesting based on the knowledge he received from the training in June. RA_A reported that he checked the weekly monitoring reports and found some of them were missing. Then he talked to PTs and explained to them in detail how to upload the reports to the shared folder.

A unique reflection on peer-to-peer interaction from the peer tutors and research assistants is that they pay specific heed to Deaf learners' affective aspect of learning. They tend to have more empathy with the Deaf learners as they share their experience of life, study and work as member of the Deaf communities. For example, regarding peer feedback, during the focus group discussion in June 2015, RA_B recommended not to give negative feedback to the Deaf learners, which might cause stress to them and lead

to dropouts. PT_B (June 2015) underlined the significance of peer encouragement and proposed to encourage Deaf learners to make enquiries.

4.1.6 Web 2.0 Technology-Enhanced Provision

The entire course is blended in nature and the Web 2.0-enriched SLEND platform is complemented with classroom learning and after-class Web 2.0 tool. These important components of the course forge a multi-directional triangular relationship (see Figure 4.12). This hybrid combination is not rare and has been utilized in previous research (Miller, 2006; Mchichi et al., 2012; Marzano et al., 2016; O'Connell, 2016).

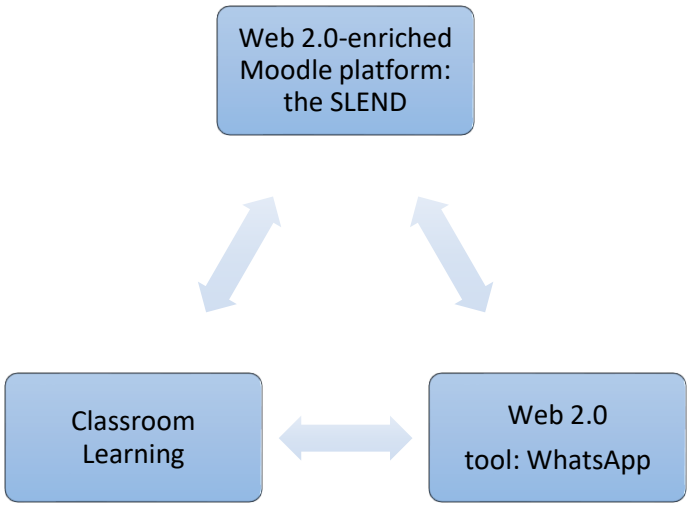


Figure 4.12 Triangular Relationship of the Peer-to-Peer Deaf Literacy Course

In the project proposal, it is mentioned that an open resource Moodle platform will be developed in combination with local teaching. The UK researchers decided to use a Moodle platform as the carrier of the learning content after a sub-group meeting in March 2015. The use of Moodle as the platform is due to convenience as it is available from the partner university. It is also due to the philosophy behind the design and development of Moodle platform (Moodle, n.d.), which believes "… groups construct knowledge for one another, collaboratively creating a small culture of shared artifacts with shared meanings. When one is immersed within a culture like this, one is learning all the time about how to be a part of that culture, on many levels."

The philosophy underpinning the Moodle platform agrees with the theoretical framework of literacy for the P2P Deaf literacy course, viewing Literacy as a Social Practice (LSP) (see Section 2.3.3). That is, the default features of the Moodle platform ensure that Deaf learners continually construct their English literacy knowledge while engaging in a shared culture of learning in the sense of the above quote.

The SLEND platform is enriched with a series of Web 2.0-featured functions. A wide array of Web 2.0 features have been embedded in the Moodle platform (McLoughlin & Lee, 2008). For example, the *Sharing Space* on the SLEND allows learners to create their profiles for community sharing. The database function enables collective contribution and creation. The function of commenting and the discussion forum facilitates interaction and communication within the e-learning community. More notably, although the Moodle platform is generally for organizational and institutional uses, and

more organization/institution-oriented, SLEND is an untypical community-based Moodle platform, which serves the learners without the control and oversight from any organization or institution.

Unlike other Moodle platforms mainly functioning as information dissemination (Hamuy & Galaz, 2010) and sharing course materials uploaded by the teachers (Deng & Tavares, 2013), on the SLEND, both peer tutors and learners are responsible for development of materials. That is to say, learners play an interactive and proactive role for the teaching and learning activities on the SLEND.

Learning that takes place in the physical classroom is the initial analysis of the real-life learning materials collected by each centre. After discussion of the raw materials, they clarify their understanding, figure out what to be uploaded to the SLEND and develop the ISL learning materials themselves. During the focus group discussion in June 2015, RA_C commented that it is rare for Deaf NGOs and schools to synthesize classroom learning, lab session and independent learning on the virtual learning platform. He believed that this synthesized course is efficient in improving learners' English skills.

Learners can access the SLEND platform through different devices, including desktop computer, laptop, tablet, and mobile phones. Both UK researchers and research assistants emphasized the importance of multi-access. According to the feedback from the UK researchers in the project meeting in June 2015, learners have more mobile phones than laptops and computers (see more information in Sections 0 and 3.6.2). RA_C also endorsed the need for multi-access of the SLEND anytime anywhere,

> "After deaf students learn at class, they go home and when they get free time, they use internet include on mobile and may use computer at home. This means possible virtual learning platform." *(from Focus Group in June, 2015)*

Despite the need for mobile access, in reality, it is problematic and details of feedback on mobile access will be discussed in Section 5.2.6.

Deaf learners initially sought WhatsApp group chat for communication during and after the course, which is a typical Web 2.0 tool. The adoption of WhatsApp reflects the September project meeting discussion of the social network mechanism, which offers the opportunities for communication, cooperation, sharing and socialization with others (Kesim & Altinpulluk, 2013). The UK researchers' original plan was to set up Twitter, Facebook and WhatsApp accounts for dissemination and communication in February 2015. Interestingly, at the implementation stage, the Deaf participants agreed on the use of WhatsApp group chat for instant connection and communication. One UK researcher commented in January 2016, "It is interesting how important WhatsApp has become, given that we did not envisage this in the beginning; it is easier to access and manipulate."

A variety of WhatsApp groups were set up for communication including learners' group, centre group, and PTs & RAs group (see more discussion in Section 5.2.5). It is worth noting that there were more WhatsApp groups than those listed. Gradually, some of the chat groups were closed because of inactiveness. For example, one UK researcher attempted to set up a mixed group with one learner from each learning centre and one peer tutor in January 2016. However, it turned out that each of these groups had minimal interaction by March 2016 and had to be closed. By contrast, the learners' group was still functioning even after the intervention had ended. The employment of

WhatsApp group chat as the Web 2.0 technique fosters their communication in English and increases the opportunity for learners to input and output spoken English. The use of WhatsApp group chats instantiates the transfer of English language speaking and listening, originally absent for Deaf learners, to the online communication context. Meanwhile, it is an important mechanism to ensure the smooth operation of the course.

The use of WhatsApp Group chats is a supplement and reflects the combined use of a Web 2.0 tool with the Web 2.0-enhanced Moodle platform. This resonates with previous research (Yu, Tian, Vogel, & Kwok, 2010) which reported the beneficial role of online social networking in enhancing self-esteem, increasing learners' social interaction and improving learning performance. In comparison, WhatsApp Group chats are more social-driven whereas Moodle platform is more academic-oriented. In a similar vein, Deng and Tavares (2013) found that a Moodle platform is less interactive and social than online social networking, in this case, Facebook.

Multimedia materials were developed and put to use by participants on the SLEND. One research assistant commented on the positive role of multimedia materials during the focus group discussion,

> "SELND includes English texts with video, photo, example for, etc, which is used by peer teachers, research assistant, other etc and which make deaf students are interested in learning more by using online as well as peer teachers and deaf students improve skills. Compared to, teachers of deaf schools have limited materials." (RA_C, from Focus Group in June, 2015)

For instance, each glossary entry is presented with text, ISL video and pictures (both content and context pictures, see Figure 4.13). A context picture is differentiated from a content picture. A context picture illustrates the context in which the concerned vocabulary is used, whereas a content picture portrays the meaning of the vocabulary. Previous studies (Cannon & Guardino, 2012; Evans, 2004; Bailes, 2004; Beal-Alvarez & Cannon, 2014) also propose a multimedia/multisensory way to present vocabulary and grammar to Deaf learners. The use of multimedia expands the traditional view of literacy to a broader context of multiliteracy/multiliteracies.

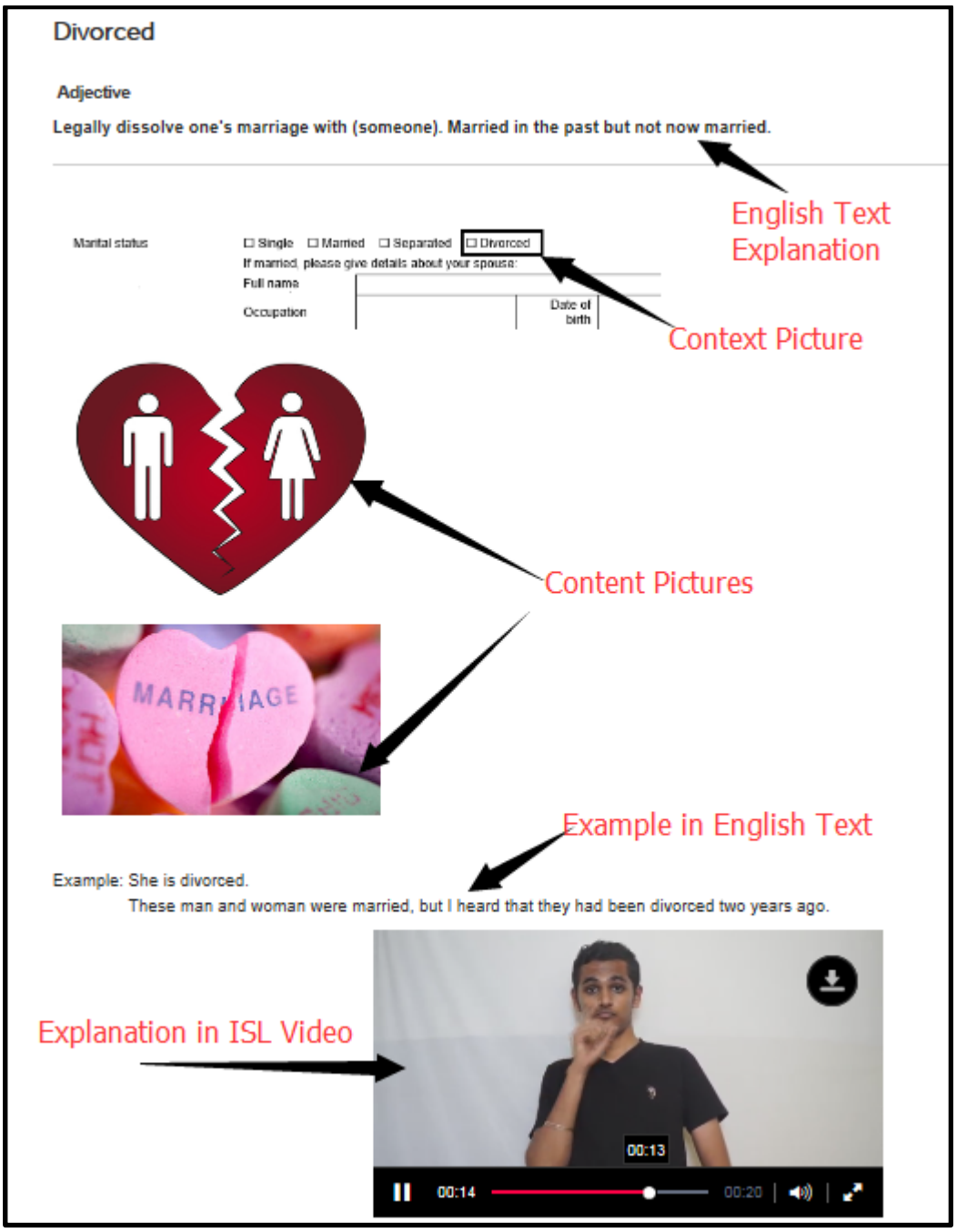


Figure 4.13 An Example Entry from the Glossary

Another technology-assisted technique is the use of captioning and subtitling especially for the ISL videos. An example is presented in Figure 4.14. During the focus group discussion in January 2016, PT_A praised the benefits of technology that enables the combination of ISL videos and English subtitles. Nevertheless, due to PTs and learners' limited English proficiency and the large number of ISL videos on the SLEND, many ISL videos did not have English subtitles or captions. During the focus group discussion (January 2016) PT_B also referred to learners' request for subtitles as not every video was subtitled. For example, learners were fond of the component of "Useful Language" and requested English subtitling for the ISL videos in this part.

Figure 4.14 An Example of ISL Explanation Video with Subtitles

To sum up, the three components of the P2P Deaf literacy course complement each other. The SLEND platform is mainly for independent study, collaborative learning and materials development among different centres. The classroom learning is the initial stage for the choice of learning materials, clarification of meanings and materials generation. The WhatsApp group chats work as a communication mechanism to ensure the smooth operation of the other two parts and connect the learners after class.

4.1.7 Emergent Syllabus Mapped to the CEFR

The Common European Framework of Reference for Languages (Levels A1-A2) is used in the P2P Deaf Literacy project as "a modified scale" (P2P Deaf Literacy Project Proposal), that is, it is adapted to Deaf learners' needs. As suggested in the project proposal, it is not only for assessing the learning achievements but also for guiding the teaching and learning. Since the learning outcomes are benchmarked against the modified CEFR, this enables the evaluation of Deaf learners' performance in India against the internationally-recognized external standards (P2P Deaf Literacy Project Proposal). Learners and peer tutors took three tests (pre-, post-, delayed post-tests) as well as self-assessment questionnaires benchmarked against the modified CEFR. The post-test at the end of the intervention shed light on their English proficiency while the delayed test indicated the retention of learning.

Besides the tests, the CEFR was also expected to be embedded in each learning session via Can-Do statements. The Can-Do checklist was viewed as the last component of each session (Project meeting, June 2015). In this way, learners can practice their self-assessment ability, while peer tutors and UK researchers can discover learners' strengths and weaknesses. However, it seems that this was not a successful exercise in the field. It is potentially due to limited knowledge of the CEFR among the Indian field research team as well as the practice of developing self-assessment checklists being unusual for learners and peer tutors. This may imply that the training of the CEFR was

insufficient, and more training should be arranged. This point is addressed in the next section.

Concerning the aspect of guiding learning and teaching, the UK researchers constructed a syllabus (see Appendix 12) to guide learning and development of learning materials (Project Meeting in October 2015). The syllabus is modified from the descriptors of the CEFR A1-A2 in the format of Can-Do statements. Each Can-Do statement is explained further with three other aspects: functions, example exponents and lexical fields. For example, for the Can-Do statement of "can understand short, simple text message"[19], it can be interpreted as the functions of "giving information, locating key information, making arrangements, saying hello and closing". The example exponents exemplify the sentence patterns involved, such as "I'm_____ /Class is on Friday, 10 am/Come on/10 July/See you Friday./What time shall we meet? Hello/Hi/How are you? Thanks for the information/See you soon/then, BYE". The inclusion of the example exponents in the syllabus echoes UK Researchers' design concept of treating grammar learning as identification and practice of sentence patterns in Section 4.1.2. A range of lexical fields regarding this Can-Do statement is also provided in the syllabus. By interpreting the Can-Do statements through functions, example exponents and lexical fields, the intention was that the peer tutors and learners will be able to understand the syllabus and refer to it when needed in the process of materials development. It is by no means to impose a prescriptive syllabus on Deaf learners; instead, it provides insights for learners to create a dynamic syllabus naturally.

In fact, the development of functions, example exponents and lexical fields was attributed to the feedback from peer tutors and research assistants. They failed to understand the CEFR and Can-Do statements in depth. Meanwhile, identification of certain statements, functions, example exponents and lexical fields tends to be extremely challenging. One UK researcher who is an expert in Deaf education in India explained this phenomenon and expressed UK researchers' stance during the project meeting in October 2015, "It is a skill to look for patterns; Indian deaf learners have often been told to memorise and reproduce, and we do not want them to simply reproduce what they see on the SLEND."

By January 2016, a summarized matching map (see Appendix 13) was available and discussed during the project meeting. Even though the CEFR-based syllabus provided by researchers was only partially covered in teaching and learning, the UK researchers confirmed that they did not intend to enforce the syllabus onto the field teaching and learning. They prioritised learning needs (Project meeting in February 2016). That is to say, learners and peer tutors were free to choose and develop the learning materials based on their own interests. To this effect, a dynamic syllabus emerges from the learning content created by learners and runs parallel to the one provided by researchers. Learners are able to create learning content and form a dynamic syllabus based on their own needs, and at the same time, cross-check what they have developed with the CEFR-based syllabus without sacrificing the ethnographic approach. In the end, by comparing learner-created content to the CEFR-oriented syllabus, the tension between the local ethnographic literacy approach and the global CEFR framework is revealed. Under the auspices of the New Literacy Studies mentioned in Section 2.3.3,

[19] This is adapted from a descriptor of level A1 in consideration of Deaf learners' usual practice in a technology-assisted environment. The original description is "can understand short, simple texts" (Council of Europe, 2011).

English literacy is viewed as being deployed for local and everyday purposes (Wallace, 2002). In this way, English literacy is not regarded as the 'global' and 'universal' skills possessed by learners; instead, it is perused as a contextualized practice (Barton, 1994). In other words, English literacy is local practice in private domains such as family life, in contrast with public ones like media and education (Wallace, 2002).

4.1.8 Continuous Training and Support

The characteristic of training and support surfaces in the meeting minutes and focus groups. The success of e-learning is heavily reliant on adequate and continuous technical support for users. In the absence of these scaffolds, users might not be able to fully leverage the potential of the technologies regardless of their motivation and enthusiasm (Protsiv & Atkins, 2016).The training and support is comprised of both formal and informal training. For formal training, project staff attended three training workshops: one two-week training before the intervention began and two one-week workshops during the project period. One peer tutor expressed how training affected him:

> "I said that I did not know define about peer to peer. After there had trained peer to peer two weeks, I was clearly it. If there had trained us, we would teach wrong." *(PT_C, from PT Focus Group in June, 2015)*

The formal training covers a variety of topics, including real life English, ethnography, operation on the SLEND platform, and data collection. The training workshop in June 2015 did touch upon the concept of the CEFR. However, without detailed explanation and practice, the peer tutors and research assistants were way far from understanding, utilising and implementing it. This highlights the importance of sufficient training regarding new concepts to the research assistants and peer tutors.

In the process of implementation, it becomes clear that informal training is as important as formal training. Besides its assisting role for formal training, informal training is especially suitable and effective in terms of solving emergent problems. User Guide and instantiation through templates and examples were two frequently-used techniques of informal training and support. The UK researchers proposed a manual guide for the Deaf field team in January 2016. SLEND User Guide in the form of PDFs with English text, successive screenshots and screen recordings were customized in response to a discussion in the project meeting of March 2015. In fact, the original plan of SLEND User Guide was in the form of PDFs with successive screenshots. Later, when the peer tutors and research assistants received the User Guide, the leading research assistant replied on behalf of them that they preferred the format of screen recordings for easier and faster understanding.

Instantiation is another essential means of informal training and support to guide the Deaf peer tutors. Templates for Moodle activity and example sessions were also requested in the project meeting in September 2015. Corresponding to the request, five example sessions were developed by research assistants and me (see details in Table 4.2). Meanwhile, templates and examples of session planning (See Appendix 14 and Appendix 15) were also developed upon their request. After receiving the examples, they were encouraged to submit their own examples (See Appendix 16).

One distinguishing feature of the training and support provided to the Deaf field team is its continuity throughout the project. It is very unlikely that the Deaf team can have full understanding all at once. In fact, they need continuous support to figure out the

difficult points. For instance, as seen in the meeting minutes in January 2016, the UK researchers found out that the research assistants and peer tutors were still confused about session planning even though the templates and examples of session planning were sent to them in October 2015. In this circumstance, the UK researcher decided to provide continuous guidance, such as a drawing with explanations in ISL and then more examples. Besides continuous academic training and support, two UK technicians were available for continuous consultation in case of emergency and unresolved technical problems.

One unaddressed request for support until the end of the P2P Deaf Literacy project is English language support. RA_A reported to me through WhatsApp group chat that they were not confident about their written English. The peer tutors were also concerned about their English proficiency and committing mistakes. PT_B requested English language assistance from the research assistants,

> "… I failed to make exercise in SLEND because my English grammar is not good. Therefore I need to take care students learn features well without error. I suggest that first I send draft subtitle dialogue to Research assistants and then they check and make correct to draft subtitle dialogue. They send it to me and I put it in useful language of SLEND. … I am happy that research assistant make exercise related to my session. "

After discussion within the UK researcher team, English language support was not implemented for two reasons. Firstly, the Deaf field team were encouraged to maximise their own practice of English. Secondly, the project intended to raise the Deaf learners' awareness of "they can". Providing English language support, especially through the hearing staff probably puts the "Deaf-led" approach at risk and weakens its impact. However, the English language problem is acknowledged and will be considered in future projects.

4.2 KEY COMPONENTS OF THE SLEND AND ITS CONTEXT AS A PARTICIPATORY AND INTERACTIVE E-LEARNING SYSTEM

All characteristics of the SLEND identified in Section 4.1 are expected to exert concerted efforts and constitute a participatory and interactive e-learning system. By relating the findings in Section 4.1 to previous studies of e-learning systems, this section first maps the characteristics to the framework of the e-learning systems.

Existing studies on e-learning systems and e-learning ecosystems (Chang & Guetl, 2007; Aparicio, Bacao, & Oliveira, 2016; Brodo, 2006) widely accept people, technology and service as the three main components of an e-learning system, although the terminology of each component varies slightly in different models. The characteristics of the SLEND are further discussed by attributing them to each component of an e-learning system in this sub-section.

4.2.1 The Component of Stakeholders

The 'people' component of the current e-learning system, referred to as "stakeholders", is a wider notion than those proposed by Brodo (2006) and Nikolaidou et al. (2010), slightly different from Chang's (2008) biotic units, which includes the roles of content providers, consumers and consultants. Specifically, the stakeholder roles comprise

learners, peer tutors, research assistants, academic and technical consulting teams within the Deaf community and beyond. The characteristic of continuous training and support is also classified as belonging to the component of stakeholders as it is highly relevant and crucial to stakeholders' interaction with the other two components (technology and pedagogy).

Underpinning these characteristics, Deaf young adults are guaranteed to have the primary stakeholder role. An aspect worth highlighting in relation to the stakeholder roles involved in the SLEND is that each Deaf learner or peer tutor could act interchangeably in different roles as a content producer, a consumer and a consultant at different occasions (see Figure 4.15). With their own skills and knowledge, they are complementary to each other while learning English literacy on the SLEND. In this way, learners' participation in learning is enhanced by playing different roles in the e-learning system.

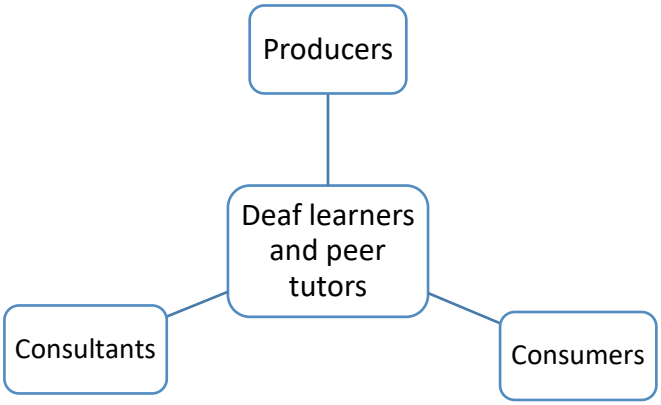


Figure 4.15 Deaf learners' and peer tutors' roles as producers, consumers and consultants

4.2.2 The Component of Pedagogy 2.0

The 'service' component is revised as 'pedagogy', which refers not only to the learning materials and activities, but also, more importantly, to the pedagogical considerations in generating the content. That is to say, both learning resources as "product", and the underpinning pedagogies as "process" together are regarded as one component of the e-learning system in the specific context of Deaf young adult learners' English literacy development. The pedagogical considerations reflect the learning conditions mentioned in Chang's model (2008). Therefore, the 'pedagogy' focuses on what the content is, how it is developed and learnt. To be more specific, the characteristics of the SLEND including topic-based real life English and emergent syllabus mapped to the CEFR fall into the 'what-strand' pedagogy by addressing what to create and learn. Meanwhile, Deaf-led implementation, learner-created content, sign bilingualism and peer-to-peer interaction belong to the 'how-strand' pedagogy through addressing how learning takes place.

The key pedagogical considerations such as emergent syllabus, learner content creation, peer communication and interaction not only fully conform to the principles of pedagogy 2.0, but also highlight the three elements of pedagogy 2.0: participation, productivity and personalisation (McLoughlin & Lee, 2008). Pedagogy 2.0 places learners' needs and choices at the centre of learning, purports collaborative learning, peer production, interaction and innovation.

4.2.3 The Component of Web 2.0 Technology

The 'technology' component offers the basis for the interaction of stakeholders and pedagogies from different regions. To some extent, it resembles to the physical and chemical environment in the natural system, which fosters continuous fluxes of content and stakeholders. To be more specific, it is a Web 2.0 technology-enhanced Moodle learning platform supplemented with a Web 2.0 social tool, namely, the WhatsApp group chats. Moodle application is also available for users as a mobile-friendly interface, which responds to the higher ownership of phones compared with laptops and computers in India. Meanwhile, the infrastructure also responds to the needs of pedagogy and stakeholders. For example, multimedia materials with substantial ISL videos and pictures/photos are on the SLEND platform. This is due to the use of ISL as language of instruction and communication which leads to large numbers of ISL videos. Similarly, the ethnographic approach of materials development brings about photos taken by learners from real life that are redeveloped into learning materials through technology.

Referring to the definition of ecosystem at the beginning of Section 2.5, the three components of stakeholders, pedagogy and technology correspond to the organisms, non-organisms and the physical, chemical environment of a natural ecosystem. With sufficient interaction within and between the components, knowledge as energy of the natural ecosystem is produced and consumed by learners and peer tutors on the SLEND.

4.3 CHAPTER SUMMARY

Through a thematic analysis of the data from documentation and focus group discussions, a list of factors have emerged as the key characteristics of the SLEND from the viewpoint of UK researchers together with research assistants and peer tutors, namely, Deaf-led implementation, topic-based real life English, learner content creation, sign bilingualism, peer-to-peer interaction, Web 2.0 technology-enhanced provision, emergent syllabus mapped to the CEFR, continuous training and support. These characteristics and their sub-features orchestrate with each other to construct an e-learning system.

With adaptation to the framework proposed by Aparicio et al. (2016) (see Figure 2.4 in Section 2.5.4), an initial framework for the e-learning system for Deaf young adults' English literacy attainment is proposed and illustrated in Figure 4.16.

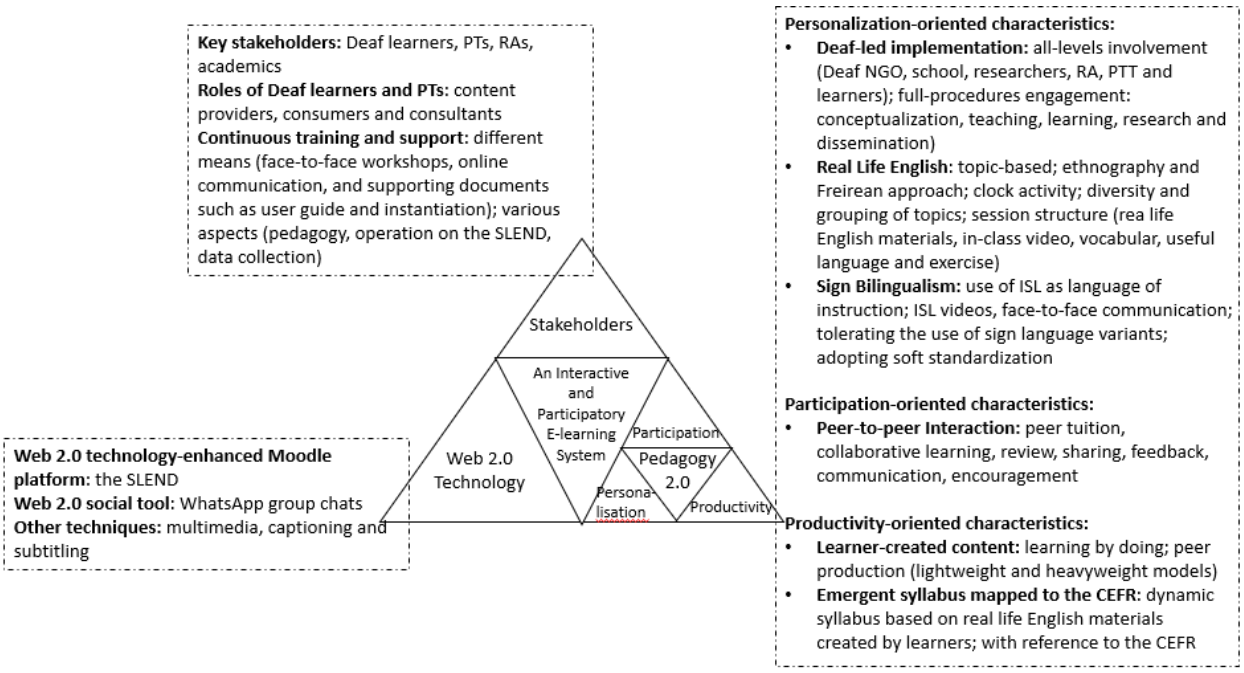


Figure 4.16 An initial framework for an interactive and participatory e-learning system for Deaf young adults' English literacy attainment (based on design concept)

This initial framework takes a similar format to the one proposed by Aparicio et al. (2016), namely, a triangle comprised of the three main components of the e-learning system with further elaboration of each component in rectangular boxes. By referring to the e-learning ecosystem models proposed by previous studies (Brodo, 2006; Chang, 2008; Nikolaidou et al., 2010), the three main components of this framework are stakeholders, pedagogy and technology. Both technology and pedagogy are aligned with the interaction approach and the participatory approach. Different from previous e-learning ecosystem models, pedagogy in the current framework is termed as pedagogy 2.0 which advocates learners' participation, personalisation and productivity, while technology in the current framework is named as Web 2.0 technology which affords learners' active participation and interaction.

The detailed composition of the three main components of the e-learning system in the dotted rectangles is different from previous e-learning ecosystem models and frameworks, as this is the application of the previous models to a specific domain, Deaf young adults' English literacy attainment. To be more specific, pedagogy 2.0 refers to the product, learning materials based on real life English and created by learners, as well as the underlying pedagogical considerations in developing the product, such as sign bilingualism, emergent syllabus mapped to the CEFR, peer-to-peer interaction and Deaf-led implementation of teaching and learning. Each of the characteristics is inclined to support participation, personalization or productivity of pedagogy 2.0 correspondingly (see the division in Figure 4.16), although the boundaries tend to be blurred.

The stakeholders consist of Deaf learners, peer tutors, research assistants and academics. The Deaf learners and peer tutors act within three roles in the e-learning system, as content consumers, providers and consultants. Their multiple roles are inevitable especially in a low-resource context lacking qualified teachers. Continuous training and support are in place for Deaf peer tutors and research assistants who are the drivers of the implementation of the intervention. The dimension of technology

covers the Web 2.0-enhanced Moodle platform, multimedia materials developed by learners, and the Web 2.0 social tool, WhatsApp group chat, for casual learning and social communication as well as the multi-access to the platform. The initial framework is further verified and enriched in the next two chapters by examining the learner experience and learning outcomes.

CHAPTER 5 LEARNER EXPERIENCE

This chapter is dedicated to examining the learner experience to determine the effectiveness of the previously-taken actions for the SLEND and inform further development. It is also assumed that positive learner experience serves as an essential criterion to justify the efficiency of the SLEND as an interactive and participatory e-learning ecosystem and adds evidence to research in the field of e-learning for the Deaf communities.

To evaluate the effectiveness of the SLEND, a closer look at learners' experience is conducted firstly through quantitative means of a Likert-scale questionnaire, and then through semi-structured interviews with learners, to add a qualitative angle. In this Chapter, firstly, I present the findings of the overall learner experience (see Section 5.1), then introduce the learner experience of each characteristic of the SLEND one by one in Section 5.2. To triangulate the findings of learner experience of each characteristic, quantitative findings from the questionnaire are reported together with corresponding qualitative findings from the interview. The correlation between experience of each characteristic is scrutinized in Section 5.3. The Chapter concludes with a summary of the main findings of learner experience alongside with some suggestions and unique experiences of learners.

5.1 OVERALL LEARNER EXPERIENCE

Most of the statements in the questionnaire derive from the identified characteristics of the SLEND, while some focus on general feedback about the intervention. From the initial quantitative analysis of the questionnaire, the statements with relatively lower means of learners' responses were identified and have been developed into interview questions, which moves the research data collection to the next stage. This sequential/cyclical design of research methods is typically representative of the developmental evaluation (Patton, 2011) as well as the transformative paradigm (Mertens, 2012). 44 learners[20] completed the Likert-scale questionnaire by the end of February 2016. These same learners attended the small-group interview organized at each learning centre at the end of March 2016.

Each of the 24 statements in the Likert-scale Questionnaire scales along the options of "Disagree (1), Disagree Somewhat (2), Not Sure (3), Agree Somewhat (4) and Agree (5)". Different facial expressions appear in the questionnaire to facilitate learners' understanding of the responses in Table 5.1. Response averages across all answers have been rounded to the corresponding whole number from 1 to 5. Accordingly, 1 refers to negative experience, 2 refers to somewhat negative experience, 3 refers to neither negative nor positive experience, 4 refers to some positive experience and 5 refers to positive experience.

[20] The actual number of learners who completed the learner experience questionnaires is 44, different from the actual number of learners who completed pre-, post-tests and pre-, post- self-assessment, and dropping to 43.

Table 5.1 Categorization of Learner Experience Based on Average Responses to the Likert-scale Questionnaire

Scales	Facial Expressions	Average Score Range	Category of Experience
Agree (5)		4.5-5.0	Positive experience
Agree Somewhat (4)		3.5-4.4	Somewhat positive experience
Not Sure (3)		2.5-3.4	Neither positive nor negative experience
Disagree Somewhat (2)		1.5-2.4	Somewhat negative experience
Disagree (1)		1.0-1.4	Negative Experience

With reference to the criteria of categorization of learner experience mentioned above, two statements have a rounded response average of 5 (positive experience), 19 statements average 4 (somewhat positive experience), and three statements average 3 (unsure experience) and no statements average below 3. The overall average for the 24 statements scored by 44 learners is 4.0, interpreted as “somewhat positive experience”. This indicates that the learning experience on the SLEND in every aspect for the 44 learners is generally positive to some extent. The average score for each statement can be found in Figure 5.1.

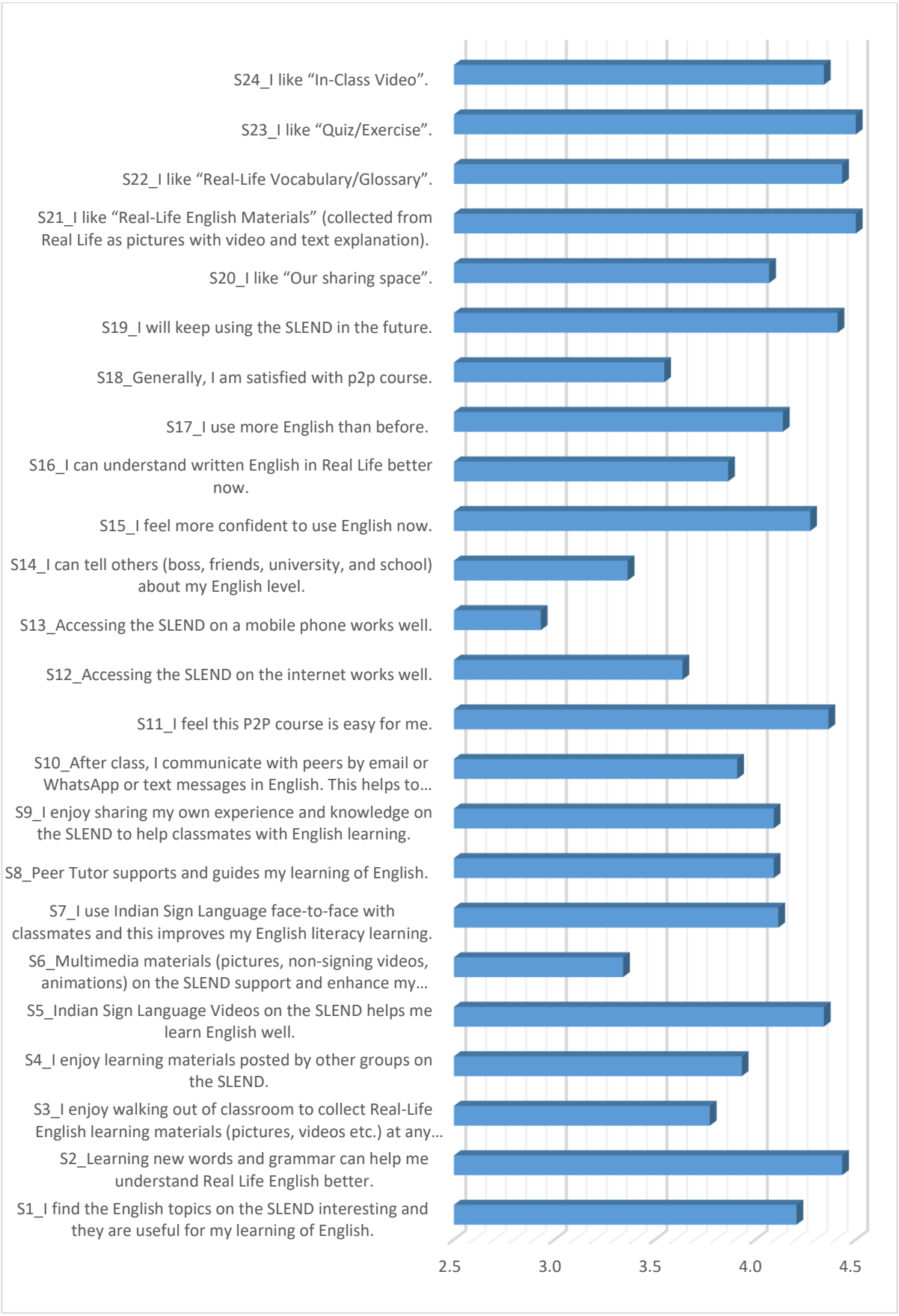


Figure 5.1 44 Learners' Mean Response to Each Statement in the Likert-scale Learner Experience Questionnaire

When the average learner experience is scrutinized in terms of different learning centres, four centres responded with similar averages of 3.8-4.2, while the Vadodara Centre outperformed them with an average of 4.4. This means that the overall learner experience of the course was best at the Vadodara Centre, followed by centres in Thrissur, Indore, Coimbatore and Palakkad respectively (see Table 5.2).

Table 5.2 Average Scores of the Responses to Learner Experience at Each Learning Centre

Learning Centre	Average Learner Experience (24 Statements)
Mean (= 44)	4.0
Vadodara Centre (n = 6)	4.4
Thrissur Centre (n = 10)	4.2
Indore Centre (n = 12)	4.0
Coimbatore Centre (n = 6)	3.9
Palakkad Centre (n = 10)	3.8

These results of learner experiences are examined closely in the following passages in terms of the key characteristics of the SLEND, its context and general feedback. Meanwhile, the figures of learner experience are justified and explained with the findings from the interviews with the learners.

5.2 LEARNER EXPERIENCE OF EACH CHARACTERISTIC OF THE SLEND

5.2.1 Learners' Experience of Real Life English

Learners are content with learning real life English materials which they developed themselves with peer tutors. The materials feature images of real life English in concrete situations, with video and text explanation. This can be seen from their responses to S1 (I find the English topics on the SLEND interesting and they are useful for my learning of English.) and S21 (I like "Real Life English Materials" collected from real life as pictures with video and text explanation.) in the learner experience questionnaire (see Table 5.3). The average response scores are 4.2 and 4.5 respectively, somewhat positive and positive accordingly. This confirms that learners welcome the approaches informed by ethnography, Freirean approach and real life English used in the course.

Table 5.3 Average Scores of the Responses to S1, S3, and S21 in the Questionnaire at Each Learning Centre

Learning Centre	S1 I find the English topics on the SLEND interesting and they are useful for my learning of English.	S3 I enjoy walking out of classroom to collect real life English learning materials (pictures, videos etc.) at any places (Railway station, Mall, Zoo, etc.)	S21 I like "Real Life English Materials" (collected from real life as pictures with video and text explanation).
Mean (n = 44)	4.2	3.8	4.5
Coimbatore Centre (n = 6)	4.2	3.5	4.5
Indore Centre (n=12)	4.4	3.8	4.4
Palakkad Centre (n = 10)	3.5	3.6	4.3
Thrissur Centre (n = 10)	4.3	4.0	4.6
Vadodara Centre (n = 6)	4.8	4.0	5.0

Besides their responses to the statements (S1, S21) in the questionnaire, learners' positive responses to the use of real life English is also evident from their answers to Q1 (Do you feel real life English topics useful from P2P Deaf literacy course? Why?)[21]. They refer to real life English learning as a 'unique' learning experience which is distinct from the way they have learnt before. This grants them a chance to gain new knowledge as well as English literacy. After class, they were able to instantly apply what they gained from the course to real life situations. A couple of examples are given in the interview. For example, one learner mentioned:

> "I did not know Platform ticket (Railway station). I went to railway station to visit at railway station without platform ticket before. After joining Peer to Peer class, I learnt platform ticket. I realized that if I did not buy platform ticket, I would be fined." *(V_S2)*

In this case, through real life English learning, learners not only improve English literacy skills but also gain life skills. Correspondingly, it enables them to remove barriers caused by English and real-life problems resulting from lack of life knowledge or skills such as the procedures and knowledge to buy a ticket at the railway station. Thus, learners are more likely to accommodate well in real life.

Nevertheless, not every learner was fully engaged in real-life materials collection and development: the average score for S3 (see Table Table 5.3) is 3.8, falling between "somewhat positive" and "neither positive nor negative". This might be due to different practices at the five centres. A closer look at the responses to this statement corroborates this inference. For example, of 10 learners at the Palakkad Centre, two responded with a neither positive nor negative score of 3, while two learners had a somewhat negative experience. In comparison, at the Vadodara Centre, only two

[21] Q1 refers to Question 1 in the interview with the learners. There are 11 questions in the interview which are referred to as Q1-Q11 respectively.

learners responded as neither negative nor positive and the remaining four learners responded with “agree” and “somewhat agree”.

In the interview, the answers to Q2 (Have you been involved in collecting and developing learning materials for SLEND? How? What have you developed?) confirm that most of the learners from Vadodara, Indore and Thrissur were involved in collecting and developing learning materials for SLEND. They outlined two ways of collecting materials: taking photos with their phones, and collecting documents such as railway tickets, SIM application forms, bank application forms, and reservation forms. This reflects the Freirean approach of bringing the importance of Deaf people’s life into learning which is discussed in Section 4.1.2. On the contrary, learners from Coimbatore and Palakkad avoided answering the question or digressed. This could indicate a negative response, or the learners may have misunderstood the interview question. There may also have been a practical problem, and that lack of participation in collecting materials may have led to a more negative experience of the real life English approach.

Based on learners’ feedback, they perceive vocabulary and grammar in relation to their understanding of real life English. In other words, vocabulary and grammar are inseparable from real life English and are essential to language learning. The responses to S2 (see Table 5.4) suggest that learners find vocabulary and grammar helpful for their understanding of real life English, with a mean of 4.4 (somewhat positive). Two elements of SLEND are intended specifically to support the learning of new vocabulary and grammar: “Glossary” and “Useful Language”. Learners grade “real-life Vocabulary/Glossary” relatively highly in S22 (see Table 5.4) with an average of 4.4 (somewhat positive and on the verge of being fully positive).

Table 5.4 Average Scores of the Responses to S2, and S22 in the Questionnaire at Each Learning Centre

Learning Centre	S2 Learning new words and grammar can help me understand real life English better.	S22 I like “real-Life Vocabulary/Glossary”.
Mean (n = 44)	4.4	4.4
Coimbatore Centre (n = 6)	4.3	4.3
Indore Centre (n = 12)	4.4	4.4
Palakkad Centre (n = 10)	4	3.9
Thrissur Centre (n = 10)	4.8	4.8
Vadodara Centre (n = 6)	4.7	4.8

More interestingly, regarding Q4 (Can you describe how you learn each session on the SLEND?) in the interview, learners say that they are able to identify efficient ways of learning real life English. On the SLEND, learners are free to choose what they want to learn, as the learning sequence of SLEND sessions and activities are not restricted. Learners from Palakkad described their experience as follows:

> “In the first, she was fast to learn a session Grammar without RLE, In Class Video and Glossary. She did not clear grammar. She thought that she tried previous a session of RLE, In Class Video, Glossary and Grammar. I cleared to relate easy a session of RLE, In Class Video,

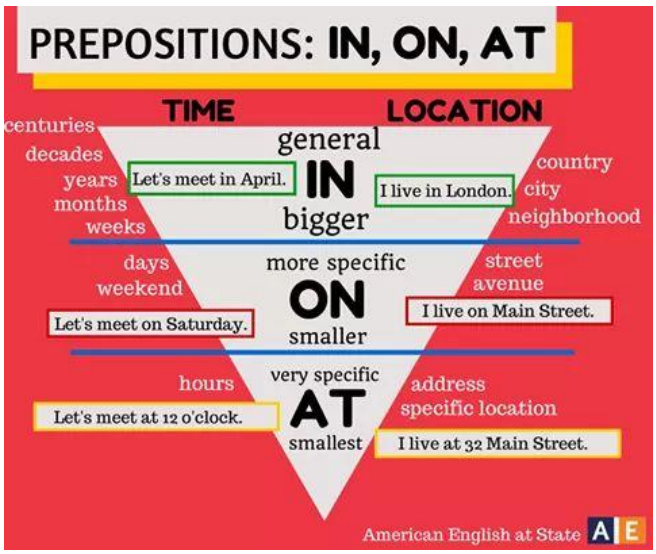
> Glossary and Grammar. She should learn to process on the SLEND." *(P_S4)*

Another learner from the Indore Centre made a similar claim,

> "Step by step I learn RLE, in class video, grammar and exercise so that I understand clearly. If first I choose grammar on SLEND to learn and then RLE, in video class, etc, it looks no clear." *(I_S3)*

In other words, the logic of each session, starting with "Real Life English Materials" with ISL video explanation of the context to activate learners' world knowledge, followed by the pre-teaching of vocabulary in "Glossary" and grammar for metalinguistic awareness-raising in "Useful Language", facilitates Deaf learners' comprehension of learning materials. This learning routine for each session is commensurate with the pre-defined steps proposed by UK researchers during a pedagogic meeting of the P2P Deaf Literacy project in June, 2015 (see Figure 4.5 in Section 4.1.2), and echoes the findings of previous studies that emphasize learning vocabulary and grammar and developing world knowledge (Bailes, 2004; Cannon & Guardino, 2012).

However, due to the delayed development of the "Useful Language" part of each session, and the fact that some parts were developed after the course had been completed, hits for "Useful Language" are not as high as expected. Learners' eagerness of learning English can be seen from their continuous post of grammar instruction pictures and quizzes in the WhatsApp group chat (see Figure 5.2 and Figure 5.3).



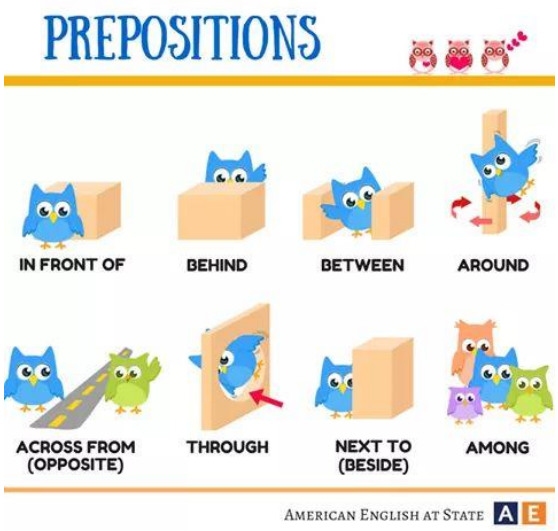


Figure 5.2 Examples of Grammar Instruction Pictures Posted in WhatsApp Group Chat by Learners

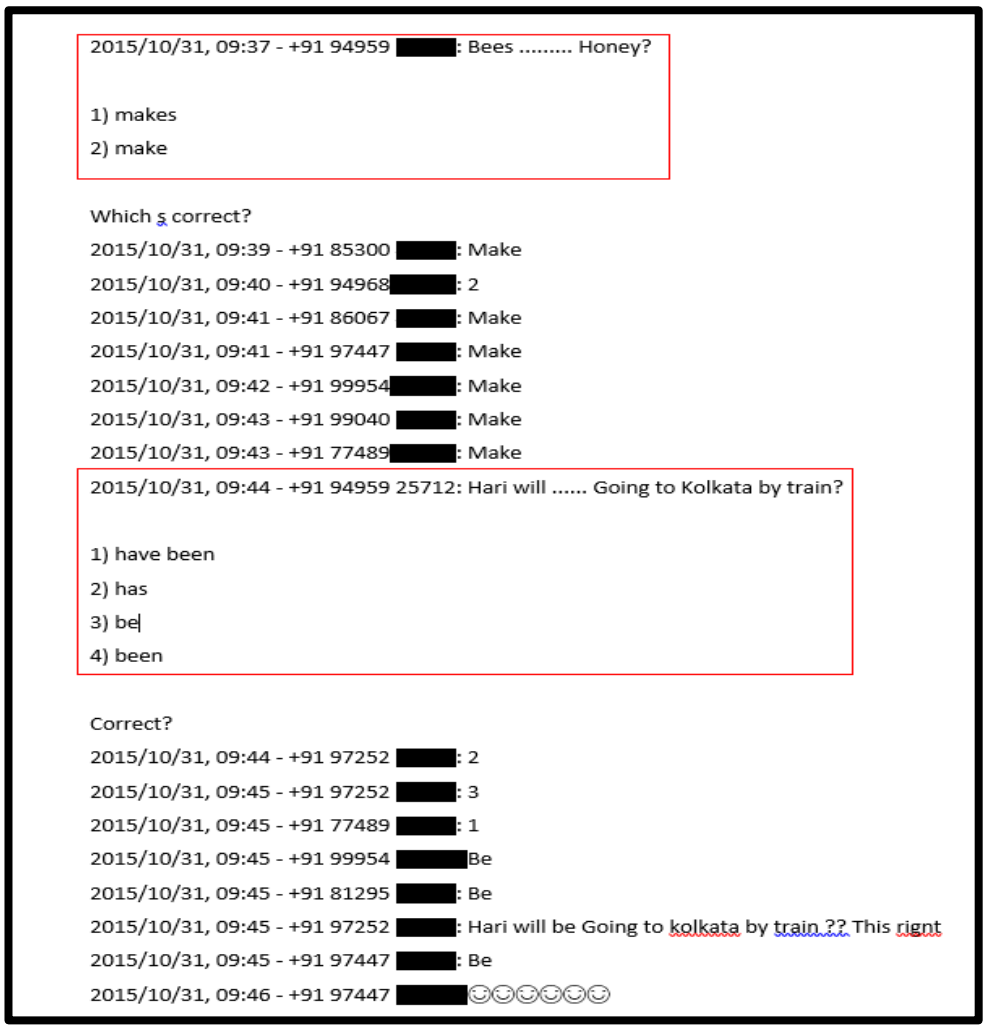


Figure 5.3 A Screenshot of Learners' WhatsApp Group Chat with Grammar Quizzes

At the same time, as most of them are unemployed, the materials they collect for learning are primarily from their lived reality rather than from the workplace.

5.2.2 Learners' Experience of Sign Bilingualism

Learners' perception of utilizing Indian Sign Language (both face-to-face ISL interaction and ISL videos) to improve their English literacy is somewhat positive. This can be seen from their responses to use of ISL videos in S5 (see Table 5.5) and to face-to-face use of ISL in S7 (see Table 5.5) with an average of 4.3 and 4.1 respectively as somewhat positive experiences.

Taking the five centres into consideration as a whole, the helpfulness of ISL videos is slightly higher than face-to-face interaction. For each centre, learners from the Indore Centre overall perceive that face-to-face ISL interaction is more helpful than ISL videos. Whereas the rest of four centres consider ISL videos are more helpful (see Table 5.5). Learners from the Vadodara Centre consider their experience of use of ISL to gain English literacy (S5) as positive with everyone rating 5, as unanimously positive experience. The experiences of learners at the other four centres are slighter lower as somewhat positive or near somewhat positive.

Table 5.5 Average Scores of the Responses to S5, and S7 regarding Use of ISL in the Questionnaire at Each Learning Centre

Learning Centre	S5 Indian Sign Language Videos on the SLEND helps me learn English well.	S7 I use Indian Sign Language face-to-face with classmates and this improves my English literacy learning.
Mean (n = 44)	4.3	4.1
Coimbatore Centre (n = 6)	3.8	3.7
Indore Centre (n = 12)	4.2	4.3
Palakkad Centre (n = 10)	4.3	3.8
Thrissur Centre (n = 10)	4.5	4.3
Vadodara Centre (n = 6)	5.0	4.5

From the data regarding Q6 (What do you think of the role of sign language in learning English?) in the interview, there is substantial evidence of learners' preference of using ISL to help with English learning. Sign Language is described by learners as 'a key' for the Deaf learners to learn English. They welcome the way of using ISL to convey information in real life English materials, in-class videos, etc. on the SLEND. They also point out several ways in which they use ISL efficiently:

- When they do not understand, they use ISL to ask for clarification and explanation.
- They use ISL to share information and knowledge with their peers.
- Peer Tutors and learners claim that ISL is an effective way of dealing with difficult learning points.

Learners state that use of ISL enables clearer explanation, and easier, better understanding to facilitate English learning. This reflects the Input Hypothesis with the assumption that comprehensive input leads to language acquisition. It is worth noting that hearing teachers without excellent knowledge of ISL might not be able to function well under the same scenarios. Their limited ISL skills might put Deaf learners' understanding and comprehension at risk.

An unexpected added-value of the use of ISL for Deaf learners is that they improve their ISL literacy[22] during developing their English literacy. The situation of multiple language development reflects the notion of multiple literacies (The New London Group, 1996). For example, Deaf learners are more confident to develop ISL videos themselves to introduce the scenario of real life English, and to explain vocabulary and grammar. One learner commented,

[22] The scope of ISL literacy in this study follows the structure of the definition of American Sign Language (ASL) literacy by Small and Cripps (2004). To be more specific, ISL literacy is appreciated in terms of functional literacy (decoding and production skills), cultural literacy (appreciating ISL literature) and critical literacy (critically reviewing the values embedded in literature and language).

"She read poster then she signed to shoot sign language video for RLE. She became to sign video my confidence." *(P_S8)*

Another issue worth noting is the way in which interviewees commented on sign language variation. Some learners argued that use of what they call 'regional sign languages' causes misunderstanding and difficulties. Thus, they concluded, "Importantly to suggest ISL is one all same only. No different sign language over India". However, other learners embraced the use of different sign language variants and enjoy learning them, with the Peer Tutor's help. They expressed their feelings, "With topics by other groups, I learn a few variety of regional sign language so that I will meet Deaf people across India." Therefore, the acquisition of previously known regional varieties is a by-product of the use of ISL and collaborative learning. Under these circumstances, the use of different SL varieties on the SLEND is inevitable and natural. It is crucial that learners receive support instantly before they are discouraged by the information overflow. Undoubtedly, Peer Tutors can play an essential role in this situation if they are already familiar with other sign language varieties.

5.2.3 Experience of Peer-to-Peer Interaction

As identified in Section 4.1.5, peer-to-peer interaction is categorised on two levels: peer support within a centre both online and offline, and peer collaborative learning across centres. Within each centre, learners consider that their Peer Tutor somewhat supported their English literacy development. This reflects both their responses to S8 (see Table 5.6) in the learner experience questionnaire and their answers to Q7 (In what ways you think peer tutors are helpful or not helpful?) in the interview.

Overall, learners grade the extent to which Peer Tutors are supportive with an average score of 4.1, as somewhat positive. The Peer Tutor from the Vadodara Centre receives the highest score of 5.0. All learners from Vadodara unanimously rate the peer tutor as helpful, in relation to the positive feedback on various aspects of learning. Learners from Coimbatore consider their peer tutor also as helpful, with a rounded 5. Peer Tutors from the remaining three centres are categorized as somewhat positive. It seems that peer tutor from each centre are not perceived as helpful to the same extent. This is further explored in Section 6.3.3 using evidence of learning outcomes.

Table 5.6 Average Scores of the Responses to S4, S8, and S9 regarding Peer Tutoring and Collaborative Learning in the Questionnaire at Each Learning Centre

Learning Centre	S4 I enjoy learning materials posted by other groups on the SLEND.	S8 Peer Tutor supports and guides my learning of English.	S9 I enjoy sharing my own experience and knowledge on the SLEND to help classmates with English learning.
Mean (n = 44)	3.9	4.1	4.1
Coimbatore Centre (n = 6)	3.5	4.8	4.0
Indore Centre (n = 12)	3.8	3.6	4.2
Palakkad Centre (n = 10)	3.9	3.5	3.9
Thrissur Centre (n = 10)	4.1	4.3	4.0
Vadodara Centre (n = 6)	4.5	5.0	4.5

Regarding Q7 in the interview, in line with the discussion in Section 2.3.2, learners identify a general profile of a helpful Peer Tutor in facilitating the following aspects:

- Using SLEND to study real life topics.
- Explaining difficult points of grammar and vocabulary to learners.
- Giving feedback to learners and clearing up their confusion.
- Technical troubleshooting, e.g. help with filming, using dictionary, SLEND, etc.
- Raising learners' confidence by helping them and being one of them.
- Monitoring learning, e.g. class management.

A representative comment made by one learner is

> "I feel that peer tutor is helpful to us at class because we discuss any topics and then if we who have doubt so we ask peer tutor. We depend on peer tutor. " *(I_S1)*

Traditionally, most of the Deaf learners in India are taught by hearing teachers (Dennis, 2005). In fact, learners expressed shock at the beginning of the course because no hearing people were around to facilitate learning. However, as the learning continues, they experienced the benefits of peer interaction and peer learning. One learner from Indore Centre pointed out, "We students learnt any RLE materials through discussion better in Peer-to-Peer class than school because teachers taught students like me but we got poor understanding and also we failed to communicate to hearing people." This confirms the facilitating role of peer support found by previous research (Moores, 1996; Herring-Harrison, Gardner III, & Lovelace, 2007; Cannon & Guardino, 2012; Sahasrabudhe, 2010; Denmark, 2013). Furthermore, some learners point out that Deaf Peer Tutors are willing to repeat their explanations, whereas hearing teachers only explain once to them regardless of whether they understand or not. However, probably this is not due to the fact that hearing teachers are not willing to explain again; instead there might be lack of efficient communication between hearing teachers and Deaf learners. On the contrary, peer tutors and learners tend to communicate with one another freely and better with ISL.

With the assistance of technology, specifically the MOODLE platform in this context, learners are able to learn collaboratively with each other. They act as 'prosumers' (Thomas, Reinders & Warschauer, 2013), that is, as providers of the real life English materials as well as consumers. From the results of S4 (see Table 5.6) and S9 (see Table 5.6), it seems that learners enjoy both their role as a consumer with an average score of 3.9, and their role as a provider with an average of 4.1. Overall, they tend to enjoy their role as a provider slightly more. There are differences between learning centres. For example, learners from the Vadodara Centre and Palakkad Centre have a balanced view towards their role of consumer and provider, with an average of 4.5 and 3.9. They consider themselves to enjoy consuming and providing materials on the SLEND more or less the same. The Thrissur Centre is the only centre where learners acknowledge enjoying the role of consumers more. On the contrary, the remaining two centres categorize themselves more as providers.

Responses elicited by interview Q3 (Do you learn materials or topics developed by other groups on the SLEND.) suggest that learners acquire new knowledge from the materials shared by other centres. This is corroborated by the number of real-life sessions each centre has developed and the number of real-life sessions each has learnt (see Table 5.7). Each centre has developed no more than 10 sessions, whereas each of them has learnt at least 40 sessions. Most of the sessions learnt are created by other centres.

Table 5.7 Number of Sessions on the SLEND Developed and Learnt by Each Centre

Learning Centre	Number of Sessions Developed	Number of Sessions Learnt
Coimbatore Centre	4	45
Indore Centre	7	40
Palakkad Centre	8	45
Thrissur Centre	10	45
Vadodara Centre	7	45
Research Assistants	7	-
Co-developed across centres	2	-
In total	45	

Some learners also commented that collaborative learning across centres raises their motivation in learning. They even revealed that collaborative learning with other centres across India makes this peer-to-peer course unique. Typical remarks from one learner at the Vadodara Centre and one learner at the Indore Centre are as follows,

> "Without topics by other groups, I feel normal." *(V_S3)*

> "It is useful because I feel new that I learn topics such as bank, notice, pizza, etc. by other groups on the SLEND. Without them, I feel normal I learn materials at Peer-to-Peer class." *(I_S7)*

In terms of the quality of learning materials developed by other centres, those materials developed by centres in Vadodara, Indore and Thrissur receive praise, including a variety of well-explained learning materials from the Vadodara Centre, and stories with subtitles developed by the Vadodara Centre. For instance, Learner T_S5 commented, "Vadodara is better because of different material and explaining well as same good SGF (Thrissur)." On the contrary, one learner from Thrissur commented that she is bored with repetition of same categories of materials from Palakkad as it is solely about application, at the railway station, hostel, bank and bus station.

5.2.4 Experience of Multimedia Materials

Multimedia learning materials play an essential role on the SLEND and consist of signing videos, non-signing videos, pictures, and animations. The interview with learners (Q5 What multimedia materials do you like on the SLEND? Any other multimedia materials you suggest for the SLEND?) also provides reassurance that learners are satisfied with most of the multimedia materials such as real-life videos, useful language, glossary, etc. However, their view towards non-signing videos, pictures and animations regarding S6 in the questionnaire (see Table 5.8) is not promising with an average response of 3.3. It is also the second lowest score for the responses to the learner experience. It seems

that only learners from Coimbatore and Thrissur classify non-signing multimedia materials as somewhat supportive with an average response rounded to scale 4. Learners from the remaining centres are unsure about whether non-signing multimedia materials are supportive or not.

Table 5.8 Average Score of the Responses to S6 regarding Use of Multimedia Materials in the Questionnaire at Each Learning Centre

Learning Centre	S6 Multimedia materials (pictures, non-signing videos and animations) on the SLEND support and enhance my learning.	S24 I like "In-Class Video".
Mean (n = 44)	3.3	4.3
Coimbatore Centre (n = 6)	3.5	4.3
Indore Centre (n = 12)	3.1	4.3
Palakkad Centre (n = 10)	3.4	4.6
Thrissur Centre (n = 10)	3.7	4.0
Vadodara Centre (n = 6)	3.0	4.7

The lower score for S6 can be explained with reference to the content on the SLEND, as non-signing videos and animations have barely been developed or uploaded. Creating non-signing videos and animations might be unpractical and time-consuming. However, uploading existing non-signing videos in English collected by Deaf learners could be an alternative option to help with learners' English learning and facilitate understanding. The lack of non-signing videos on the SLEND probably arises from the fact that the peer tutor and Deaf learners are unaware of the use of non-signing multimedia materials.

According to the interview with learners, dissatisfaction with both signing and non-signing multimedia materials can be attributed to three aspects. Firstly, the slow Internet connection leads to long waiting time for buffering videos. For example, one learner from Indore claimed, "I waited for SLEND videos to open slowly because of slow Internet." *(I_S8)* Secondly, although multimedia materials are useful, learners are concerned about the quality of these materials. For instance, there are under-developed materials such as lack of English subtitles and unclear filming. Finally, learners' views of the key element of "in-class video"[23] is controversial. Although the average rating for S24 is 4.3, rounded to scale 4 as somewhat positive experience (see Table 5.8), it does cause negative effect on learners' experience with multimedia materials.

The interview with learners reveals inconsistent opinions with the ratings for S24. Three learners from the Vadodara Centre claim that there is room for in-class videos to improve. For example, one learner *(V_S1)* from Vadodara commented that the in-class video shows unclear discussion. This is due to the fact that some in-class videos are long, unclear and with SL varieties, which cause confusion and difficulties in understanding. Interestingly, despite the negative comments, Vadodara has the highest rating for S24, with an average of 4.7, rounded to scale 5 as positive experience. As presented in Section 5.2.3, the peer tutor from Vadodara is unanimously considered as helpful by all

[23] In-class video is a key element of each learning session on the SLEND. It consists of ISL videos recorded from peer discussion on difficult learning points during learning in the physical classroom.

their learners. More likely, how the peer tutor leads the learners to make the most of the in-class videos is equally important and can mitigate the confusion and difficulties caused by unclear and lengthy videos.

5.2.5 Experience of WhatsApp Group Chat

Web 2.0 social tool is regarded as one feature of technology-supported learning of this course in Section 4.1.6. Harris, Holmes and Mertens (2009) state that investigators should acknowledge the rights of the Sign Language Community members to have what they value to be fully considered in all interactions. Thus, the Deaf learners and peer tutors have the full rights to choose social network they prefer to use for after-class use among Facebook, Twitter, WhatsApp and the like. In the end, they choose WhatsApp as it is more mobile-friendly. Gradually, each learner became engaged with three WhatsApp group chats:

- Peer Tutors-Students Group: This is the only group to include peer tutors and learners from different learning centers.
- Buddy Group: Each group contains a mix of learners from different learning centers.
- Centre Group: Each learning center has one group.

Learners' entire feedback on the use of WhatsApp Group Chat from the questionnaire is somewhat positive with an average of 3.9 (see Table 5.9) and they perceive that utilizing WhatsApp group chat help them to improve their English literacy. Learners from Vadodara consider WhatsApp the most useful with an average response of 4.7, rounded to scale 5 as positive, and followed by learners from Thrissur with an average of 4.2, rounded to scale 4 as somewhat positive. Learners from Coimbatore, Palakkad and Indore have nearly the same average, 3.6 and 3.7.

Table 5.9 Average Score of the Response to S10 regarding Use of Web 2.0 social tool-WhatsApp in the Questionnaire at Each Learning Centre

Learning Centre	S10 After class, I communicate with peers by email or WhatsApp or text messages in English. This helps to improve my English literacy.
Mean (n = 44)	3.9
Coimbatore Centre (n = 6)	3.7
Indore Centre (n = 12)	3.6
Palakkad Centre (n = 10)	3.7
Thrissur Centre (n = 10)	4.2
Vadodara Centre (n = 6)	4.7

Learners tend to participate in the WhatsApp Group Chat in a differentiated way based on the findings from Q8 (Do you talk a lot in WhatsApp Group Chat? How can we improve the Group Chat?) in the interview. Some learners contribute both by chatting and reading others' chat in a two-way mode, i.e. receptive and productive manner, whereas others only read messages from the group chat without their own contribution in a one–way receptive mode (see Figure 5.4).

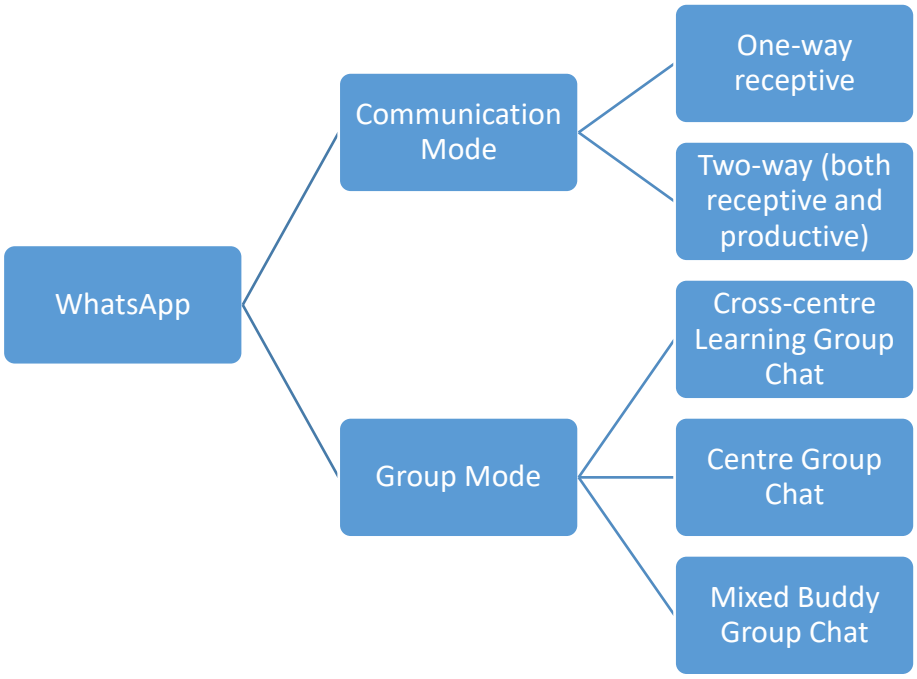


Figure 5.4 Communication Mode and Group Mode of WhatsApp Communication

According to the feedback received from Q8 in the interview, it seems learners fulfil various learning and communication purposes through different group chats (see Figure 5.4). The big cross-centre Peer Tutors-Students Group was used to share English learning information, such as quizzes, quotes, grammar pictures, news, jokes, greetings, new words and sentences. Meanwhile, they maintained daily contact through their Centre Group, especially for timetable update, class arrangement, class information and so on. On the contrary, they were cautious about their communication in the Buddy Group. They perceived the same information being repeated many times in the Buddy Group, which they disliked. Various above-mentioned WhatsApp group chats emerged naturally during the intervention. In fact, potentially, the grouping is a good strategy to strike a balance in using the Web 2.0 social tool for both learning and social purposes.

WhatsApp Group Chat plays an essential role in computer-mediated communication and differentiates itself from the learning platform SLEND. Some learners from the Thrissur Centre pointed out that WhatsApp Group Chat is not as efficient as SLEND and classroom teaching. This echoes previous research (Deng & Tavares, 2013) that a Moodle platform is more efficient in learning than social networking software. They complained that it is difficult to explain confusing points in WhatsApp group chat; some complained that there are heavy messages coming in every day and they might be too occupied to read each message; sometimes the communication could be confusing without clear clarification. For example, one learner from the Thrissur Centre said, “I have talked and share to group in WhatsApp so sometimes I sent to one student, but one not understood but he is difficult to explain more about him then left it.” *(T_S7)* This is understandable as each element in the triangular course mentioned in Section 4.1.6 plays a different role in the course. Unlike the role of SLEND as an online platform to acquire and disseminate knowledge, the essential purpose of setting up WhatsApp group chat is firstly to establish an after-class communication mechanism; and secondly to increase learners’ opportunities to output and input written English.

5.2.6 Experience of SLEND Access

The access to SLEND is not as good as learners expect, which can be seen from their responses to the statements in Table 5.10. Computer/laptop-based Internet access, with a mean satisfaction of 3.6, is slightly better than mobile access, with a mean satisfaction of 2.9 rounded to scale 3 of unsure experience. Learners' responses to these two statements score the lowest and third lowest among all the statements in the learner experience questionnaire. Their experience of Internet access, through computers and laptops, is better than that with phones, at each learning centre. This could indicate that learners can access SLEND better through computers and laptops than through phones in the current context.

Table 5.10 Average Score of the Responses to S12 and S13 regarding SLEND Access in the Questionnaire at Each Learning Centre

Learning Centre	S12 Accessing the SLEND on the Internet works well.	S13 Accessing the SLEND on a mobile phone works well.
Mean (n = 44)	3.6	2.9
Coimbatore Centre (n = 6)	3.8	2.5
Indore Centre (n = 12)	3.8	2.8
Palakkad Centre (n = 10)	3.8	3.1
Thrissur Centre (n = 10)	3.3	3.2
Vadodara Centre (n = 6)	3.3	2.8

The findings from interviews regarding Q9 (Is it working well for you to use mobile phone to access SLEND? If not, why?) corroborates the fact that learners have more problems with mobile access, as discussed in the previous passage. The dissatisfying experience results from:

- Hardware problems: non-quality mobiles with limited internal space or even no mobiles.
- SLEND display problems: partial content showing on the screen.
- Exercise bugs: especially drag and drop items cannot function well on the mobiles.
- Mobile network speed. For example, one learner said, "When I use SLEND on mobile with 3G internet, pictures and videos seems well and some types of exercises are good but drag and drop into text, drag and drop markers, drag and drop onto image are not working well. When I use SLEND on mobile with 2G internet, pictures and text work well but videos did not work because of 2G internet slowly. "

Therefore, it is not surprising that most of the learners prefer to use SLEND on their laptops, computers or tablets. However, due to lack of these devices, some learners were using their phones to learn on the SLEND. They even commented, "Mobile access is possible provided that quality phones are available as well as fast Internet." Some learners from the Thrissur Centre further suggest the development of a SLEND App. This has been discussed during the technical group meeting in June 2016 when the intervention came to an end. Actually, the Moodle App by then was available for downloading. The view of SLEND on mobiles is even more user-friendly and might bring more mobile users for SLEND as the technology is more mobile-leading in India, Africa

and other developing areas. It is also estimated that by 2020, more people will have an Internet-connected mobile phone than will have electricity globally, and that by 2020, mobile users will increase to 5.5 billion, accounting for 70 percent of the global population (CISCO, 2016). Mobile access should be taken into consideration at the very beginning of the project or for future projects. This has been pointed out by one UK Moodle expert as a member of the wider project during the project meeting in June 2016.

The problems listed above directly cause unpleasant experiences with SLEND access and indirectly undermine learners' satisfaction with the use of multimedia materials in Section 5.2.4 as learners mentioned that it takes longer to buffer the videos. Sometimes, they downloaded the videos to watch, which is an effective, popular way in the low-tech area (Gonzalez & St. Louis, 2013).

5.2.7 Experience of CEFR Benchmarking and Perception of Literacy Attainment

Learners lack the awareness of benchmarking their English level against certain standards. This is shown in their responses to S14 with an average of 3.4 (see Table 5.11). The intervention course is supposed to be mapped to a modified CEFR A1-A2. As we discussed in Section 4.1.7, CEFR benchmarking has not been fully implemented due to lack of training for research assistants and peer tutors. Consequently, it affects learners' understanding of CEFR benchmarking. It is understandable that learners are not aware of their English level against the CEFR.

Table 5.11 Average Score of the Responses to S14 regarding CEFR Benchmarking in the Questionnaire at Each Learning Centre

Learning Centre	S14 I can tell others (boss, friends, university, and school) about my English level.
Mean (n = 44)	3.4
Coimbatore Centre (n = 6)	3.0
Indore Centre (n = 12)	3.4
Palakkad Centre (n = 10)	3.2
Thrissur Centre (n = 10)	3.5
Vadodara Centre (n = 6)	3.7

Learners' lack of awareness of CEFR benchmarking can also be detected from the interview with them regarding (Q10 How can you show your English proficiency to your boss, friends, university?). This question was intended to elicit learners' ideas of their English literacy level linked with the CEFR. Due to lack of awareness of the CEFR, it is not surprising that none of them discussed their English level according to the CEFR. They comprehended this question as a prompt for solid evidence, e.g. examples of how their English has been improved. It is very encouraging to see that they provided so many positive examples even though a few of them did not feel they improved a lot in terms of solid evidence (Responses of positive change: Responses of no change=26 hits: 10 hits). Some of the positive changes after attending the P2P Deaf Literacy course are listed below:

- Some learners mentioned they started using English to communicate with people.

- Some learners mentioned they could communicate more and better with friends, including hearing people by SMS, WhatsApp, Writing, etc.
- Some provided examples to show that they could make use of what they have learnt to live a more independent life.

Despite being unaware of the CEFR, some of them mentioned that it is necessary to learn a higher level of English to meet their needs such as attending an interview. This indicates some learners' need for learning sequential levels of course content, which can be realized through the CEFR benchmarking.

Even though learners cannot relate their English literacy to the CEFR, their feedback to S15-17 demonstrates their feelings of improvement in English literacy. Firstly, the intervention raises their confidence in using English to some extent according to S15 (see Table 5.12), with an average of 4.3 rounded to scale 4. It seems their improvement in productive skills is slightly higher than that of receptive skills, with a mean response of 4.1 for S17 and 3.9 for S16 respectively. This is further corroborated with evidence of learning outcomes (see details in Section 6.1.1). From Table 5.12, it can be seen that learners from the Vadodara Centre perceive themselves to have improved the most, with an average of 4.7 for S15 and S17, although their average response to S16 is a bit lower at 3.7. Taking these three statements into consideration altogether, the Vadodara Centre still ranks first and has the highest perception of literacy attainment.

Table 5.12 Average Scores of the Responses to S15, S16, and S17 regarding Perception of Literacy Attainment in the Questionnaire at Each Learning Centre

Learning Centre	S15 I feel more confident to use English now.	S16 I can understand written English in real life better now.	S17 I use more English than before.
Mean (n = 44)	4.3	3.9	4.1
Coimbatore Centre (n = 6)	4.2	4.0	4.2
Indore Centre (n = 12)	4.4	3.8	4.0
Palakkad Centre (n = 10)	4.1	3.5	4.0
Thrissur Centre (n = 10)	3.5	4.1	4.3
Vadodara Centre (n = 6)	4.7	3.7	4.7

5.2.8 Experience of Key SLEND Elements

Five essential elements (Our Sharing Space, Real Life English Materials, Real-life Vocabulary/Glossary, Quiz/Exercise, and In-Class Video) of SLEND are evaluated by learners as somewhat positive and positive, with all the means above scale 4 (see Table 5.13). "Our Sharing Space", "Real-Life Vocabulary/Glossary" and "In-Class Video" are somewhat welcomed by learners, while "Real Life English Materials" and "Quiz/Exercise" are welcomed with the same mean response of 4.5 rounded to scale 5 (positive). This somewhat positive and positive feedback on the crucial components of SLEND could possibly shed light on the moderately successful development of the SLEND.

Table 5.13 Average Scores of the Responses to S20-24 regarding the Five Essential Elements of the SLEND

Statements	Mean
S20 I like “Our Sharing Space”.	4.1
S21 I like “Real Life English Materials”.	4.5
S22 I like “Real-life Vocabulary/Glossary”.	4.4
S23 I like “Quiz/Exercise”.	4.5
S24 I like “In-Class Video”.	4.3

5.2.9 Overall Experience of the Entire Course

Learners’ general feedback on the course is slightly controversial. They feel the course is easy for them with an average response of 4.4 to S11 in the questionnaire (see Table 5.14). The word ‘easy’ is used here in a positive way. It implies that the learning content is apprehensible for Deaf learners and does not cause frustration. It is in contrast with Deaf learners’ common experience of discouragement for those learning resources not tailored to their needs. According to the interview, this is partially due to the use of ISL and peer-to-peer interaction. One learner commented, “We students learnt any RLE materials through discussion better in Peer-to-Peer class than school because teachers taught students like me, but we got poor understanding and also we failed to communicate to hearing people.” Learners from the Coimbatore Centre and Vadodara Centre highlight the easiness of the course most strongly.

Their response to S18 in relation to satisfaction of the course (see Table 5.14) scored a low average of 3.5, though rounded to scale 4 of somewhat positive. Nevertheless, they were somewhat willing to use SLEND in the future according to their response to S19 (see Table 5.14) with a mean of 4.4, on the fringe of being scale 5 (positive). Especially for learners from the Coimbatore Centre, Thrissur Centre and Vadodara Centre, a large majority of them chose to keep using the SLEND in the future with average response of 4.7, 4.8 and 4.8 respectively. It can be seen from Table 5.14 that Deaf learners’ overall perception of the course from three angles of ‘easiness of the course’, ‘satisfaction with the course’, and ‘willingness to continue using the course’, are controversial, especially the slightly lower satisfaction with the course against moderately higher willingness to continue using the course. This might imply that there are other external factors affecting learners’ experience such as slow Internet, limited mobile access, unclear videos and lack of awareness of CEFR benchmarking. Thus there is room for change or evolution of the current course. However, the course demonstrates its merits in Deaf learners’ English literacy attainment, endorsed by learners’ higher willingness to reuse the SLEND in the future.

Table 5.14 Average Scores of the Responses to S11, S18, and S19 regarding Overall Experience of the Entire Course in the Questionnaire at Each Learning Centre

Learning Centre	S11 I feel this P2P course is easy for me.	S18 I am satisfied with P2P course.	S19 I will keep using the SLEND in the future.
Mean (n = 44)	4.4	3.5	4.4
Coimbatore Centre (n = 6)	4.2	3.5	4.7
Indore Centre (n = 12)	4.2	3.4	4.3
Palakkad Centre (n = 10)	4.3	3.6	3.8
Thrissur Centre (n = 10)	4.5	3.6	4.8
Vadodara Centre (n = 6)	4.8	3.7	4.8

5.3 CORRELATION OF EXPERIENCE

Learners' corresponding experience of the SLEND in terms of each characteristic and overall experience has been presented above. In this section, the correlation between learners' experience of each characteristic and the overall experience, and the correlation between characteristics are examined. As identified in Chapter 4, the SLEND is situated in a Deaf-led, peer supported context with real life English, learner-created content, sign bilingualism, peer-to-peer interaction, Web 2.0 technology-enhanced provision, Emergent syllabus mapped to the CEFR, and continuous training and support as the key characteristics. The characteristics are not isolated but interacting with each other. Therefore, it is assumed that learners' experience of each characteristic, if not all, should correlate positively with their overall experience. It is also expected that learners' experience of some characteristics, if not all, should correlate to some extent.

5.3.1 Correlation between Learners' Experience of each Characteristic and the Overall Experience

In the learner experience questionnaire, the responses to several statements relevant to the same characteristic are merged before correlation analysis. The categorization is briefly introduced in Table 5.15 with learners' average response.

Table 5.15 Average Response of categorized statements in relation to Each Characteristic

Categories/ Characteristics	Statements in the questionnaire
Experience of real life English	S1, S3
Experience of Vocabulary and Grammar Learning	S2
Experience of Sign Bilingualism	S5, S7
Experience of Peer Tuition and Collaborative Learning	S4, S8, S9
Experience of Multimedia materials	S6
Experience of Web 2.0 social tool (WhatsApp Group Chat)	S10
Experience of SLEND access	S12, S13
Experience of the CEFR	S14
Experience of Literacy attainment	S15, S16, S17
Overall experience of the course	S11, S18, S19
Experience of SLEND key elements	S20, S21, S22, S23, S24

A Shapiro-Wilk test demonstrates that the responses of the 44 learners for most of the categories are inconsistent with being normally distributed. Only their response of experience of SLEND access is consistent with being normally distributed. The descriptive statistics are elaborated in Table 5.16.

Table 5.16 Descriptive Statistics of the Statements

Categories	Median	SD	Variance	Minimum	Maximum	Percentiles		
						25	50	75
Experience of Real Life English (S1, S3)	4.0	0.82	0.680	2.0	5.0	3.5	4.0	4.5
Experience of Vocabulary and Grammar Learning(S2)	5.0	0.82	0.670	1.0	5.0	4.0	5.0	5.0
Experience of Sign Bilingualism (S5, S7)	4.5	0.60	0.366	3.0	5.0	4.0	4.5	4.5
Experience of Peer Tuition and Collaborative Learning(S4, S8, S9)	4.3	0.73	0.528	2.0	5.0	3.7	4.3	4.7
Experience of Web 2.0 social tool_WhatsApp Group Chat (S10)	4.0	0.98	0.968	2.0	5.0	3.3	4.0	5.0
Experience of the CEFR (S14)	4.0	0.94	0.888	2.0	5.0	2.3	4.0	4.0
Perception of Literacy Attainment (S15, S16, S17)	4.0	0.64	0.405	2.0	5.0	3.8	4.0	4.6
Overall Experience (S11, S18, S19)	4.3	0.76	0.578	2.3	5.0	3.7	4.3	4.7

Experience of SLEND Key Elements (S20, S21, S22, S23, S24)	4.6	0.55	0.307	3.0	5.0	4.1	4.6	4.8

Due to the non-normal distribution of data, a non-parametric correlation test, Kendall's tau, is utilized to investigate the correlation concerning the small sample size (n = 44) in the current study. In fact, both Kendall's tau and Spearman's correlation test are for non-normally distributed data. Kendall's tau is a non-parametric correlation test for small samples. However, Kendall's tau is more likely to draw more accurate generalizations than Spearman's correlation test for small numbers of data and a large number of tied ranks (Field, 2009). Therefore, Kendall's tau is used to detect the correlation.

According to the results of Kendall's tau, experience of real life English is positively correlated with perception of literacy attainment, overall experience and experience of SLEND key elements, r(N = 44) = .33), p<.01; r(N = 44) = .24), p<.05; r(N = 44) = .58), p<.01 respectively. These positive correlations imply that real life English as a key characteristic identified in Chapter 4 is decisive for learners' overall experience of the SLEND and the intervention, as well as for their self-assessment of English literacy attainment.

Experience of vocabulary and grammar learning is positively correlated with perception of literacy attainment, overall experience and experience of SLEND key elements, r(N = 44) = .29), p<.05; r(N = 44) = .45), p<.01; r(N = 44) = .35), p<.05 respectively. The statistics indicate the important role of vocabulary and grammar learning in Deaf learners' English literacy development. A better knowledge of vocabulary and grammar ensures a more pleasant experience of learning at each SLEND key element, and a better perception of literacy attainment.

Experience of sign bilingualism is positively correlated with perception of literacy attainment, overall experience and experience of SLEND key elements, r(N = 44) = .46), p<.01; r(N = 44) = .48), p<.01; r(N = 44) = .69), p<.01 respectively. This justifies the importance of sign bilingualism as a key characteristic of the SLEND that makes use of ISL for face-to-face communication and ISL videos to deliver learning content on the SLEND.

Experience of peer tuition and collaborative learning is positively correlated with perception of literacy attainment, overall experience and experience of SLEND key elements, r(N = 44) = .47), p<.01; r(N = 44) = .46), p<.01; r(N = 44) = .59), p<.01 respectively. These correlations acknowledge the positive role of peer-to-peer interaction including peer tuition and collaborative learning in Deaf learners' English literacy development.

Experience of WhatsApp group chat is positively correlated with perception of literacy attainment, overall experience and experience of SLEND key elements, r(N = 44) = .27), p<.05; r(N = 44) = .27), p<.05; r(N = 44) = .49), p<.01 respectively. The effective use of WhatsApp group chat as a means of Web 2.0 social application fosters literacy development, and pleasant use of the SLEND and the intervention.

Experience of CEFR benchmarking is positively correlated with perception of literacy attainment, overall experience and experience of SLEND key elements, r (N = 44) = .63), p<.01; r(N = 44) = .50), p<.01; r(N = 44) = .27), p<.05. Learners who are more able to

describe their level of English literacy have better perception of their literacy, and are also more comfortable with learning on the SLEND and with the overall experience of the intervention.

In a nutshell, based on the correlation statistics above, it is convincing to conclude that all the concerned characteristics identified in Chapter 4 are positively correlated with learners' perception of literacy attainment, overall experience and their experience of the SLEND key elements reflecting the characteristics. The positive correlation further articulates the importance of each characteristic during Deaf young adult learners' English attainment on the SLEND within the P2P Deaf Literacy project.

5.3.2 Correlation between Characteristics

Similarly, the non-parametric test, Kendall's tau, is used again to examine the correlation between experiences of each characteristic of the SLEND. Experience of real-life English is positively correlated with experience of sign bilingualism $r (N = 44) = .34)$, $p<.01$. Learners have better experience of real life English learning if they obtain better experience of sign bilingualism, and vice versa. This positive correlation is understandable as real-life English is introduced and explained through face-to-face ISL communication and ISL videos on the SLEND as presented in Section 4.1.4.

A positive correlation also exists between sign bilingualism and peer tuition/collaborative learning, $r (N = 44) = .44)$, $p<.01$. Indeed, peer-to-peer interaction including peer tuition and collaborative learning fosters an enabling environment for sign bilingualism. Likewise, advocating the use of ISL maximizes the opportunities of peer-to-peer interaction and guarantees efficient communication.

SLEND access is crucial, which has correlations with the experience of real life English, sign bilingualism, peer tuition and collaborative learning, and CEFR benchmarking $r(N = 44) = .27)$, $p<.05$; $r(N = 44) = .31)$, $p<.05$; $r(N = 44) = .36)$, $p<.01$; $r(N = 44) = .39)$, $p<.01$ accordingly. This correlation emphasizes that SLEND access is the base for the successful experience of every other aspect in the context of Web 2.0 technology-enhanced provision of learning materials.

The positive correlations of experiences between each characteristic of the SLEND and the overall learning experience justify the positive contribution of each characteristic to form the e-learning ecosystem. Whereas the positive correlations of experiences between each characteristic elicit the internal logic of the e-learning ecosystem which is further discussed in the concluding chapter.

5.4 UNIQUE EXPERIENCES AND PERIPHERAL GAINS

This section highlights some unique experiences emerging from the interviews. Some of these interesting viewpoints have been elicited unintentionally. Learners compared their learning experience with the P2P course to their previous learning experiences. The P2P Deaf Literacy Couse is considered as unique by the learners in terms of use of peer-to-peer interaction rather than hearing teachers; use of technology-enabled collaborative learning across India rather than classroom learning; and use of real life English materials instead of grammar-only materials.

The most striking part of the course is the learning content of real life English which is attuned to Deaf learners' real needs for the Deaf young adults in India. Learners put into

practice what they acquire from the course instantly in their daily life. In the interviews, learners introduced various situations of instant application, such as buying train tickets, written communication with hearing people, change of mobile number at the bank, sim replacement, etc. One learner from Vadodara commented, "I felt SLEND features made me changed my life." The following quotes are some real life-changing examples underlined by the learners in the interview.

> "College students visited My School. I talked to one of them by writing introduction such as name, where are you form, what you, what is goal, etc. I also applied application for college myself and talked to office without the help of my father."
>
> "My deaf friends and me were in train on way to Indore. Hearing passenger tried to talk with my friends by writing but they were not able to write so they asked me to talk to hearing passenger by writing in English like normal communication. I also talked to the principal by writing in English about what did you study, what were you, etc."
>
> "My friend and I wrote reservation application to office and bought ticket. Office helped me to write it shortly after learning P2P class and also learnt discussion which we talked same topic. I thank P2P Deaf literacy because first time I wrote at railway station. My father bought train ticket for me before."
>
> "She learned about railway this course. She went to railway so wrote reservation ticket and chat to other people understood with her so it is not barriers and she wrote hostel application, so it is easy so not problem."
>
> "She happened to went railway with their friends, so she knew all how to go different platform and read schedule train lists at railway. Her friend asked to her that how does she know all? She asked that she made learned a lot from peer tutor and discussed so it helped to her."
>
> "I joined Peer to Peer class and learnt RLE topics and then I applied for changed mobile of bank application at the bank and also sim of replacement form. I thank to RLE topics for helping me."

Therefore, it is evident that the participatory literacy approach has a positive effect on changing and improving Deaf learners' life experiences. It might also be reasonable to argue that the P2P Deaf Literacy project accomplishes its catalytic validity (Ladd, 2003). As defined by Ladd (2003), the research bringing very positive outcomes to make a change to Deaf people's social life is considered a hallmark of catalytic validity. Meanwhile, these unique learning experiences not only help to improve learners' English literacy level, but also transform their learning ideology. This is in accordance with the transformative paradigm which aims to address the inequality and oppression through empowering the community.

Besides the unique experiences, two peripheral gains are detected alongside English literacy attainment. Learners recognize that the course enhances their ISL literacy (see details in Section 5.2.2) and computer literacy. Due to adopting a participatory approach and the principle of user-created content, they had substantial chances to practice their computer skills and ISL during filming of the videos in ISL.

5.5 TECHNICAL SUGGESTIONS FOR SLEND DEVELOPMENT

Learners' great interest and engaging role in the course is also reflected in their active contributions to the development of the SLEND. They pointed out a few challenges and accordingly they also put forward a variety of insightful suggestions during the interview.

5.5.1 Pedagogical Suggestions

More real-life topics reflecting Deaf cultures are needed. Diversified topics are enumerated by the learners, such as celebrity and history videos, stories, news, formal dialogues, English songs, drama, jokes, and formal governmental letters and the like. Some learners even suggest the learning of official documents issues by the government, such as laws relevant to Deaf people, etc.

Real-life topics should be classified and sequenced. One learner from the Vadodara Centre proposed, "Basic level and then advanced level are clear categories, which will made in SLEND. Now basic level and advanced level are mixed in SLEND." This echoes the project group's call for classifying and sequencing of the topics during several project meetings (January, February, March, April 2016). Due to technical limitations, the topics were not differentiated.

5.5.2 Technological Suggestions for Multimedia Materials Development

Learners' intricate feelings shed light on the necessity of multimedia materials, yet also reflect their high expectation of multimedia materials. A series of improvements are proposed by learners.

Videos should stay clear and short. In-class videos are meant to record the interesting and inspiring ongoing discussions among learners during offline learning. Unlike ISL video explanation, in-class videos tend to be long and unclear due to the fact that multiple learners engage in the process and it is real-time impromptu processing. Many learners stated that lengthy and unclear videos create barriers for understanding, and that it would be ideal to keep them clear and short. Alternatively, the peer tutors should be trained how to use lengthy and unclear videos with Deaf learners. For instance, peer tutors can fast forward the videos, focus on the essential part of the videos and give more explanation if needed.

ISL signs are necessary to explain new vocabulary. The current entry of new vocabulary starts with the explanation through content and context pictures, followed by text explanation and ISL video explanation. Some learners argue that it is necessary to provide an ISL sign for the specific vocabulary.

All the videos should be subtitled with English. Learners from Vadodara and Coimbatore Centre have made the request for adding English subtitles to the videos uploaded onto the SLEND platform. As a matter of fact, English videos are suggested to be developed with subtitles, which can be seen from the example videos developed by the research assistants. Nevertheless, from the Focus Group Discussion in the second round, Deaf peer tutors and learners are not confident about their written English and avoid developing subtitles, exercises. One Deaf peer tutor admits,

> I need to take care students learn features well without error. I suggest that first I send draft subtitle dialogue to Research assistants and then they check and make correct to draft subtitle dialogue. They send it to me and I put it in

> useful language of SLEND. But I am not happy because I failed to make exercise in SLEND as my grammar is not good. If I put wrong sentences in exercise of SLEND, students learnt wrote. I need to care take students. I can put picture and video in SLEND exercise. I can put materials in RLE and in class video. I am happy that research assistant make exercise related to my session.

Thus, lack of subtitles in the videos developed by peer tutors and learners is a sign of lack of confidence in English literacy which also affects their development of exercises on the SLEND. Therefore, it might be meaningful to consider English language support to the peer tutors and learners in the future projects.

5.5.3 Suggestions for Support Provided to Peer Tutors

Comprehensive training on the CEFR is highly suggested for Deaf Research Assistants and Peer Tutors. It is worth mentioning that this suggestion is inferred from the feedback of no awareness of the CEFR by learners and incomplete implementation of the CEFR elements by peer tutors.

English language support needed by peer tutors without undermining Deaf-led approach is necessary. The underdevelopment of subtitles and useful language reveals insufficient English literacy skills from the Deaf peer tutors and learners. To tackle the problem, the optimal option could be including a Deaf peer tutor who is near-native in English. Alternatively, the inclusion of hearing English teachers might be another option while not undermining the Deaf-led approach.

5.6 CHAPTER SUMMARY

Sections 5.1 and 5.2 present overall learner experience and experiences in relation to each characteristic of the SLEND. The overall learner experience of the SLEND is moderately positive based on learners' responses to the learner experience questionnaire and the interview. Generally, learners are satisfied with the course. They feel the course is easy for them, and most of the features of the SLEND are welcomed. By attending the course, they have built their confidence to use English more. They also indicate that they are willing to continue using the SLEND in the future.

With respect to each specific characteristic of the SLEND identified in Chapter 4, learners are moderately satisfied or satisfied with the key elements of the SLEND as well as most of the characteristics of SLEND and its context, such as sign bilingualism, peer-to-peer interaction, ethnographic and Freirean literacy approaches with learner-created real life English materials, and Web 2.0 technology-enhanced collaborative learning. Learners confirm the usefulness of real life English and consider that learning useful language, such as vocabulary and grammar, are conducive to their understanding of real life English. Learners find English topics on the SLEND developed by themselves or by other groups interesting and useful. At the same time, they also somewhat enjoy seeking out real life English materials outside the classroom. They feel ISL is useful for English literacy attainment by means of ISL videos and face-to-face ISL interaction. As for peer-to-peer interaction, they agree moderately that peer tutors support and guide their English literacy attainment. They enjoy sharing their experience and knowledge on the SLEND platform for collaborative English learning. After class, they resort to Web 2.0 social tools, such as WhatsApp, which they regard as beneficial to their English literacy

development. Learners are satisfied with the "Our sharing space", "Real-life Vocabulary/Glossary" and "In-Class Video" on the SLEND to some extent. These findings corroborate previous research on the facilitating roles of peer tuition (Herring-Harrison et al., 2007; Cannon and Guardino, 2012; Sahasrabudhe, 2010; Denmark, 2013), sign bilingualism (Evans, 2004) and Computer-Mediated Communication (Garberoglio et. al, 2015).

The data also uncover some unsure experiences for participants: SLEND access, multimedia materials and CEFR benchmarking. The access to the SLEND through computer/laptop is not entirely user-friendly due to the 'limited' or 'low-tech' settings (Egbert & Yang, 2004). The interviews with the learners reveal that Internet speed and mobile phone quality cause the dissatisfaction with access. Participants are unsure of how to inform others of their English level. This indicates their unsuccessful integration of the CEFR benchmarking, which is consistent with the finding of unsuccessful implementation of the CEFR on the SLEND platform in Section 5.2.7. Participants' expectation of the use of multimedia materials is not fully addressed. They require much more advanced multimedia materials such as non-signing videos and high-quality signing videos.

The above-mentioned learner experience is demarcated by the contrast between learners' overall satisfaction with the course and access problems caused by infrastructure and Internet access. This contrast sparks the argument that it is possible to compensate for the hardware deficit, for example with human factors, which is in line with the viewpoint of Gonzalez & Louis (2013). They point out two factors affecting Computer-Assisted Language Learning: human constraints and physical obstacles. They believe that the human constraints are more important than physical problems such as limited access to the technology resulting from slow Internet or low computer to student ratio. Peer tutors and participants accommodate themselves to the 'limited' or 'low tech' settings with their techniques, such as downloading videos to compensate for the physical problems.

It is worth noting that each centre differs not only in experience of overall intervention but also in experience of different key characteristics of the SLEND, despite the same platform used and intervention received. In general, the Vadodara Centre ranks first in terms of overall learner experience and also tops the experience of most key characteristics of the SLEND. The differences between centres are further explored in Section 6.3 with a focus on learning outcomes, its correlation with learner experience and potential factors contributing to the difference.

In Section 5.3, it is revealed that the overall learner experience is positively correlated with several key characteristics of the SLEND, including real life English, vocabulary/grammar learning, sign bilingualism, peer-to-peer interaction and computer-mediated communication technique. The correlation consolidates the view that these are indispensable to the SLEND. At the same time, the positive correlations between some key characteristics including real life English, sign bilingualism, peer-to-peer interaction and SLEND access corroborates the internal logic and connections of these key characteristics in an e-learning ecosystem discussed in Section 7.1.4.

Strikingly, a large body of evidence from learners' interviews articulates the unique catalytic power of real life English (see Section 5.4). It enables learners' instant application of knowledge and skills gained from the intervention and empowers Deaf

learners to function better in daily life. This ultimately brings a real change to Deaf learners' lives. It is equally interesting and encouraging to discover the peripheral gains for Deaf learners over the course of the intervention, such as improvement of ISL literacy and computer literacy.

Based on the rich data from the learner experience, it is evident that learners' overall positive experience with the key characteristics of the SLEND spells out the efficiency of the SLEND as a participatory e-learning system for Deaf young adults' learners English literacy attainment. Learners' positive experience verifies the composition of the key characteristics of the SLEND. Some concrete suggestions and feedback under the key characteristics are proposed for instant or future adjustment of the development of the SLEND. Building on the initial framework for a participatory e-learning system for Deaf young adults' English literacy attainment (see Section 4.3), the initial framework mentioned in Section 4.3 is enriched with the progressively added inputs through investigating learners' experience of using the SLEND for English literacy learning.

The inputs to the initial framework are focused on the elaboration of the key characteristics under each main component. For the pedagogical aspect, the findings uncover two ways of collecting real life English materials: taking photos with phones and collecting print documents. The diversity of topics of real life English is stressed with flexible choices of learning sequences based on personalised needs. It is revealed that the peripheral gain of ISL literacy couples with English literacy attainment, in favour of the multi-literacies development. In view of the emergence of the ISL varieties, advanced Deaf peer tutors or peers provide instant support to Deaf learners' understanding. Peer-to-peer interaction is conducive for better understanding and efficient communication within and across different learning centres.

For the technological aspect, both one-way (receptive only) and two-way communication (both receptive and productive) appear in the WhatsApp group chats. These two ways of communication correspond to the observation of interaction and active interaction in the interaction approach (Gass & Mackey, 2014). The SLEND is friendly to multi-access with computers, laptops, tablets and mobile phones, and it has been suggested to feature more non-signing English videos as well as short and clear ISL videos of in-class discussion with English captions and/or subtitles. In addition, due to the unfamiliarity with the CEFR, future training to the peer tutors is recommended to give more weighting to the CEFR.

CHAPTER 6 FINDINGS OF LEARNING OUTCOMES

Positive outcomes are a key indicator/criterion of an e-learning ecosystem. Therefore, it is imperative to evaluate the learning outcomes to qualify the SLEND as an effective e-learning environment/ecosystem. On the one hand, this can shed light on the efficiency of the SLEND. On the other hand, further analysis of the results can inform the development of the SLEND as an interactive and participatory e-learning system. To explore the efficiency of the SLEND from the aspect of learning outcomes, both standardized tests and self-assessment were utilized. 43 learners who attended the whole journey of the intervention participated in the pre-test held at the beginning and the post-test at the end of the course. Due to the dispersion of learners after the course, lack of personal devices, and/or access to internet, only 17 learners managed to complete all three tests including the test at a delayed interval of 70 days, which was the longest practically implementable interval that the research could manage.

As is elaborated in Section 3.3.6, a delayed post-test is an essential means to investigate robust learning outcomes in terms of retention of learning. Although there is a great drop in the number of test-takers for the delayed test, it is necessary to examine the extent to which the impact of the course has persisted. Therefore, learning outcomes in terms of standardized tests were investigated and reported both in the group of 43 learners who went through the course and in the group of 17 learners who sat the three tests. The investigation of the performance of the 43 learners can ensure a better view of the achievements of all the participants involved in this course, while the examination of the performance of the 17 learners can look into robust learning outcomes and retention of learning. Long-term retention is a sign of deeper learning and has been scrutinized in previous studies (Benati & Lee, 2008; Karpicke & Roediger III, 2007).

Along with pre-, post- and delayed tests, learners self-assessed their literacy level with the same English Literacy Self-Assessment Questionnaire. The questionnaire comprised 17 Can-Do statements adapted from the CEFR A1-A2 statements. Among the 43 test-takers, 41 of them completed the self-assessment questionnaires along with the pre-test and post-test. 16 out of 41 completed the self-assessment questionnaire with the delayed test as well. Although these 16 learners are not exactly the same learners who completed the delayed post-test, the results shed light on learners' confidence on their English literacy 70 days after intervention.

In this Chapter, by referring to both the test performance and self-assessment, I present the findings of learners' overall attainment of English literacy, retention of learning, centre difference and literacy skill achievements.

6.1 OVERALL ATTAINMENT OF ENGLISH LITERACY

A series of statistical test results uncover the extent of improvement learners have made, whether this lasts for the long term, and the differences of learning outcomes across centres.

6.1.1 Test Performance Indicates Improvement of English Literacy

After 7-month immersion into the P2P Deaf literacy course (CEFR A1-A2), it is of great interest for the research to investigate the learners' attainment of English literacy. As there was a drop of participants from 43 to 17 in the delayed post-test, only the performance in the pre-test and post-test is taken into consideration of the overall

attainment for a full picture of all the participants. The performance in all three tests by 17 learners will be explored later in Section 6.1.1. In the pre-test, the 43 learners had a mean score of 23.82 (*N*=43, *SD*=9.00), while they reached an average of 30.62 (*N*=43, *SD*=8.72) in the post-test. Due to the small sample size (43 learners), a Shapiro-Wilk test rather than Kolmogorov-Smirnov test was conducted. It demonstrated that the mean performance of the 43 learners for each test is consistent with being normally distributed.

As this is a typical "before-after" situation with two means of performance by the same learners, a paired-samples t-test was utilised. Field (2009) also suggests an examination of the distribution of the sampling difference itself before conducting a paired-samples t-test. Another Shapiro-Wilk test indicates that the sampling difference is consistent with being normally distributed. The normal distribution of the data enables the use of a parametric test, paired-sample t-test, to compare the performance before and after the intervention with the same group of learners. It compared the 43 learners' mean performance in the pre-test and in the post-test. There was a significant difference in the scores for pre-test (*M*=23.82, *SD*=9.00) and post-test (*M*=30.62, *SD*=8.72); *t* (42) = -7.67, *p*<.001. These results are statistically significant and suggest that the course/intervention is effective and has facilitated an improvement in literacy attainment for the 43 learners.

Both tests are divided into two sessions, a reading part and a writing part, with a full mark of 30.00 and 35.00 respectively. This is to examine learners' English literacy in terms of receptive and productive skills. The following Figure 6.1 illustrates learners' improvement in total performance, reading part and writing part. Learners' mean performance in pre-reading is 13.38 (N=43, SD=4.29) and its counterpart in post-reading is 15.62 (N=43, SD=4.28). As for writing, learners' mean performance in the pre-test is 10.44 (N=43, SD=5.90) and it is 15.00 (N=43, SD=5.54) in the post-test. The mean for reading has risen by 16.7% whilst that for writing by 43.7%. In other words, learners' attainment of English literacy through the P2P Deaf literacy course has improved. The improvement in English writing skills is greater as a percentage than that of reading skills. Productive skills and receptive skills are a set of skills naturally supporting each other. A possible explanation for the greater improvement of productive skills could be that learners had limited chances of producing English before they joined in the course. With the intervention, they were able to practice writing skills intensively online and offline. Further examination on and explanation of each literacy skill improvement, both productive and receptive skills, is presented in Section 6.4.

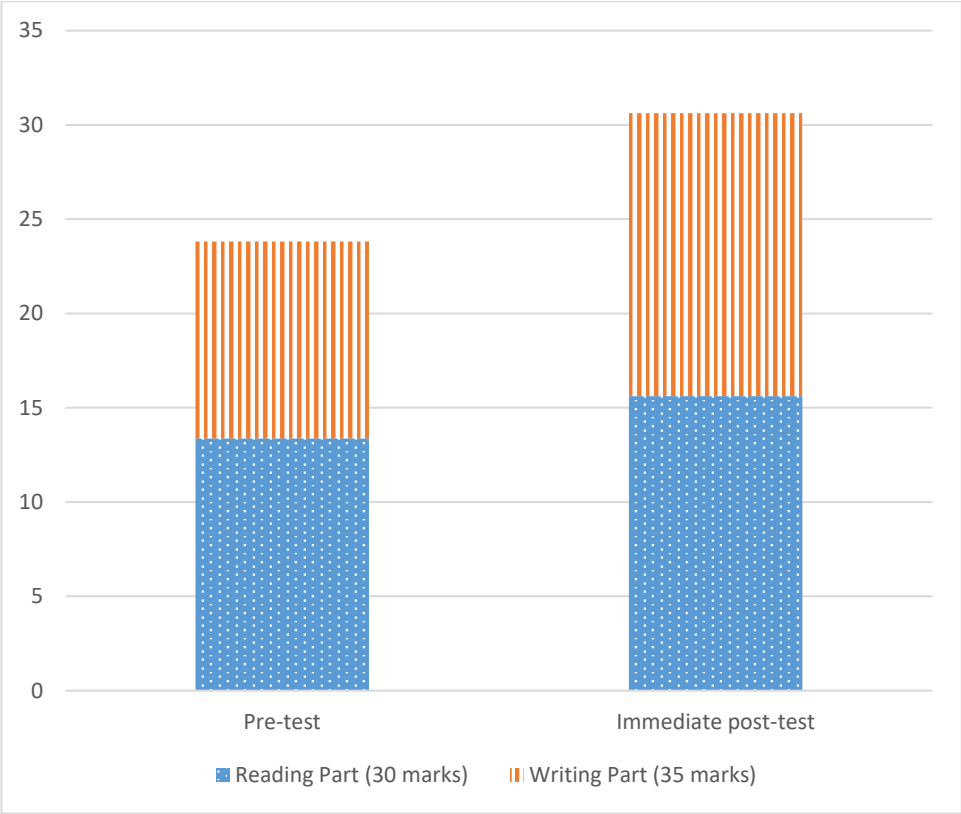


Figure 6.1 Learners' Improvement of English Literacy in Total performance, Reading Part and Writing Part

6.1.2 Learners Perceive their Literacy Skills as Improved

Learners' improvement in English literacy is reflected in their test performance objectively. By adopting the transformative approach which prioritizes the target learners' voice (see detailed discussion in Chapter 3), it is the Deaf learners that become the focus. Therefore, their subjective perception of their English literacy skills is equally worth exploring. This section first investigates 41 learners' self-assessment of English literacy skills as a whole before and immediately after intervention. As discussed in Section 3.4.2, the Likert-scale data from the self-assessment questionnaire are considered as continuous data. At the same time, the data for pre-intervention self-assessment and post self-assessment are not significantly skewed. The mean and median are not appreciably different. As the current data were interval data and they were not skewed, the measure of mean is reported to express the central tendency of the data as well as the standard deviation for the variability. 41 learners' average self-assessment scores are presented in Table 6.1.

Table 6.1 Descriptive Statistics of 41 Learners' Pre and Post Self-Assessment of English Literacy

Time	N	Minimum	Maximum	Mean	Std. Deviation
Pre Self-Assessment	41	1.9	4.8	3.7	.62
Post Self-Assessment	41	1.4	5.0	4.1	.82

A Shapiro-Wilk test demonstrated that the mean self-assessment of the 41 learners along with the pre-test is consistent with being normally distributed, yet the mean self-assessment with the post-test of the 41 learners and the mean self-assessment with delayed-test of the 16 learners are not. A Wilcoxon Signed-ranks test was conducted to

evaluate whether learners (N=41), when taking post-test, assess their English literacy level higher or lower than in the pre-test. The results (see Table 6.2) indicated a significant difference, z=-3.13, p=.002. The mean of the ranks in favour of Post self-assessment was 19.81, while the mean of the ranks in favour of Pre-intervention self-assessment was 20.75.

Table 6.2 Wilcoxon Signed-ranks Test for Pre, Post Self-Assessment of English Literacy Skills

Ranks

		N	Mean Rank	Sum of Ranks
Post Self-Assessment - Pre Self-Assessment	Negative Ranks	8[a]	20.75	166.00
	Positive Ranks	31[b]	19.81	614.00
	Ties	2[c]		
	Total	41		

a. Post Self-Assessment < Pre Self-Assessment
b. Post Self-Assessment > Pre Self-Assessment
c. Post Self-Assessment = Pre Self-Assessment

Test Statistics[a]

	Post Self-Assessment – Pre-intervention Self-Assessment
Z	-3.128[b]
Asymp. Sig. (2-tailed)	.002

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

That is to say, among the 43 learners who participated in pre-test, post-test and the whole journey of intervention, 41 of them perceived their English literacy level had improved after the intervention. Learners' perception of improvement of English literacy is consistent with their real performance in pre-test and post-test presented in 6.1.1. Their improvement in self-assessment and performance shed light on the efficiency of the seven-month long blended course.

6.1.3 Correlation between Test Performance and Self-Assessment

As discussed in Sections 6.1.1 and 6.1.2, the learning outcomes of the seven-month blended learning of English literacy is significant in terms of both standardized test performances and self-assessment. A series of correlation tests further corroborate the intra-consistency and inter-consistency of the standardized tests and self-assessment. The data of 40 learners who completed the pre-, post-tests, pre, post self-assessment and learner experience questionnaire were included in the correlation tests.

Descriptive statistics was employed to generate a general picture of the data of tests and self-assessment with details in Table 6.3.

Table 6.3 Descriptive Statistics of Learning Outcomes and Learner Experience

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-test Total Score/65.00	40	9.3	47.0	23.25	8.88

Post-test Total Score/65.00	40	11.5	47.5	30.33	8.96
Improvement in tests	40	-2.5	25.2	7.07	5.60
Pre Self-Assessment/5.0	40	1.9	4.8	3.72	.61
Post Self-Assessment/5.0	40	1.4	5.0	4.10	.83
Improvement in self-assessment	40	-1.44	2.06	.37	.68
Learner Experience/5.0	40	2.7	4.8	3.97	.51

A subsequent Shapiro-Wilk test showed that most of the data were consistent with a normal distribution except for the data of improvement in tests and post self-assessment. Pearson Correlation tests are used for normally distributed data, whereas Kendall's tau tests are employed for non-normally distributed data due to the small sample and potential repeated ranks (Field, 2009).

For pre-test and pre self-assessment, a Pearson Correlation test showed that there was a significant relationship between the pre-test performance and the pre self-assessment, r=.31, p (one-tailed) =.027. As for the post-test and the post self-assessment, according to the results of a Kendall's tau test, the overall post-test performance statistically positively correlated with learners' post self-assessment, τ=.24, p (one-tailed) =.018. That is to say, learners who tend to score higher are more likely to reach a higher score for self-assessment. For instance, in Table 6.4, the top five learners in the post-test with an average score of 44.3 out of 65 marks self-assessed their English literacy skills as an average of 4.6 out of 5 in the post self-assessment, whereas the bottom five learners had a mean of 16.9 in the post-test and 2.9 for post self-assessment. The correlation statistics could indicate the convergence of the standardized test and the self-assessment within the same timeline.

Table 6.4 The Top Five and Bottom Five Learners' Performance in Post-test and Post Self-Assessment

	Learners	Post-test (marks)	Post self-assessment
Top five	I_S3	44	4.5
	T_S6	39.5	4.5
	T_S8	47.5	4.3
	V_S1	46.5	4.8
	V_S3	44	4.9
	Mean	44.3	4.6
Bottom five	T_S3	19	3.1
	P_S4	18.5	2.5
	P_S9	17.5	3.2
	P_S6	11.5	1.4
	T_S5	18	4.1
	Mean	16.9	2.9

A subsequent Pearson Correlation test for the relationship between the extent of improvement in test results and in self-assessment was conducted to further explore the consistency. The extent of improvement in test results strongly correlated with the extent to which learners improve their self-assessment scores, r=.49, p (one-tailed) = .001. In other words, the more learners improve in tests, the more learners improve their perception of English literacy. A comparison between the top five learners who

improved the most after the intervention and the bottom five learners who barely improved is shown in Table 6.5. The five learners who improved the most in the tests after the intervention self-assessed their English literacy 1.1 higher than that at the pre-intervention self-assessment on average. By contrast, the five learners who failed to improve their test performance after the intervention perceived their English skills as not improved with a mean improvement rate of 0. Individually speaking, V_S3 ranked first with a gain of 25.2 marks more after the intervention and a rise of 2.06 in self-assessment, whereas P_S 6 listed at the bottom of improvement in test performance self-assessed his English literacy even .54 lower than in the initial self-assessment at the beginning of the intervention.

Table 6.5 Comparison of the Extent of Improvement by the End of the Intervention (Top Five and Bottom Five)

Learners		Improvement in test performance	Improvement in self-assessment
Top Five	I_S5	17.2	0.38
	I_S1	12.2	0.5
	V_S4	18	1.38
	V_S5	16.1	1.38
	V_S3	25.2	2.06
	Mean	17.7	1.1
Bottom Five	P_S2	-1.4	0.13
	P_S6	-2.5	-0.54
	P_S8	-0.4	-0.19
	T_S5	-0.4	0.19
	V_S2	0	0.31
	Mean	-0.9	0.0

Nevertheless, the correlation statistics described above do not rule out the possibility of learners' overestimation or underestimation of their English literacy level (see further explanation in Section 6.5). That is to say, although there is positive correlation between learners' self-assessment and test results, it is still possible that learners' self-assessment could exceed or be lower than what they actually achieve.

6.1.4 Correlation between ISL/Computer literacy, Learner Experience and Learning Outcomes

ISL and computer skills are assumed to be two key factors during the intervention. ISL is the language of instruction and communication on the SLEND and in its context, while computer skills decide whether learners can use the SLEND efficiently. It might be interesting to see the correlation between ISL/computer literacy, learner experience and learning outcomes.

The peer tutor from each centre evaluated their learners' ISL and computer skills in terms of four scales: Excellent user, Good user, Basic user and Bad user. These four scales were converted into numeral numbers 4, 3, 2 and 1 accordingly. Descriptive statistics of ISL skills, computer literacy, improvement in tests, improvement in self-assessment and learner experience are summarised in Table 6.6.

Table 6.6 Descriptive Statistics of ISL, Computer Skills and Learning Outcomes

	N	Minimum	Maximum	Mean	Std. Deviation
ISL skills	40	1.0	4.0	3.1	.81
Compute skills	40	2.0	4.0	3.1	.78
Pre-test Total Score/65.00	40	9.3	47.0	23.25	8.88
Post-test Total Score/65.00	40	11.5	47.5	30.33	8.96
Improvement in tests	40	-2.5	25.2	7.07	5.60
Pre Self-Assessment/5.0	40	1.9	4.8	3.72	.61
Post Self-Assessment/5.0	40	1.4	5.0	4.10	.83
Improvement in self-assessment	40	-1.44	2.06	.37	.68
Learner Experience/5.0	40	2.7	4.8	3.97	.51

Through a Shapiro-Wilk test, it was shown that the data of the ISL skills and computer skills were inconsistent with a normal distribution. Consequently, a series of Kendall's tau tests were employed to examine the correlations. ISL skills were positively and significantly correlated with computer skills, learner experience, pre-test, post-test performance and self-assessment, but not with the extent of improvement in test performance and self-assessment (see the statistical details in Table 6.7). In other words, learners with better ISL skills tend to have better computer skills as well as a better learning experience, perform better in pre- and post-tests and perceive their English literacy skills as higher. As for computer skills, significant positive correlation was found with ISL skills, pre-, and post-tests. That is to say, learners who had better computer skills were very likely to have better ISL skills and perform better in both pre- and post-tests. Therefore, it seems that ISL skills and computer skills are strong indicators of learning outcomes. This adds evidence to the benefit of using sign bilingualism in the P2P Deaf Literacy project, and echoes previous studies (Marschark, Lang, & Albertini, 2002; Hrastinski & Wilbur, 2016) which overwhelmingly underline the importance of sign language skills in Deaf learners' academic achievements.

Table 6.7 Correlation between ISL/Computer Skills, Learner Experience and Learning Outcomes

Kendall's tau_b	ISL skills			Computer skills		
	Correlation Coefficient	Sig. (2-tailed)	N	Correlation Coefficient	Sig.(2-tailed)	N
ISL skills	1.000		40	.427	.003	40
Computer skills	.427	.003	40	1.000		40
Improvement in Tests	.016	.900	40	-.039	.755	40
Improvement in Self-Assessment	.024	.851	40	-.049	.698	40
Learner Experience	.311	.013	40	.203	.105	40
Pre-test score	.372	.003	40	.466	.000	40
Post-test score	.457	.000	40	.424	.001	40
Pre Self-Assessment	.271	.032	40	.189	.137	40
Post Self-Assessment	.292	.021	40	.046	.717	40

6.2 RETENTION OF LEARNING

From the results in Section 6.1, the effectiveness of the course and learners' attainment of English literacy has been detected. Yet it is not clear whether the intervention through the course has long-term lasting effects and retention of learning. In response to this consideration, a 70-day delayed test along with self-assessment is carried out and its necessity is justified in Section 3.3.6.

6.2.1 Long-term Retention of Learning Revealed by Test Performance

In order to investigate the long-term lasting effect, it is necessary to investigate learners' retention of learning over a certain period of time. A delayed post-test was conducted and the model of the "pre-post-delayed" study facilitates the understanding of the retention of learning and long-term effect of the course.

As mentioned before, 17 learners sat all three tests. The average performance for all 17 learners increased from pre-test to post-test and dropped slightly in the delayed test compared to that of the post-test. Before conducting the comparison of performance at the three stages, descriptive statistics were run to look into the mean, standard deviation, outliers, and normal distribution of each group data of pre-test, post-test and delayed post-test. The detailed descriptive statistics, such as number of participants, minimum, maximum, mean and standard deviation of data are presented in Table 6.8.

Table 6.8 Descriptive Statistics of 17 learners' Mean performance in the Tests

	N	Minimum	Maximum	Mean	SD
Pre-test Total Score/65.00	17	12.3	47.0	27.05	9.37
Post-test Total Score/65.00	17	17.5	47.5	33.82	9.02
Delayed-test Total/65.00	17	15.0	50.0	33.38	10.33
Valid N (listwise)	17				

In addition to the statistics in the table above, no outliers have been found. The Shapiro-Wilk test indicates that the data of 17 learners' performance at each test are consistent with being normally distributed. This is the prerequisite for parametric tests. As there is one independent variable of 17 learners and three dependent variables of performance, a one-way repeated measured ANOVA was conducted to evaluate the null hypothesis that there is no change in learners' performance when measured in pre-test, post-test and delayed-test (N=17). The results of the ANOVA indicated a significant time effect, Wilks' Lambda=.24, $F(2,15)=23.76$, $p<.001$, multivariate partial eta squared=.76. Thus, there is significant evidence to reject the null hypothesis and there is significant change of the 17 learners' mean performance over time. The projection of their mean performance over time can also be seen in Figure 6.2.

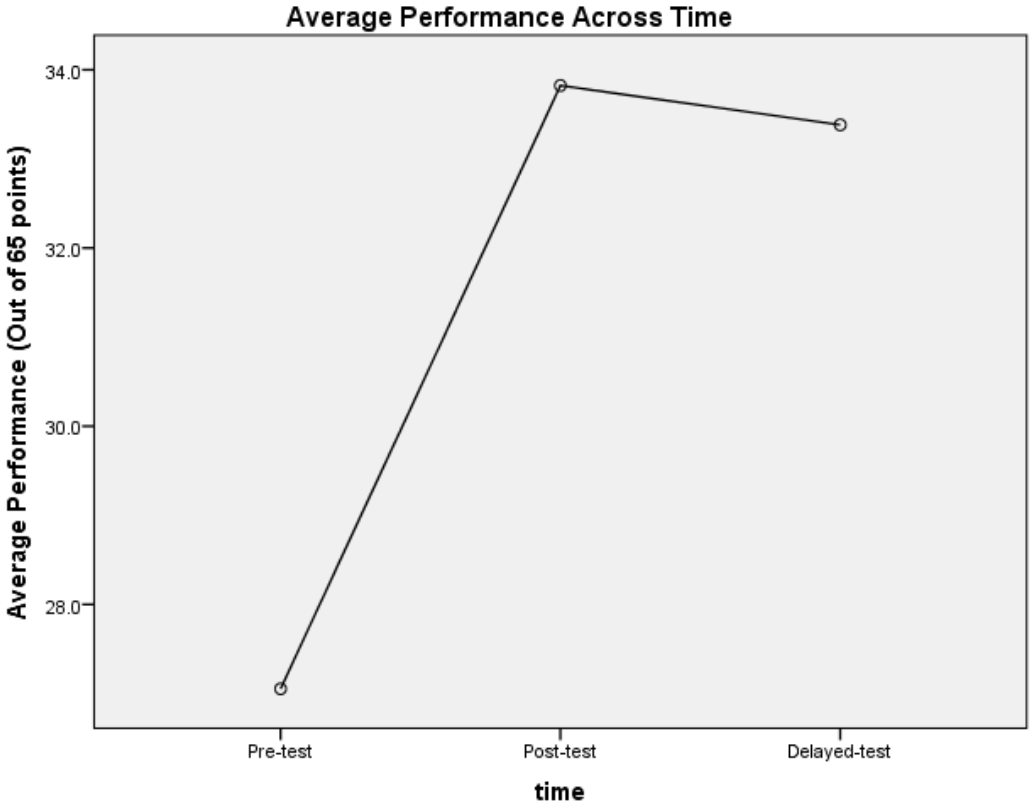


Figure 6.2 43 Learners' Average performance for Pre-, Post-, and Delayed Tests

The previous repeated-measure ANOVA revealed that there was a significant difference in means of pre-test, post-test and delayed post-test. However, it is now clear where the difference of means exactly lies. In this situation, a Bonferroni post hoc test can locate the difference (Field, 2009). It is only used when the initial ANOVA result is significant. Otherwise, there is no need to conduct a Bonferroni post hoc test. The post hoc test shows a statistically significant difference of performance between the pre-test and the post-test ($p<.001$), and between the pre-test and the delayed post-test ($p=.007$). There is no significant difference of performance between the post-test and the delayed post-test ($p=1.000$). In other words, learners improve their English literacy after the intervention, and the long-term effect of the intervention is retained.

In fact, it is usual to expect a lower performance in a delayed post-test than in the immediate post-test as the intervention stops at this interval. A previous study (Benati & Lee, 2008) documented the diminishing effect of intervention by comparing performance between delayed post-test and immediate post-test. The strong retention of learning in the current study might be due to the learning content, real life English mentioned in Section 4.1.2. English content is practically derived from real life and can be applied to real-life situations instantly, which is one of the unique aspects of this course commented on by learners in Section 5.2. The instant use corroborates learners' knowledge and ensures the retention of learning from the intervention even without formal or informal learning after it.

6.2.2 Learners' Perception of English Literacy Skills after the Intervention

In consideration of the long-term retention of learning detected from test performance, it is reasonable to assume a higher perception of learners' literacy levels 70 days after

the intervention. However, learners' perception of retention of learning unfolds in a different way. Along with the delayed post-test, a delayed self-assessment was also conducted 70 days after the intervention. 16 learners completed all three self-assessment questionnaires. The descriptive statistics of 16 learners' self-assessment is shown in Table 6.9.

Table 6.9 Descriptive Statistics of 16 Learners' Pre, Post and Delayed Self-Assessment of English Literacy Skills

Time	N	Minimum	Maximum	Mean	Std. Deviation
Pre Self-Assessment	16	3.1	4.3	3.7	.36
Post Self-Assessment	16	3.8	4.5	4.2	.20
Delayed Self-Assessment	16	3.1	4.3	3.6	.29

A Shapiro-Wilk test indicated that the results of learners' post self-assessment are inconsistent with a normal distribution. As the data violate the assumption of normal distribution, they require a non-parametric Friedman test to compare the means of three times of self-assessment of English literacy skills. The Friedman test is the non-parametric counterpart of one-way ANOVA with repeated measures to measure differences between categories of the dependent variable, either ordinal or continuous with the same participants (Field, 2009). When continuous data (normally at least three groups of data with the same participants) violate the assumptions, for example in the current context not being normally distributed, the Friedman test is used instead of one-way ANOVA with repeated measures (Laerd Statistics, 2018). There was a statically significant difference in self-assessment considering the factor of when learners completed the self-assessment, $\chi^2(2) = 20.222$, $p < 0.001$. In other words, these 16 learners' self-assessment of their English literacy skills were significantly different at the beginning, the end of, and 70 days after the intervention.

To further examine where the difference lies exactly, post hoc analysis with Wilcoxon signed-rank tests was conducted. The Wilcoxon Signed-Rank Test is to compare two sets of scores from the same participants and where normality has been violated. It is the non-parametric counterpart of dependent t-test (Laerd Statistics, 2018). The test is based on the differences between scores under two situations compared. These differences are calculated and ranked. The sign of the difference (either positive or negative) is assigned to the rank (Field, 2009). A Bonferroni correction was implemented and the significance level was reset as $p < 0.017$. There was no significant difference between delayed self-assessment and pre self-assessment ($Z = -.415$, $p = 0.678$). There were significant differences between post self-assessment and pre-intervention self-assessment, ($Z = -3.411$, $p = .001$); and between delayed post self-assessment and post self-assessment ($Z = -3.448$, $p = .001$). Therefore, these 16 learners self-assessed their English literacy skills at the end of the intervention higher than at the outset of the intervention and 70 days after the intervention. The differences were statistically significant. However, their pre-intervention self-assessment and delayed self-assessment were more or less the same. The variation of self-assessment across time is illustrated in Figure 6.3.

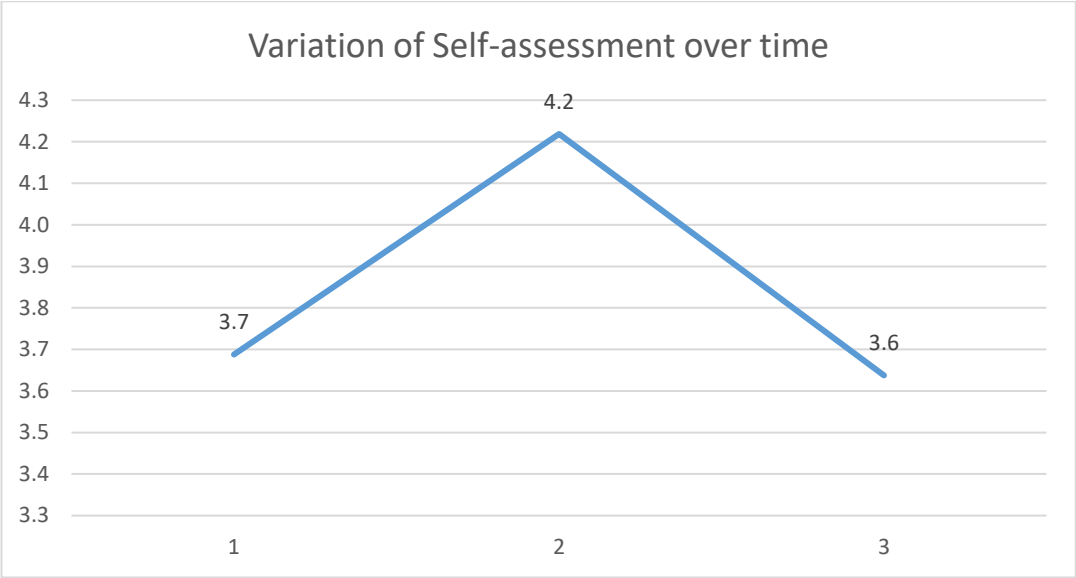


Figure 6.3 Variation of Self-Assessment over Time (1=Pre; 2=Post; 3=Delayed)

The increase of learners' self-assessment immediately after the intervention shows their improvement of confidence. This coincides with the positive feedback of the course in terms of raising confidence in Section 5.2.7. The confidence-raising is probably due to the characteristics of this course, such as peer collaboration. Previous studies have already documented the facilitating role of peer collaboration (Batten, Oakes, & Alexander, 2014) in raising Deaf learners' confidence. As learners return to an isolating environment, the scaffolding through ISL and peer communication disappears. It is less likely that peer support, interaction and Deaf-led characteristics are maintained in their daily life. Therefore, a drop in their confidence is expected, evidenced by their subdued perception of English literacy skills. This may imply that Deaf learners' self-assessment is sensitive to the environment. They tend to overestimate their English literacy proficiency when it occurs in a supporting environment, whereas they might underestimate themselves when exposed to an unsupportive environment.

In relation to the test performance results at Section 6.2.1, learners' retention of learning is positive and promising. Their perception of English literacy skills is inconsistent with their actual performance. Seeing from Figure 6.2 and Figure 6.3, it is obvious that there was a dip at the point of delayed post self-assessment whereas the delayed post-test performance was steady. That is to say, the standardised tests indicated a positive retention of learning although it seems there was no retention of learning in terms of self-assessment. This could imply that there was a drop of learners' confidence rather than their real literacy skills when learners left the course. In this sense, it can be concluded that this course has a positive influence both on learners' English literacy attainment and on learners' confidence-raising. However, the influence on literacy attainment seems to be long-term, whereas the effect on confidence-raising of Deaf learners seems to not last after leaving the learning context. It might be worth exploring what further actions could bring long-term encouraging effects to learners. Follow-on activities to maintain learners' confidence after the course should be an essential part of future projects. For instance, the normalization of learning on the SLEND even after the project could be one option.

6.3 CENTRE DIFFERENCES IN LEARNING OUTCOMES

The rationale for examining the differences across centres is to identify the more efficient context for the SLEND. Given that learners from different centres are exposed to the same learning content with the same amount of time, larger differences in terms of learning outcomes are not expected. If they do exist, this might imply that certain factors comprising the context of the SLEND play an important role in learning.

6.3.1 Test Performance Difference across Centres

Learners' overall attainment of English literacy through the P2P Deaf literacy course is significant and the long-term retention of learning fosters robust learning. As these 43 learners are distributed over five different learning centres, it is worth examining whether there are performance differences across centres and the efficiency of the course at different centres. The descriptive statistics of the mean performance at pre-test and post-test across five centres are summarized in Table 6.10.

Table 6.10 Descriptive Statistics of Mean Performance over Time across Centres

Tests	Groups	N	Minimum	Maximum	Mean	SD
Pre-test Total Score/65.00	Coimbatore	6	18.3	31.0	24.35	4.75
	Indore	12	9.3	40.9	25.28	8.54
	Palakkad	10	9.3	33.9	18.59	7.57
	Thrissur	9	16.9	47	29.38	9.78
	Vadodara	6	12.0	39.0	20.78	10.71
	Total	43	-	-	23.82	9.00
Post-test Total Score/65.00	Coimbatore	6	26.5	39.5	32.17	5.31
	Indore	12	23.5	44.0	32.71	6.64
	Palakkad	10	11.5	33.5	22.95	6.47
	Thrissur	9	18.0	47.5	33.50	10.93
	Vadodara	6	22.5	46.5	33.33	9.62
	Total	43	-	-	30.62	8.72

A Shapiro-Wilk test shows that all the mean performance of each centre at each test are consistent with being normally distributed which allows for parametric statistical tests. As there is a mixture of within-subject variables such as pre- and post-test, and between-subject variables such as the Coimbatore, Indore, Palakkad, Thrissur and Vadodara Centre, a Mixed Factorial ANOVA was conducted to compare the main effects of time and centres, and the interaction effect between time and groups on the mean performance. Factorial ANOVA is to investigate the effects of several variables at the same time, and to examine the interaction between these variables. The Mixed Factorial ANOVA is the integration of one-way (independent) ANOVA and one-way (repeated measures) ANOVA. In the current situation, the mixed design of Factorial ANOVA includes both within-subject and between-subject variables. The within-subject variable of time includes pre-test and post-test, and the between-subject variable of group consists of the Coimbatore, Indore, Palakkad, Thrissur and Vadodara Centre.

There was a significant main effect of time, $F(1, 38) = 73.47$, $p<.001$. This effect implies that the performance between pre-test and post-test was significant regardless of the factor of groups. This corroborates the finding in Section 6.1.1 that 43 learners' post-

test performance was significantly different from their pre-test performance while putting aside the factor of groups. There was no significant main effect of groups regardless of the factor of test-sitting time, F (1, 38) = 2.54, p=.056. This indicates that the mean performances across centres/groups at pre-test or post-test are not significantly different, although it is on the verge of being statistically significant. As for the interaction of time and groups, there was a significant interaction between time of taking tests and group location of the learners, F (1, 38) =2.92, p=.034. This effect of the interaction of time and group demonstrates that the course/intervention had an effect on the mean performances of learners over time (comparing pre-test performance to post-test performance) across five centres.

To further explore the difference of performance over time at all five centres, a post-hoc analysis using a Bonferroni adjustments was conducted. Table 6.11 reveals that the mean performances of learners from each centre between pre-test and post-test are significantly different. This indicates that the intervention/course has a significant effect on learners at each centre.

Table 6.11 Pairwise Comparisons of Learner Performance at Each Centre over Time (Within-Subjects Effects)

Groups	(I) time	(J) time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
Coimbatore	1	2	-7.817*	2.181	.001	-12.232	-3.401
	2	1	7.817*	2.181	.001	3.401	12.232
Indore	1	2	-7.433*	1.542	.000	-10.555	-4.311
	2	1	7.433*	1.542	.000	4.311	10.555
Palakkad	1	2	-4.360*	1.689	.014	-7.780	-.940
	2	1	4.360*	1.689	.014	.940	7.780
Thrissur	1	2	-4.122*	1.781	.026	-7.727	-.517
	2	1	4.122*	1.781	.026	.517	7.727
Vadodara	1	2	-12.550*	2.181	.000	-16.965	-8.135
	2	1	12.550*	2.181	.000	8.135	16.965

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

As seen in Table 6.12, for pre-test, there is only a significant performance difference between learners from Palakkad and learners from Thrissur (p=.009). For post-test, there are significant differences between Coimbatore and Palakkad (p=.031), Indore and Palakkad (p=.007), Thrissur and Palakkad (p=.007), Vadodara and Palakkad (p=.016). That is to say, through the intervention, learners from the Coimbatore Centre, Indore Centre, and Vadodara Centre have made more progress than the Palakkad Centre, as their post-test performance is significantly different, and this difference is absent at the pre-test.

Table 6.12 Pairwise Comparisons of Learner Performance between Centres at Pre-test and Post-test (Between-Subjects Effects) [24]

time	(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
Pre-test	Palakkad	Thrissur	-10.788*	3.922	0.009	-18.727	-2.848
	Thrissur	Palakkad	10.788*	3.922	0.009	2.848	18.727
Post-test	Coimbatore	Palakkad	9.217*	4.122	0.031	0.873	17.56
	Indore	Palakkad	9.758*	3.417	0.007	2.84	16.676
	Palakkad	Coimbatore	-9.217*	4.122	0.031	-17.56	-0.873
	Palakkad	Indore	-9.758*	3.417	0.007	-16.676	-2.84
	Palakkad	Thrissur	-10.550*	3.667	0.007	-17.974	-3.126
	Palakkad	Vadodara	-10.383*	4.122	0.016	-18.727	-2.04
	Thrissur	Palakkad	10.550*	3.667	0.007	3.126	17.974
	Vadodara	Palakkad	10.383*	4.122	0.016	2.04	18.727

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

The results of the Mixed Factorial ANOVA can be summarized by Figure 6.4. In addition, it also shows that the intervention/course for the Vadodara, Coimbatore and Indore Centre is more effective than the intervention in Palakkad and Thrissur as shown by the profile. It is easier to predict the relatively narrow improvement of English literacy at the Thrissur centre, as they already have had a rather higher literacy level when they joined the intervention, with an average of 29.38, close to the average of all the 43 learners in the post-test at 30.62. For the Palakkad Centre, the result might be due to its rather low starting English literacy level, with an average of 18.59, the lowest across the five centres in the pre-test. This might indicate that this Web 2.0 technology-enhanced course is more efficient for learners who have a certain level of English knowledge but not close to A1-2.

[24] Non-significant statistics are removed from the table for a clearer view of significant statistics.

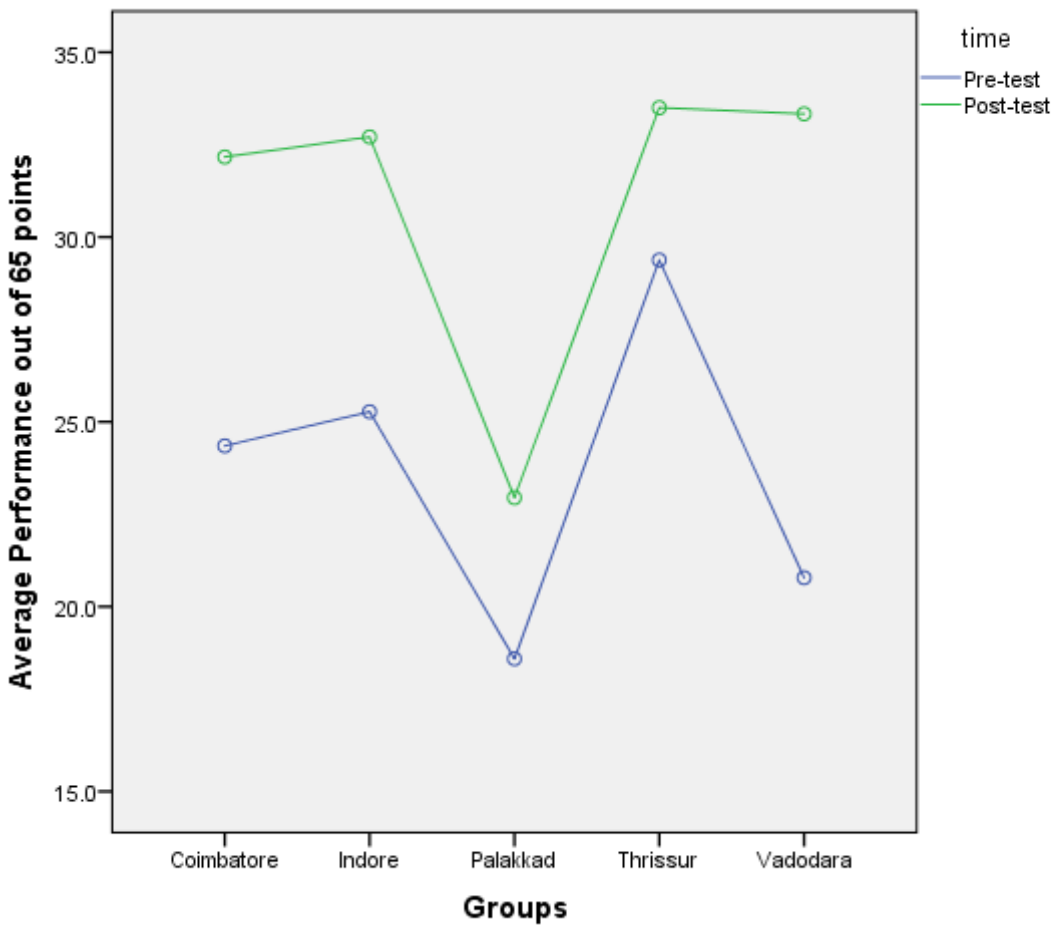


Figure 6.4 Change of Learners' Pre-, Post-Tests Performance at Each Centre

It is very interesting to see that learners from four centres reach more or less the same level of performance at the end of the intervention with a range between 32.167 and 33.500, though learners at each centre have a different starting level of English literacy. Therefore, it will be helpful to explain: (1) why the Palakkad Centre and the Vadodara Centre seem to have a similar level of English literacy at the beginning of the intervention, but end up so differently, with one at the bottom and the other one ranking second among the five centres; (2) the implication of the more or less same level reached by four centres, as the achievement of the CEFR A2 or just as a coincidence.

6.3.2 Difference of Self-Assessment across Centres

As can be seen from Section 6.3.1, there is a performance difference between centres over time in terms of standardized tests. It is interesting to examine whether learners from different centres perceive their literacy improvement aligned with their performance. The descriptive statistics of the mean self-assessment along with pre-test and post-test across five centres are presented in Table 6.13 with a total number of 41 learners who all sat the standardized tests[25].

[25] When it comes to comparison between centres or within one centre, only pre and post self-assessment data are included. This is due to the small number of participants for delayed self-assessment, namely, 16. After this small number is divided into five groups, it is impossible to carry out statistical tests.

Table 6.13 Descriptive Statistics of Mean Performance over Time across Centres

	Groups	N	Minimum	Maximum	Mean	SD
Pre Self-assessment Scale of 1-5	Coimbatore	4	3.0	3.9	3.4	.48
	Indore	12	3.1	4.6	3.9	.54
	Palakkad	10	1.9	4.8	3.6	.95
	Thrissur	9	3.4	4.3	3.9	.32
	Vadodara	6	2.9	4.2	3.6	.47
	Total	41	-	-	3.7	.62
Post Self-assessment Scale of 1-5	Coimbatore	4	3.8	4.5	4.1	.28
	Indore	12	2.5	4.9	4.2	.65
	Palakkad	10	1.4	5.0	3.7	1.17
	Thrissur	9	2.4	4.6	3.9	.74
	Vadodara	6	4.5	5.0	4.8	.18
	Total	41	-	-	4.1	.82

A Shapiro-Wilk test shown that most of learners' self-assessment scores of each centre are consistent with being normally distributed, except for the self-assessment scores of Indore and Thrissur Centre along with the post-test. Therefore, non-parametric tests are employed to detect self-assessment differences across groups over time. At the same time, the sample size for each centre is smaller than 15 and the sample size of the Coimbatore centre is even smaller than five. This is likely to reduce the power of the tests, which means the significance is difficult to spot even it is there.

To examine the longitudinal variation of self-assessment at each centre, Wilcoxon Signed-ranks tests were conducted. The results in Table 6.14 shows a significant difference for the Vadodara Centre, z=-2.21, p=.027. The mean of the ranks in favour of post self-assessment at the Vadodara Centre is 3.50, while the mean of the ranks in favour of pre-intervention self-assessment is .00. There is no significant difference for the Coimbatore Centre, z=-1.83, p=.068, Indore Centre, z=-1.93, p=.054, Palakkad Centre, z=-.534, p=.594, and Thrissur Centre, z=-.561, p=.574.

Table 6.14 Wilcoxon Signed-ranks Tests for Pre, Post Self-Assessment at Each Centre

Ranks

		N	Mean Rank	Sum of Ranks
CoimbatorePostSelfAssess – CoimbatorePreSelfAssess	Negative Ranks	0[a]	.00	.00
	Positive Ranks	4[b]	2.50	10.00
	Ties	0[c]		
	Total	4		
IndorePostSelfAssess – IndorePreSelfAssess	Negative Ranks	2[d]	7.25	14.50
	Positive Ranks	10[e]	6.35	63.50
	Ties	0[f]		
	Total	12		
PalakkadPostSelfAssess – PalakkadPreSelfAssess	Negative Ranks	4[g]	4.50	18.00
	Positive Ranks	5[h]	5.40	27.00
	Ties	1[i]		
	Total	10		
ThrissurPostSelfAssess – ThrissurPreSelfAssess	Negative Ranks	2[j]	7.00	14.00
	Positive Ranks	6[k]	3.67	22.00

	Ties	1[l]		
	Total	9		
VadodaraPostSelfAssess – VadodaraPreSelfAssess	Negative Ranks	0[m]	.00	.00
	Positive Ranks	6[n]	3.50	21.00
	Ties	0[o]		
	Total	6		

a. CoimbatorePostSelfAssess < CoimbatorePreSelfAssess
b. CoimbatorePostSelfAssess > CoimbatorePreSelfAssess
c. CoimbatorePostSelfAssess = CoimbatorePreSelfAssess
d. IndorePostSelfAssess < IndorePreSelfAssess
e. IndorePostSelfAssess > IndorePreSelfAssess
f. IndorePostSelfAssess = IndorePreSelfAssess
g. PalakkadPostSelfAssess < PalakkadPreSelfAssess
h. PalakkadPostSelfAssess > PalakkadPreSelfAssess
i. PalakkadPostSelfAssess = PalakkadPreSelfAssess
j. ThrissurPostSelfAssess < ThrissurPreSelfAssess
k. ThrissurPostSelfAssess > ThrissurPreSelfAssess
l. ThrissurPostSelfAssess = ThrissurPreSelfAssess
m. VadodaraPostSelfAssess < VadodaraPreSelfAssess
n. VadodaraPostSelfAssess > VadodaraPreSelfAssess
o. VadodaraPostSelfAssess = VadodaraPreSelfAssess

Test Statistics[a]

	Coimbatore PostSelfAssess – Coimbatore PreSelfAssess	Indore PostSelfAssess – Indore PreSelfAssess	Palakkad PostSelfAssess – Palakkad PreSelfAssess	ThrissurPost SelfAssess – ThrissurPre SelfAssess	VadodaraPost SelfAssess – VadodaraPreS elfAssess
Z	-1.826[b]	-1.925[b]	-.534[b]	-.561[b]	-2.207[b]
Asymp. Sig. (2-tailed)	.068	.054	.594	.574	.027
Exact Sig. (2-tailed)	.125	.051	.625	.617	.031
Exact Sig. (1-tailed)	.063	.026	.313	.309	.016
Point Probability	.063	.001	.016	.023	.016

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

Based on the results mentioned above, there is a significant improvement in self-assessment of English literacy at the Vadodara Centre after the intervention. There is also improvement at the Coimbatore Centre, Indore Centre, and Palakkad Centre, yet it is not statistically significant. The non-significance might be due to the use of non-parametric tests, which are less powerful in indicating significance than parametric tests (Field, 2009). It might also be due to having small samples. Their improvement of self-assessment of English literacy skills is portrayed in Figure 6.5. From the bars, it is easy to see the clear improvement at Vadodara, Coimbatore, Indore and Palakkad Centre. No change of self-assessment has been found for the Thrissur Centre before and after the intervention.

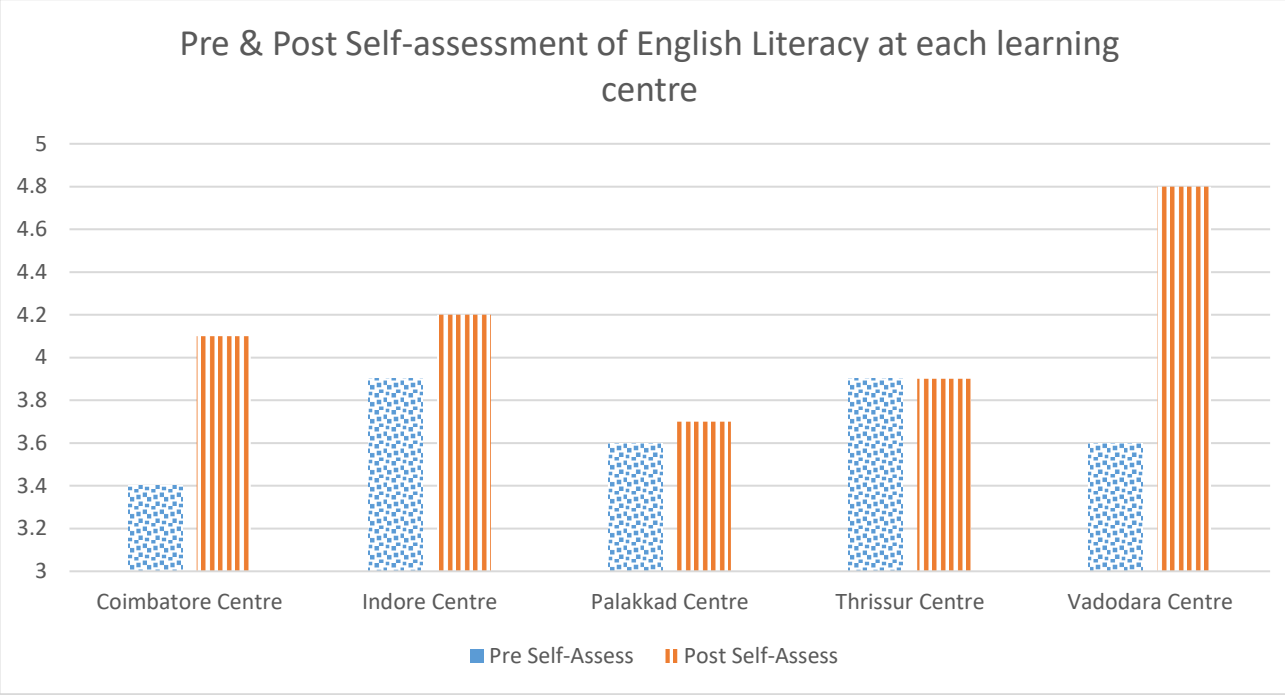


Figure 6.5 Change of Learners' Self-Assessment of English Literacy at Each Centre

The strong correlation between overall test performance and self-assessment presented in Section 6.1.3 does not necessarily exclude the possibility of learners' overestimation or underestimation of their English literacy level. In fact, after post-test and post-self-assessment, it becomes clear that at least some of them possibly overestimated their performance at the beginning. Seeing from Table 6.15, at the Coimbatore Centre, Indore Centre and Palakkad Centre, although their improvement in terms of standardized test is significant, there is either no greater difference or no difference between their pre self-assessment and post self-assessment. For example, at the Thrissur Centre, learners' self-assessment of English literacy before and after the intervention remains the same, with an exact same average of 3.9 regardless of their improvement in standardized tests. This might indicate an overestimation of their self-assessment of their English literacy level at the outset of the intervention. Previous studies (Marschark, Sapere, Convertino, Seewagen, & Maltzen, 2004; Borga, Convertino, Marschark, Morrison, & Rizzolo, 2011) have also documented Deaf learners' tendency to overestimate academic performance relative to their hearing peers.

Table 6.15 An Overview of Learners' Performance in Standardized Tests and Self-Assessment of English Literacy

Centres	Average of Pre-test	Average of Post-test	Performance Differences	Average of Pre self-assessment	Average of Post self-assessment	Self-assessment Differences
Five Centres	23.82	30.62	↑6.80	3.7	4.1	↑0.4
Coimbatore Centre	24.35	32.17	↑7.82	3.4	4.1	↑0.7
Indore Centre	25.28	32.71	↑7.43	3.9	4.2	↑0.3
Palakkad Centre	18.59	22.95	↑4.36	3.6	3.7	↑0.1
Thrissur Centre	29.38	33.50	↑4.12	3.9	3.9	↑0
Vadodara Centre	20.78	33.33	↑12.55	3.6	4.8	↑1.2

One point that arouses great interest might be how learners' self-assessment improved, and this becomes another plus point of the intervention, as it facilitates learners' better understanding of their own English level. This echoes the previous findings in Section 5.2.7: although learners are unfamiliar with CEFR benchmarking, they are capable of providing substantial examples of their successful use of English in real life after the intervention. Through learning and practice, they are much clearer of what they are capable of when using English.

6.3.3 Additional Factors Affecting Learning Outcomes

With a closer examination of learners' remarkable achievements at the Vadodara Centre, additional factors are taken into account to explain this phenomenon.

- **Outstanding Improvement at the Vadodara Centre**

By analysing centre differences of test performance and self-assessment in Sections 5.1, 6.3.1 and 6.3.2, it is reasonable to conclude that the intervention at the Vadodara Centre is the most efficient practice in terms of test performance, self-assessment and learner experience (see Table 6.16). Learners from Vadodara have remarkably achieved a mean improvement of 12.55 in test performance and ranked 2nd with an average of 33.33 in the post-test. Meanwhile, their self-assessment soars from a mean of 3.6 at the pre self-assessment to a mean of 4.8. In so achieving, their learning outcomes from the intervention are assessed as the most efficient in both objective and subjective evaluation. In addition, they share the most pleasant experience of using the SLEND with an average response of 4.4 ranked 1st among the five groups.

Table 6.16 Learning Outcomes and Learner Experience at the Vadodara Centre

Students (n = 6)	Pre-test	Post-test	Performance Differences	Pre self-assessment	Post self-assessment	Self-assessment Differences	Learner experience
S1_V	14.0	22.5	↑8.5	3.4	4.9	↑1.5	4.5
S2_V	28.0	28.0	↑0	4.2	4.5	↑0.3	4.3
S3_V	39.0	46.5	↑7.5	4	4.8	↑0.8	4.6
S4_V	12.0	30.0	↑18.0	3.5	4.9	↑1.4	3.9
S5_V	12.9	29.0	↑16.1	3.6	5.0	↑1.4	4.8
S6_V	18.8	44.0	↑25.2	2.9	4.9	↑2.0	4.0
Mean	20.78	33.33	↑12.55	3.6	4.8	↑1.2	4.4

- Internal Factors of Learners

The issue of greater achievements of the Vadodara Centre with the same resources as other centres needs addressing. What additional factors could possibly contribute to their greater achievements and positive learning experience? After a close observation of learners' demographic information (see Appendix 17), a couple of factors including education, competence of ISL and computer literacy (see Table 6.17), are worth discussing.

Table 6.17 Learning Outcomes and Learner Experience at the Vadodara Centre

Students	S1_V	S2_V	S3_V	S4_V	S5_V	S6_V
Gender	Male	Male	Female	Male	Male	Male
Age	21	21	19	20	21	20
Education	10th passed	10th Passed	12th Passed	10th Passed	8th Passed	10th Passed
ISL	Excellent	Excellent	Excellent	Good	Good	Excellent
Computer Literacy	Basic	Good	Good	Basic	Basic	Excellent

Learners' proficiency of ISL seems to have a large effect on their learning outcomes. Learners from Vadodara possess a good knowledge of ISL compared to the other centres, with two good users and four excellent users[26]. On the contrast, at the Palakkad Centre where learners achieve the least, among the 10 learners, one of them is a bad user of ISL and four of them are only basic users. As sign bilingualism is one of the most important characteristics of the SLEND (see Section 4.1.3), ISL plays an essential role in conveying information and explanation of learning materials. It is the language of instruction in the format of both face-to-face interaction and ISL-video explanation.

[26] Learners' level of education, ISL and computer literacy were assessed by the peer tutor from each centre at the end of the intervention. Detailed instruction was given by the researcher in the U.K. and passed on to them by the research assistants in the field. Initially, the four levels were labelled as Excellent User, Competent User, Basic User and Incompetent User. However, the research assistants modified them into Excellent User, Good User, Basic User and Bad User to help with peer tutors' understanding.

Thus, learners' incompetence in ISL means that potentially these learners have no strong language at all, with consequences for general cognition. This can create barriers to their understanding and learning. Conversely, good knowledge of ISL is conducive to learners' English literacy attainment underpinning a paradigm of sign bilingualism. The finding of facilitating role of ISL competence in comparatively better learning outcomes of learners at the Vadodara Centre is theoretically commensurate with the Input Hypothesis (Krashen, 1985), acknowledging that the use of L1 to explain subject-matter information and to understand abstract ideas facilitates comprehensible input of English. The facilitating role of sign language is also evident from previous studies (Niederberger & Prinz, 2005; Goldin-Meadow & Mayberry, 2001).

- External Factors Associated with Learners

Besides the internal factors of learners, there are two major external factors worthy of consideration: peer tutors and technological environment. Although the five peer tutors are recruited based on the same recruiting criteria, it is very likely that they differ from each other in terms of English literacy, technology literacy, and teaching experience, etc. According to their performance at the pre-test, the peer tutor from the Vadodara Centre outperforms the other four peer tutors and two research assistants. His relatively high literacy level might be a positive factor for peer tutoring, which indirectly influences learners' learning.

Moreover, according to the feedback from the research assistants and the P2P Deaf Literacy project researchers, the peer tutor from Vadodara is the only one among the five peer tutors who has had experience of teaching English to Deaf learners before joining the project. The detailed demographic information of peer tutors is introduced in Appendix 18. As for technology literacy, there is no difference among peer tutors. The second workshop with a primary focus on their use of the SLEND also helps to eliminate the technology barriers and to ensure that they learn the necessary skills of technology for the intervention. Therefore, it is more apt to conclude that the professionalism of the peer tutor is crucial for the satisfying learning outcomes and pleasant learner experience. The peer tutor at the Vadodara Centre in the current project has the attributes of good subject knowledge (in this case, good English literacy and ISL literacy) and rich teaching experience to be the best peer tutor.

As described in Table 3.6 in Section 3.6.2, the Vadodara Centre is the only centre less likely to be classified as a low-tech environment according to the demarcation of low-tech environment proposed by Egbert and Yang (2004). Good Internet access and high student and computer/laptop ratio place the Vadodara Centre above a low-tech environment. It is by no means to conclude that a high-tech environment leads to relatively better learning results. It is noteworthy that the remaining four centres with low-tech environment do make progress in English attainment to some extent. However, due to the large number of ISL videos as primary learning materials on the SLEND, the advantage of good internet access and enough devices are more likely to create a positive learning experience and ensure efficient learning especially in the circumstances that the same learning content is used at all the five centres.

6.4 SELF-ASSESSMENT OF LITERACY SKILLS IN RELATION TO LEARNING AND TEST PERFORMANCE

This section is concerned with 16 learners' self-assessment of each specific skill across time. The analysis is to reflect on how relevant the intervention is to each literacy skill, and accordingly inform content development on the SLEND platform. It is worth noting that the self-assessment data is supplemented by the data of actual test performance and curated learning content on the SLEND platform.

As specified in Section 3.3.7, the statements in the questionnaire are adapted from the descriptors of the CEFR A1-A2 and used three times, with both receptive and productive aspects. Figure 6.6 offers a general understanding of learners' longitudinal change in self-assessment of their English literacy skills. Firstly, there is a clear overall trend of increase in learners' self-assessment of each specific skill immediately after the intervention comparing to that of pre self-assessment, except for S12 with an equal response. Secondly, there is a clear trend of decrease in learners' delayed self-assessment of each specific skill 70 days after the intervention, except for S12. Finally, for each statement the increase or decrease varies.

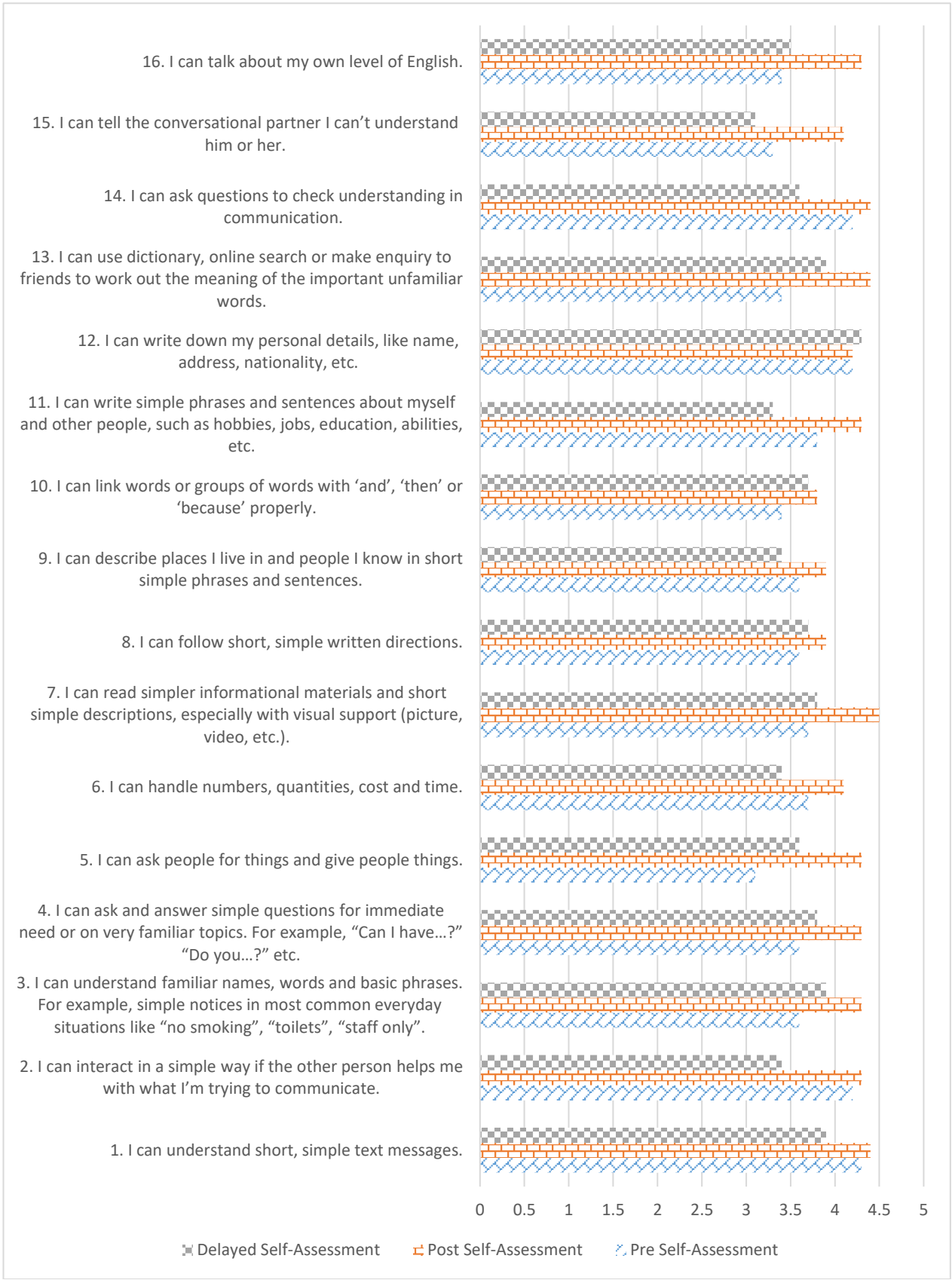


Figure 6.6 Learners' Self-assessment of Specific English Literacy Skills before, by the End of and 70 Day after the Intervention

The variation of self-assessment for each statement is examined closely with respective statistical tests. If available, learners' actual performance in the tests and learning content from the SLEND corresponding to the statements of the questionnaire are associated to better understand and justify their changes of self-assessment over time. In this way, a full picture of learners' perception of each literacy skill is depicted together with solid evidence.

A Shapiro-Wilk test shows that for the majority of the data, learners' responses to each statement at different times were non-normally distributed with the exception of S04 and S10 for pre self-assessment. Table 6.18 presents the descriptive statistics of learners' responses to each skill statement across time.

Table 6.18 Descriptive Statistics of 16 Learners' Responses to Each Skill Statement across Time

Statement	Self-assessment	N	Minimum	Maximum	Mean	SD	Mdn
1	Pre	16	2.0	5.0	4.3	.87	4.50
	Post	16	2.0	5.0	4.4	.81	5.00
	Delayed	16	1.0	5.0	3.9	1.41	4.50
2	Pre	16	1.0	5.0	4.2	1.17	5.00
	Post	16	1.0	5.0	4.3	1.18	5.00
	Delayed	16	1.0	5.0	3.4	1.36	4.00
3	Pre	16	1.0	5.0	3.6	1.41	4.00
	Post	16	1.0	5.0	4.3	1.14	5.00
	Delayed	16	1.0	5.0	3.9	1.29	4.00
4	Pre	16	1.0	5.0	3.6	1.21	4.00
	Post	16	2.0	5.0	4.3	.86	4.00
	Delayed	16	1.0	5.0	3.8	1.33	4.00
5	Pre	16	1.0	5.0	3.1	1.59	3.50
	Post	16	2.0	5.0	4.3	.79	4.00
	Delayed	16	1.0	5.0	3.6	1.26	4.00
6	Pre	16	1.0	5.0	3.7	1.08	4.00
	Post	16	2.0	5.0	4.1	1.02	4.00
	Delayed	16	1.0	5.0	3.4	1.21	4.00
7	Pre	16	2.0	5.0	3.7	1.25	4.00
	Post	16	2.0	5.0	4.5	.82	5.00
	Delayed	16	1.0	5.0	3.8	1.13	4.00
8	Pre	16	2.0	5.0	3.6	1.03	4.00
	Post	16	1.0	5.0	3.9	1.12	4.00
	Delayed	16	1.0	5.0	3.7	1.30	4.00
9	Pre	16	1.0	5.0	3.6	1.15	4.00
	Post	16	2.0	5.0	3.9	1.02	4.00
	Delayed	16	1.0	5.0	3.4	1.21	4.00
10	Pre	16	1.0	5.0	3.4	1.26	4.00
	Post	16	1.0	5.0	3.8	1.11	4.00
	Delayed	16	1.0	5.0	3.7	1.14	4.00
11	Pre	16	2.0	5.0	3.8	.98	4.00
	Post	16	2.0	5.0	4.3	.86	4.00

	Delayed	16	1.0	5.0	3.3	1.25	4.00
12	Pre	16	2.0	5.0	4.2	1.05	4.50
	Post	16	1.0	5.0	4.2	1.33	5.00
	Delayed	16	1.0	5.0	4.3	1.24	5.00
13	Pre	16	1.0	5.0	3.4	1.41	4.00
	Post	16	3.0	5.0	4.4	.72	4.50
	Delayed	16	1.0	5.0	3.9	1.31	4.00
14	Pre	16	2.0	5.0	3.7	.91	4.00
	Post	16	2.0	5.0	4.4	.81	5.00
	Delayed	16	1.0	5.0	3.6	1.26	4.00
15	Pre	16	1.0	5.0	3.3	1.29	4.00
	Post	16	2.0	5.0	4.1	1.00	4.00
	Delayed	16	1.0	4.0	3.1	1.06	3.50
16	Pre	16	1.0	5.0	3.4	1.41	4.00
	Post	16	2.0	5.0	4.3	.86	4.00
	Delayed	16	1.0	5.0	3.5	1.37	4.00

Therefore, non-parametric tests, Friedman's ANOVA tests (see Appendix 19 for detailed test results) were employed to explore the variation of learners' self-assessment of each skill across time. I report the findings in categories according to the degree of self-assessment improvement.

6.4.1 Literacy Skills with Retention in Self-assessment

Among the 16 statements, statement 12 "I can write down my personal details, like name, address, nationality, etc." was the only literacy skill that retained the self-assessment at the delayed post point. There was no significant change over time for self-assessment of statement 12, $\chi2(2) = .267$, $p = .88$, with the medians of 4.50, 5.00 and 5.00 for pre, post and delayed self-assessment respectively. Seeing from Figure 6.6, there is a draw between pre self-assessment and post self-assessment, but a slight rise for delayed self-assessment. Their performance on the items linked with the skill of writing down my personal details, like name, address, nationality, ranks first the during post-test with a total score of 84, followed by 78 for delayed-test and 69 for pre-test. In spite of the dissimilar variation pattern of self-assessment and test results, there is congruence that learners' writing skill of personal details 70 days after the intervention is higher than when they first started the course.

A possible explanation for the improvement is that writing personal details was covered by four sessions out of 46 on the SLEND. Learners were also asked to update their personal profile on the platform. These corroborate learners' previous knowledge of their personal information. Moreover, the ethnographic approach in terms of identifying literacy practices from real life encourages learning real life English. This enables instant application in real life which was mentioned in learners' interviews (see Section 5.2). Transfer of knowledge acquired from one context takes places when the knowledge stored in long-term memory is used to solve a problem in another context. Therefore, learners might have more chances of practicing writing their personal information in real life during or after the course, which can also account for the increase of this particular writing skill.

6.4.2 Literacy skills with Significant Improvement in Self-assessment

Based on the results of the Friedman's ANOVA tests, learners' self-assessment of the statements 7, 11, 13, 14 over time improved statistically significantly.

- **Statement 7: I can read simpler informational materials and short simple descriptions, especially with visual support (picture, video, etc.).**

Learners' self-assessment of statement 7 over time differed significantly, $\chi 2(2) = 10.978$, $p = .004$, with the medians of 4.00, 5.00 and 4.00 for pre, post and delayed self-assessment accordingly. Follow-up pairwise comparisons with a Wilcoxon test (see Appendix 20 for details of test results) were conducted. It controlled for the Type I errors across theses comparisons at the .05 level using the Least Significant Difference (LSD) procedure. A Type I error refers to a "false positive" situation under which a true null hypothesis is incorrectly rejected, whereas a Type II error means a "false negative" scenario in which a false null hypothesis is incorrectly retained (Banerjee, Chitnis, Jadhav, Bhawalkar, & Chaudhury, 2009). Learners' median post perception of statement 7 was significantly different from their pre perception (Z=-2.511, *p*=.012), and learners' median delayed perception of statement 7 differed from post perception significantly (Z=-3.051, *p*=.002). There was no significant difference between delayed perception and pre perception (Z=-.093, *p*=.926).

That is to say, the intervention has an effect on learners' perception of their capability of reading simpler informational materials and short simple descriptions, especially with visual support (picture, video, etc.). However, the effect was short-term and disappeared 70 days after the intervention. As this skill cannot be divided from test tasks, there is no specific performance evidence to associate with their improvement of self-assessment. Nevertheless, it is likely that the intense use of visual support on the SLEND, such as pictures and ISL videos, does lead to a great short-term impact on their perception. However, it does not seem to help with their long-term perception.

- **Statement 11: I can write simple phrases and sentences about myself and other people, such as hobbies, jobs, education, abilities, etc.**

Learners' self-assessment of statement 11 over time differed significantly, $\chi^2(2) = 6.178$, $p = .046$, with the same median of 4.00 for pre, post and delayed self-assessment. Follow-up pairwise comparisons with a Wilcoxon test were conducted. It controlled for the Type I errors across theses comparisons at the .05 level using the LSD procedure. Learners' median post perception of statement 11 was not significantly different from their pre perception (Z=-1.461, *p*=.144), and learners' median delayed perception of statement 11 did not differ from pre perception significantly (Z=-1.125, *p*=.261). Unusually, there was significant difference between delayed perception and post perception (Z=-2.506, *p*=.012).

That is to say, the intervention did not affect learners' perception of their capability of writing simple phrases and sentences about themselves and other people, such as hobbies, jobs, education, abilities, etc. by the end of the intervention. However, there was a decrease from post perception to delayed perception.

For test results of the items (Writing Part, the last four items) relevant to this particular skill, there was a similar rise of performance from pre-test to post-test, with a total score of 106.00 and a total score of 158.50 respectively. Rather than their self-assessment

dropping 70 days after the intervention, it seems that the effect was long-term seeing from their performance with a total score of 109.00 for the delayed test. In fact, there was no specific learning session on the SLEND with the instruction of writing simple phrases and sentences about themselves and other people. The only relevant content on the SLEND was the sharing space where learners and peer tutors provided their brief introduction. The long-term effect of the intervention on learners' skills of writing simple phrases and sentences can possibly be attributed to the incremental acquisition of knowledge and the increase in confidence with the intervention.

- **Statement 13: I can use dictionary, online search or make enquiry to friends to work out the meaning of the important unfamiliar words.**

Learners' self-assessment of statement 13 over time differed significantly, $\chi^2(2) = 7.476$, $p = .02$, with the medians of 4.00, 4.50 and 4.00 for pre, post and delayed self-assessment accordingly. Follow-up pairwise comparisons with a Wilcoxon test were conducted. It controlled for the Type I errors across theses comparisons at the .05 level using the LSD procedure. Learners' median post perception of statement 13 was significantly different from their pre perception (Z=-2.506, *p*=.012). Learners' median delayed perception of statement 13 did not differ from pre perception significantly (Z=-1.461, *p*=.144). There was no significant difference between delayed perception and post perception (Z=-1.642, *p*=.101). In other words, learners' perception of their skills of using dictionary, online search or making an enquiry to friends to work out the meaning of unfamiliar words improved statistically significantly at the post point and dropped at the delayed point.

No particular learning content on the SLEND and test performance can account for this significant variation of self-assessment. This is due to the techniques they employ for learning which are about the learning process rather than the learning product. As learners continuously utilize these techniques, it is not surprising that there was a significant rise of self-assessment immediately after the course. The decrease of self-assessment 70 days later was possibly due to the fact that they were back to an even worse low-tech environment with both physical and human constraints (Gonzalez & St. Louis, 2013), which might not give them the chance of using a dictionary, online search or making enquiry to friends.

- **Statement 14: I can ask questions to check understanding in communication.**

Learners' self-assessment of statement 14 over time differed significantly, $\chi^2(2) = 8.318$, $p = .02$, with the medians of 4.00, 5.00 and 4.00 for pre, post and delayed self-assessment accordingly. Follow-up pairwise comparisons with a Wilcoxon test were conducted. It controlled for the Type I errors across theses comparisons at the .05 level using the LSD procedure. Learners' median post perception of statement 14 was insignificantly different from their pre perception (Z=-1.136, *p*=.256). Learners' median delayed perception of statement 14 differed from post perception significantly (Z=-2.176, *p*=.030). There was also significant difference between delayed perception and pre perception (Z=-2.066, *p*=.039).

That is to say, the intervention facilitated a slight improvement of learners' perception of their capability of asking questions to check understanding in communication by the end of the intervention. Unfortunately, the effect was not retained 70 days after the intervention and dropped statistically significantly to the level even lower than in the

pre-assessment. The variation of perception of this particular skill follows the exactly same pattern as that of statement 11. The reason behind the significant decrease from post perception to delayed perception might be similar to that of statement 13, which was due to disappearance of the communication context after the intervention. Although this skill is very likely to be absent from their face-to-face communication, it does exist in online communication. This implies the necessity of the modification of the statement to an online context.

6.4.3 Moderate Improvement of Post Self-assessment

Self-assessment of statements 3, 4, 5, 15, and 16 fell into the category of non-statistical significant change over time, but with moderate improvement at the post self-assessment comparing to pre self-assessment.

- **Statement 3: I can understand familiar names, words and basic phrases. For example, simple notices in most common everyday situations like "no smoking", "toilets", "staff only".**

No significant difference was found for the self-assessment of statement 3 over time, $\chi^2(2) = 5.150$, $p = .08$, with the medians of 4.00, 5.00 and 4.00 for pre, post and delayed self-assessment correspondingly. Although no statistical significance found, from Figure 6.6, it is clear that there was a moderate increase by the end of the intervention and the delayed self-assessment was higher than the pre-assessment.

In relation to the tests, there are five items (Reading Part, Items 1-5) in each test regarding simple notices. 17 learners who attended the three tests received a total score of 27, 38, 39 for pre, post and delayed tests respectively. That is to say, the intervention helped these learners to improve their skills of understanding simple notices by the end of the intervention. This was in line with their improvement of self-assessment from pre-point to post point. The positive learning effect was retained 70 days after the intervention according to the test results, which differed from learners' perception indicating a decrease.

- **Statement 4: I can ask and answer simple questions for immediate need or on very familiar topics. For example, "Can I have…?" "Do you…?" etc.**

Although there was no statistically significant change over time for self-assessment of statement 4, $\chi^2(2) = 2.735$, $p = .26$, with the same median of 4.00 for pre, post and delayed self-assessment, there was a slight increase from pre-intervention self-assessment to post self-assessment. 70 days after the intervention, learners perceived their delayed self-assessment of literacy skill of asking and answering simple questions as more or less at the same level as when they started the course. (See Figure 6.6)

There are 25 items relevant to this skill in each test weighing a total mark of 25 out of 65. 17 learners scored a mean of 9.8, 11.0 and 10.3 for pre, post and delayed test accordingly. The test results regarding this specific skill varied in a similar pattern as learners' self-perception, rising significantly at the point of immediate post-test and decreasing slightly during delayed post-test.

In contrast to the heavy weighting in this skill in the tests, there is no specific learning content regarding this skill on the SLEND. Learners also lacked practicing these skills of asking and answering questions in English in real life due to the fact that they do not speak and cannot lip read English. A possible explanation of learners' improvement in

post-test and post self-assessment regarding the literacy skill of asking and answering simple questions is their implicit learning through WhatsApp group chat during the 7-month course. In other words, English literacy skills such as asking and answering simple questions for hearing learners can be transferred to an on-line context for Deaf learners naturally as Deaf learners tend to rely on Web 2.0 social tools more than their hearing peers. This is also commensurate with the VISEL project in Italy, which intends to increase Deaf learners' access to web-based education. In this way, either Web 2.0 social tools or web-based education complements learners' English literacy attainment both in compensating literacy skills absent of Deaf learners' off-line life and in increasing their access to spoken/written English.

Furthermore, this sharp contrast between the heavy weighting and the complete absence of learning content in this skill uncovers a mismatch between learning and testing. As mentioned in Section 4.1.7, CEFR benchmarking is one of the characteristics of the learning platform, SLEND. It is supposed to guide the learning and benchmark learners' achievements through learning. Two factors hinder this match. On the one hand, due to the ethnographic approach, learners distil the literacy practices emerging from the Deaf community into the learning content. As Deaf learners in India tend to have no opportunities of asking and answering simple questions in English in real daily life outside of WhatsApp, learners and peer tutors are unlikely to identify it as key learning content. The ethnographic approach of literacy as social practices is criticized as restricted to the local (Brandt & Clinton, 2002). On the other hand, the CEFR is acknowledged as global (Jones, Orme, & Waller, 2011) and may not fit in the context of Deaf learners' learning of English literacy automatically. Therefore, there is tension between the local ethnographic literacy approach for learning and the global CEFR for testing.

- **Statement 5: I can ask people for things and give people things.**

No significant difference was found for the self-assessment of statement 5 over time, $\chi^2(2) = 3.731$, $p = .16$, with the medians of 3.50, 4.00 and 4.00 for pre, post and delayed self-assessment correspondingly. No corresponding learning content on the SLEND and test items in all three tests have been found. This is similar to Statement 4 and can be transferred to the context of online social communication.

- **Statement 15: I can tell the conversational partner I can't understand him or her.**

No significant difference was found for the self-assessment of statement 15 over time, $\chi^2(2) = 5.080$, $p = .08$, with the medians of 4.00, 4.00 and 3.50 for pre, post and delayed self-assessment accordingly. However, there was a moderate improvement of perception of their skill of clarifying during conversation by the end of the course, which indicated the short-term effect of the intervention, although it was not statistically significant. 70 days after the intervention, learners became suspicious of their literacy skills of telling the conversational partner that they cannot understand him or her. They had a lower perception of this skill comparing to their post self-assessment. It was unclear whether they had the chance of communicating with others after they went back or whether they were willing to inform the conversational partners of their confusion provided they have the chance. Similarly, this compensation strategy of communication was no part of teaching content on the SLEND; instead, it happened naturally during their collaborative learning with their Deaf peers.

- **Statement 16: I can talk about my own level of English.**

There was no significant change over time for self-assessment of statement 16, $\chi^2(2) = 3.378$, $p = .19$, with the same median of 4.00 for pre, post and delayed self-assessment. Although not statistically significant, there was a marginalized improvement immediately after the intervention. The delayed self-assessment of talking about learners' English level was more or less the same as in their pre self-assessment. Despite the discouraging statistics, there was some solid evidence from their interviews (see Section 5.2.7), where they reported on continuing successful application of what they learnt to daily life. However, due to the use of ISL for the interview, this does not necessarily imply that they were capable of talking about their own level of literacy in English.

6.4.4 Slight Improvement in Post Self-assessment

Learners' self-assessment of the remaining statements 1, 2, 6, 8, 9 and 10 had no statistically significant improvement and the slight improvement of self-assessment for these statements at the end of the intervention was less than 0.5.

- **Statement 1: I can understand short, simple text messages.**

Learners' self-assessment of Statement 1 did not significantly change over time, $\chi^2(2) = .429$, $p = .81$, with the medians of 4.50, 5.00 and 4.50 for pre, post and delayed self-assessment respectively. Learners perceived their receptive skill of understanding rather similar over the three times of self-assessment. This means that the intervention did not change learners' perception of their understanding skills significantly. This might be due to the fact that they already reach the CEFR A1-A2 level of understanding short, simple text messages, which was demonstrated by their initial self-assessment with a mean score of 4.3.

- **Statement 2: I can interact in a simple way if the other person helps me with what I'm trying to communicate.**

There was no significant change over time for self-assessment of statement 2, $\chi^2(2) = 3.897$, $p = .14$, with the medians of 5.00, 5.00 and 4.50 for pre, post and delayed self-assessment correspondingly. Learners were confident about their skill of simple communication with assistance at the beginning and at the end of the intervention. There was no clear proof of why learners' delayed self-assessment of this particular skill decreased slightly 70 days after the intervention. A possible explanation might be the sharp contrast between the substantial peer support and interaction during the course and limited or no support after the course.

- **Statement 6: I can handle numbers, quantities, cost and time.**

There was no significant change over time for self-assessment of statement 6, $\chi^2(2) = 3.150$, $p = .21$, with the same median of 4.00 for pre, post and delayed self-assessment. There was a slight increase in self-assessment by the end of the course, and a slight decrease in self-assessment 70 days after the intervention. The delayed self-assessment was even lower than the pre self-assessment. In fact, there was learning content with embedded time, quantities and numbers. However, this was not supported with enriched learning materials, and learners did not learn these topics in depth.

- **Statement 8: I can follow short, simple written directions.**

No significant difference was found for the self-assessment of statement 8 over time, $\chi 2(2) = .605$, $p = .74$, with the medians of 4.00 for pre, post and delayed self-assessment. Seeing from Figure 6.6, statements 8 and 3 shared a similar variation pattern, rising slightly at post self-assessment and dropping marginally at delayed self-assessment, yet still slightly higher than pre self-assessment. The corroborating proof comes from the same test items from the three tests. As mentioned above, there was moderate increase in test performance after the intervention and this increase was maintained 70 days after the intervention.

The short, simple written directions were mixed in with the substantial learning materials of signs and notices (see Statement 3). Therefore, learners were able to learn and practice these repeatedly and were more likely to retain the knowledge and skills. This explains learners' retention of improvement in test performance within long-term period.

- **Statement 9: I can describe places I live in and people I know in short simple phrases and sentences.**

There was no significant change over time for self-assessment of statement 9, $\chi^2(2) = 1.282$, $p = .53$, with the same median of 4.00 for pre, post and delayed self-assessment. Both Statement 9 and Statement 11 were for the same writing skill: writing simple phrases and sentences they were familiar with. Though the changes of self-perception of Statement 9 over time was not statistically significant, it did share a similar variation pattern as that for Statement 11, rising considerably at post self-assessment and decreasing 70 days after the course, even slightly lower than their perception at the beginning of the course. Details of the discussion of the test performance regarding this skill can be found above regarding Statement 11.

- **Statement 10: I can link words or groups of words with 'and', 'then' or 'because' properly.**

No significant difference was found for the self-assessment of statement 10 over time, $\chi^2(2) = 2.000$, $p = .37$, with the same medians of 4.00 for pre, post and delayed self-assessment. This was understandable as no learning of link words on the SLEND was in place. Likewise, there were no test items targeting the use of these link words. This was another English literacy skill that was informed by the CEFR, yet absent from the learning content.

Regarding each specific literacy skill, through detailed analysis of learners' self-assessment of each particular literacy skill and cross checking with their actual learning content and test performance, the results are summarised in Table 6.19.

Table 6.19 The Change of Self-Assessment of Each Literacy Skill over Time in Comparison with Learning and Testing

Literacy Skills	Self-assessment	Standardised tests	Learning and Practice
Statement 1 I can understand short, simple text messages.	Slight increase at post self-assessment	Cannot be divided	Both Included

Statement 2 I can interact in a simple way if the other person helps me with what I'm trying to communicate.	Slight increase at post self-assessment	Not tested	Not included in learning, but accompanying learning.
Statement 3 I can understand familiar names, words and basic phrases. For example, simple notices in most common everyday situations like "no smoking", "toilets", "staff only".	Moderate increase at post self-assessment	Tested, retention of learning detected.	Substantial repeated learning.
Statement 4 I can ask and answer simple questions for immediate need or on very familiar topics. For example, "Can I have…?" "Do you…?" etc.	Moderate increase at post self-assessment	Slight rise at post-test.	Not included. Needs transferring to the context of online social communication.
Statement 5 I can ask people for things and give people things.	Moderate increase at post self-assessment	Tested.	Not included. Needs transferring to the context of online social communication.
Statement 6 I can handle numbers, quantities, cost and time.	No change.	Not tested.	Partially included.
Statement 7 I can read simpler informational materials and short simple descriptions, especially with visual support (picture, video, etc.).	Statistically significant increase at post self-assessment and statistically significant decrease at delayed self-assessment.	Cannot be divided from the tasks.	Included.
Statement 8 I can follow short, simple written directions.	Slight increase at post self-assessment.	Tested, retention of learning detected.	Substantial repeated learning.
Statement 9 I can describe places I live in and people I know in short simple phrases and sentences.	Slight increase at post self-assessment.	Tested.	Not included.
Statement 10 I can link words or groups of words with 'and', 'then' or 'because' properly.	Slight increase at post self-assessment.	Not tested.	Not included.
Statement 11 I can write simple phrases and sentences	Statistically significant	Tested, retention of	Learning included

about myself and other people, such as hobbies, jobs, education, abilities, etc.		learning detected	alongside with real life practice.
Statement 12 I can write down my personal details, like name, address, nationality, etc.	Retention of self-assessment.	Tested, increase at post-test.	Both included.
Statement 13 I can use dictionary, online search or make enquiry to friends to work out the meaning of the important unfamiliar words.	Statistically significant increase at post self-assessment.	Not tested.	Practiced.
Statement 14 I can ask questions to check understanding in communication.	Statistically significant increase at delayed self-assessment.	Not tested.	Not included. Needs transferring to the context of social online communication.
Statement 15 I can tell the conversational partner I can't understand him or her.	Moderate increase at post self-assessment.	Not tested.	Not included. Needs transferring to the context of social online communication.
Statement 16 I can talk about my own level of English.	Moderate increase at post self-assessment.	Not tested.	Not included.

The detailed analysis of the self-assessment variation of each CEFR A1-A2 skill in relation to learners' test performance and learning content reveals several interesting points. Firstly, learning on the SLEND does not cover some specific skills, such as "Statements 2, 9". Consequently, most of these skills have no significant change in terms of learners' self-assessment over time. This is reasonable as learners are not likely to improve what they haven't learnt automatically. However, this reveals the tension between a learner-centric ethnographic literacy approach and CEFR benchmarking. How can learners' incidental choices of local learning materials be mapped onto the global CEFR A1-A2 descriptors? This question reminds the researcher of the tension of the local and the global in ethnographic NLS (Street, 2003; Brandt & Clinton, 2002). This resonates with Street's (2003) concept of "New Literacy Studies (NLS)" characterised by the hybrid of the local and the global. The linking of the local with the global seems extremely challenging when learners and peer tutors lack knowledge of the CEFR, the global knowledge. This further justifies the call for training in the CEFR for peer tutors mentioned in Section 5.2.7.

Secondly, some skills reflected in "statements 4, 5, 14, 15" are inappropriate for Deaf learners' literacy practices. This requires in-depth modifications of the CEFR descriptors. A possible solution is to transfer these skills to the context of online social communication, which is similar to the strategy of transferring speaking and listening skills to an online learning context proposed in the VISEL project. In this way, Deaf learners can learn, practice and assess these literacy skills, which are normally absent

from real-life communication. For instance, for statement 4 “I can ask and answer simple questions for immediate need or on very familiar topics. For example, ‘Can I have…?’ ‘Do you…?’etc.”, it can be modified as “I can make and reply to simple questions for immediate need or on very familiar topics when I communicate with other through online social networks. For example, ‘Can I have…?’ ‘Do you…?’etc”.

Thirdly, for those literacy skills relating to “statements 3, 8, 11, 12”, learners tend to have significant increase in self-assessment or they have long-term retention of learning according to the test results. Those skills are either practiced abundantly in their real life or learnt and tested substantially and repeatedly on the SLEND. Taking statement 3 as an example, the positive test results and moderate increase of self-assessment concerning the skill of understanding simple notices andsigns are not surprising, as 16 sessions out of 46 on the SLEND are primarily concerned with learning of signs and notices in different contexts. The appropriate overlapping content dispersed in different sessions enables the chance of repetition of learning and enhancement of knowledge and skills. This echoes the results of a previous study (Karpicke & Roediger III, 2007) that repeated study and test trials of particular skills or knowledge during learning can lead to long-term retention. In this way, it justifies learners’ long-term retention of understanding everyday situations like “no smoking”, “toilets” and “staff only”, etc. That is to say, a repetition of similar topics is necessary and can potentially extend retention of learning. In the meantime, sufficient exercises on the SLEND and/or instant practice in real life are in favour of retention of learning.

6.5 CHAPTER SUMMARY

After the seven-month intervention, by comparing 43 learners’ post-test to pre-test performance, it is evident that learners have improved their English literacy. The improvement in writing skills is even higher than in reading skills as learners had more opportunities of practicing writing skills in the wider P2P Deaf Literacy project compared to the chances in their daily life. Learners’ attainment in literacy skills is further evidenced by the comparison of their self-assessment at the beginning and end of the intervention. Learners perceive that they have significantly improved their English literacy skills immediately after the intervention in comparison with their self-assessment at the outset of the intervention. Therefore, learners’ self-assessment is positively correlated with their test performance. At the same time, the more learners improve in test performance, the more learners perceive that they have improved their literacy skills.

However, the positive correlation between test performance and self-assessment does not rule out the possibility of learners’ overestimation or underestimation of their English literacy proficiency, which should be recognized in further analysis. As explored in Section 6.1.3, it seems that learners tend to overestimate their English literacy skills at the points of pre-test and post-test. The correlation tests also reveal that ISL and computer literacy are strong indicators of positive learner experience and learning outcomes. ISL being a strong indicator supports the use of the sign bilingualism approach in the P2P Deaf Literacy project.

Long-term retention of learning is detected among 17 learners through a delayed post-test conducted 70 days after the intervention. 17 learners performed in the delayed post-test more or less the same as in the post-test, and significantly higher than in the pre-test. The strong retention of learning not only results from the effective intervention

but also from the strategy of real life English on the SLEND. Learning content comes from real life and can be practiced substantially in real life, which is beneficial for retention of learning.

In contrast, learners' perception of their retention of learning is at odds with their performance. Their self-assessment of English literacy skills 70 days after the intervention is even slightly lower than that at the outset of the intervention. It seems that learners underestimate their English literacy skills. The drop in self-assessment scores at the time of the delayed post-test is probably due to a drop in confidence rather than their actual literacy skills. A possible explanation of the learners' overestimation at pre-test and post-test and underestimation at delayed post-test is that learners' self-assessment is sensitive to the environment. That is to say, they tend to overestimate their English literacy proficiency when it occurs in a supporting environment with peer interaction and free use of sign language during the intervention period, whereas they might underestimate themselves when exposed to an unsupportive environment after the intervention ends. Further research is needed to investigate the factors that caused the drop in self-assessment scores 70 days after the intervention, for example, learners' confidence, intricate psychological change, change of context such as extremely-low technology environment, etc.

In general, the intervention with Deaf young adult learners' English literacy delivered through the SLEND is efficient, judging by learning outcomes in terms of standardized tests and self-assessment in Sections 6.1 and 6.2. This indirectly endorses the key characteristics and the e-learning ecosystem presented and discussed in Chapter 4.

Section 6.3 explores the differences of learning outcomes at the five centres. Concerning test performance, each centre has made improvements in the post-test. The Vadodara Centre has made the greatest progress in attainment in English literacy. Learners from the Coimbatore Centre, Indore Centre, and Vadodara Centre have made more progress than the Palakkad Centre and Thrissur Centre. In fact, the Palakkad Centre had the lowest performance and the Thrissur Centre had the highest performance at the outset of the intervention. This might imply that learners with appropriate prior knowledge, neither too high nor too low, might benefit more from the course. As for self-assessment, there is a significant improvement at the Vadodara Centre, and there is improvement at the Indore, Coimbatore and Palakkad Centre, though not statistically significant, and no improvement of perception of English literacy at the Thrissur Centre. Table 6.20 summarizes the improvement in test performance and self-assessment at each centre.

Table 6.20 *A summary of improvement in test performance and self-assessment at each centre*

Centre	Standardized Tests (post-test VS pre-test)	Self-assessment (post self-assessment and pre self-assessment
Coimbatore Centre	↑, significantly improved	↑, improved but not significantly
Indore Centre	↑, significantly improved	↑, improved but not significantly
Palakkad Centre	↑, significantly improved	↑, improved but not significantly
Thrissur Centre	↑, significantly improved	No change
Vadodara Centre	↑, significantly improved	↑, significantly improved

It is worth noting that the Vadodara Centre has the greatest improvement not only in test performance but also in self-assessment. Moreover, learners from Vadodara report the most pleasant learner experience as presented in Section 6.1. Two additional factors - professionalism of peer tutors and technology environment - have contributed to the outstanding achievement in Vadodara. The peer tutor from Vadodara has prior teaching experience before joining the P2P Deaf Literacy project while the rest four peer tutors have no experience. The Vadodara Centre is equipped with a favourable technology environment with a relevantly higher student to computer/laptop ratio and faster Internet connection. A favourable technology environment enables positive learning experience and efficient learning as most of the learning materials are multimedia delivered on the SLEND platform.

Section 6.4 scrutinizes learners' self-assessment in relation to each literacy skill. There is a clear overall trend of increase in learners' self-assessment scores of each skill immediately after the intervention, and a trend of decrease in learners' delayed self-assessment scores 70 days after the intervention. For each specific skill, the increase and decrease vary. With further reference to the learning content on the SLEND platform and actual test performance, it is noteworthy that learning content on the SLEND does not cover certain specific skills, and that some skills adapted from the CEFR are inappropriate for Deaf young adult learners and need further modification. On the other hand, learners have increase in self-assessment scores of those skills either practiced abundantly in real life or learnt substantially and repeatedly on the SLEND (see details in Section 6.4.4). These findings again unveil the tension between the CEFR benchmarking (the global) and the ethnographic approach (the local), and the necessity of repetition of topics and sufficient exercises on the SLEND platform.

In view of the learning outcomes from various angles, it is reasonable to conclude that this interactive and participatory e-learning system primarily consisting of SLEND Moodle platform, after-class Web 2.0 social communication and learning, and classroom collaborative learning is effective in terms of not only improving learners' English literacy, but also ensuring long-term retention of learning. This is commensurate with learners' feedback in Section 5.2.7 about their perception of improvement in English literacy as somewhat/moderately positive. Nevertheless, from the perspective of developmental evaluation, the outcomes scrutinized via standardized tests and learners' self-assessment are not the end of the evaluation; instead, they are the starting point. It is not the aim to make a final decision of whether the course is effective or not; instead, through evaluation of its effectiveness, it assesses the previously-taken actions, uncovers and informs the future developmental route and actions. In other words, as Patton (2011, p.5) concludes, "Outcomes will emerge as we engage."

The significant improvement of learning outcomes and good retention of learning not only endorses the efficiency of the SLEND underpinned by the key characteristics, but also brings new development to the framework of the e-learning system for Deaf young adults' English literacy attainment. Within the main component of pedagogy, it is unveiled that the use of real life English is beneficial to the retention of learning as it enables instant application to practice of knowledge gained and increases the opportunities of language output favouring language acquisition. Learning content can be dispersed in the course with substantial practice and tests to facilitate language production. Peer-to-peer interaction is proven to be supportive of confidence-raising and tendering to affective feelings of Deaf learners, which is instrumental in unlocking

Deaf learners' social concerns in the process of language acquisition. The CEFR needs further modification to meet Deaf learners' needs such as further transfer of speaking and listening tasks into online communication contexts and incorporating new elements of the emergent syllabus/curriculum.

For the technological aspect, in light of the technological conditions used in the Vadodara Centre with best learning performance and learner experience, it is claimed that faster Internet connection is needed in consideration of the many ISL videos posted on the SLEND, and that a sufficient number of devices can make learning more convenient. Figure 6.7 demonstrates the entire framework of the interactive and participatory e-learning system instantiated by the SLEND for Deaf young adults' English literacy development. The evolution and internal logic of this framework as an e-learning ecosystem is further discussed in Section 7.1

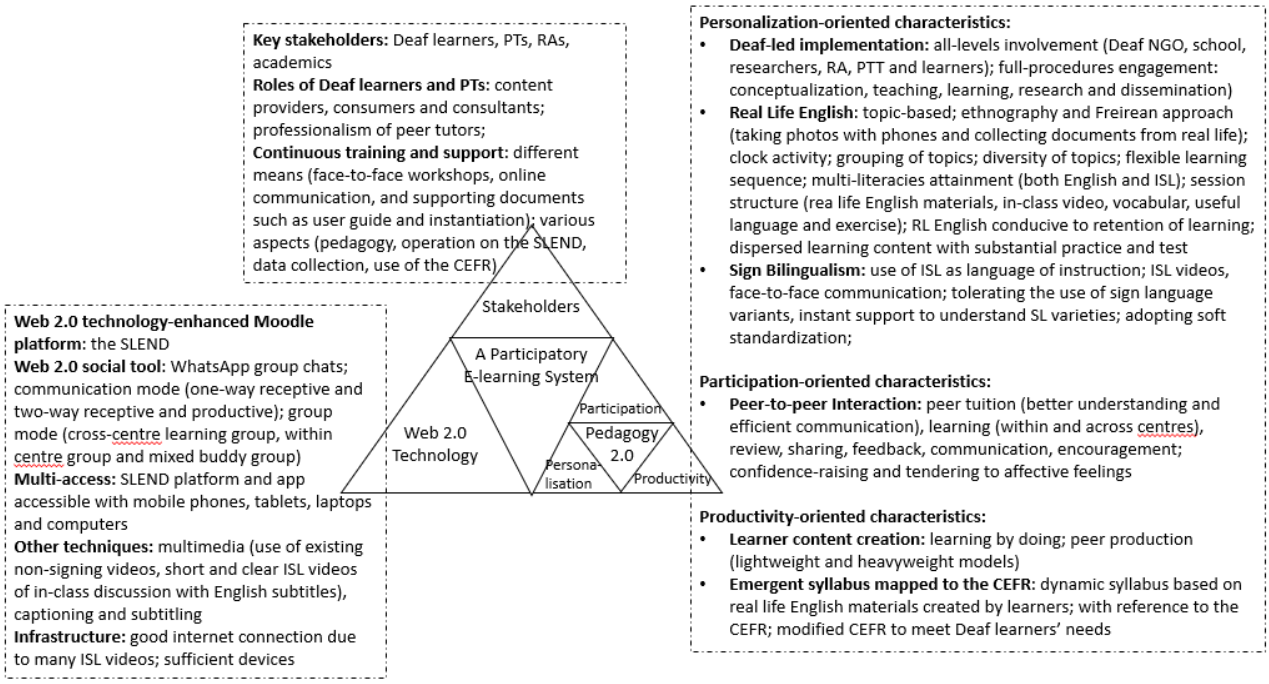


Figure 6.7 A framework for an interactive and participatory e-learning system for Deaf young adults' English literacy attainment (based on design concept, learner experience and learning outcomes)

CHAPTER 7 CONCLUSION

In the concluding chapter, at the outset, I summarise the evolution of the stakeholders, pedagogy 2.0 and Web 2.0 technology of the SLEND as a result of the developmental evaluation of conceptualisation, learner experience and learning outcomes, followed by a discussion on the criteria and internal logic that the SLEND qualifies as an e-learning ecosystem for Deaf young adult learners' English literacy attainment. Then I present the implications derived from the study followed by some recommendations for the development of the SLEND. Limitations of the current study are specified before ideas for further research are proposed.

7.1 EVOLUTION OF AN E-LEARNING ECOSYSTEM FOR DEAF YOUNG ADULT LEARNERS

The current research engages in the evolution of the SLEND, an interactive and participatory e-learning ecosystem for Deaf young adult learners in India. Some of the evaluative findings were addressed immediately along with the progress of the P2P Deaf Literacy Project (pilot project), while some are expected to be considered in future project replication and expansion. The evolution of the e-learning ecosystem relies on three components: stakeholders, pedagogy 2.0 and Web 2.0 technology.

7.1.1 The Component of the Stakeholders

Following Brodo's terminology (2006), the first component of the e-learning ecosystem is "stakeholders" including content providers, consumers and consultants. However, using a different interpretation from Brodo's (2006), in the current research, "consultants" refers to a consultation mechanism which relies on the driving force from within the communities in the first place and is complemented by the hearing consultants. The component of stakeholders consists of the stakeholder roles and the characteristic of continuous training and support which is closely associated with the stakeholders.

Although the Deaf-led and peer-to-peer approaches adopted by the SLEND emphasize the empowering consultation driven from within the Deaf community, the external training and support creates the context for internal consultation and transforms the pedagogic concept of the Deaf community. That is to say, the external consultation guarantees the operation of the internal consultation. Before the P2P Deaf Literacy Project commenced, a two-week training workshop for the research assistants and peer tutors was conducted. The training covered the fields of data collection, pedagogy, literacy approach and Deaf empowerment. When they started to work on the SLEND, User Guide and instantiation such as examples and templates were introduced to prompt their materials development on the SLEND.

Despite a series of pre-defined training and support at the outset of the intervention, the peer tutors and research assistants were still unable to generate substantial materials on the SLEND. Consequently, most learning occurred in the physical classroom rather than on the SLEND at the beginning of the intervention. Two inhibiting factors were found from their discussion feedback: low competency in English and unfamiliarity with the Moodle platform. In response, a one-week workshop was convened in November 2015, two months after the intervention had started. This was a special training of the operation on the Moodle platform for materials development. This

November training was seen as a turning point after which materials development surged on the SLEND. However, the request for English language support was not addressed because the research team did not want to interfere with the Deaf-led approach.

Besides the formal intensive training, informal continuous support was also available during the intervention, such as technical and pedagogic support. Especially for the pedagogic support for language patterns/grammar, several rounds of interaction took place between the field team and the UK researchers. For example, the example document and template of session planning were provided to the peer tutors with aspects of identifying language patterns from the raw materials.

7.1.2 The Component of the Pedagogy 2.0

The component of the pedagogy 2.0 comprises the aspects of what is developed and learnt by Deaf learners and their peer tutors, and how this is done. This component focuses not only on the "product" as learning materials on the SLEND but also on the "process" as the ways to develop and learn the learning materials. It is not fully pre-defined at the outset of the project, instead, it evolves alongside the developmental evaluation.

Deaf-led implementation (see Section 4.1.1), peer-to-peer interaction (see Section 4.1.5), real life English (see Section 4.1.2), learner content creation (see Section 4.1.3), sign bilingualism (see Section 4.1.4) and emergent syllabus mapped to the CEFR (see Section 4.1.7) emerge as the six essential elements of the component of the pedagogy 2.0. According to the three elements of the pedagogy 2.0 proposed by McLoughlin & Lee (2008), Deaf-led implementation, real life English and sign bilingualism are categorised as personalisation-oriented characteristics, peer-to-peer interaction as participation-oriented characteristic, learner content creation and emergent syllabus mapped to the CEFR as productivity-oriented characteristics. As expected, there was convergence and divergence of opinions across researchers, research assistants and peer tutors, which consolidated and propelled forward the evolution of the pedagogy 2.0 respectively. A consensus on the six elements of the pedagogy 2.0 was reached, while diverse contributions to the sub-elements were made.

Deaf-led implementation is a concept initiated by the UK researchers, who are a mixed group of Deaf and hearing academics. As specified in Section 4.1.1, it refers to involvement at all levels and full-procedure engagement. The SLEND integrates the interaction of different levels of the Deaf communities, including Deaf NGO, academics, research assistants, peer tutors and learners. They were proactively engaging in learning, teaching, research, conceptualization/development of the SLEND and dissemination activities. As far as the Deaf research assistants and peer tutors are concerned, they were surprised at and comfortable with the way that English was being taught by Deaf people.

The Deaf-led approach makes the peer-to-peer interaction possible as Deaf members appear at each step of the procedure, which favours communication among Deaf peers. Perception of the peer-to-peer interaction from different stakeholders is presented in Section 4.1.5. The UK researchers interpreted the peer-to-peer interaction as peer tuition, peer review and peer collaborative learning. From the point view of the peer tutors, the peer-to-peer collaborative learning was flexible, comfortable, raised

confidence and fostered better understanding. They viewed the support between learners and peer tutors as bidirectional/mutual with coverage of learning, technology/SLEND operation and sign language varieties. Meanwhile, the support that they received from research assistants was more unidirectional including teaching, research, learning, technology and administration. For the learner experience in Section 5.2.3, learners revealed in their interview that they preferred Deaf peer tutors to hearing teachers, and peer tutors were supportive of the use of SLEND, explanation of grammar, vocabulary, giving feedback, clearing doubts, raising confidence and monitoring learning, although there was difference across centres. More notably, Deaf peer-to-peer interaction also tendered to the affective aspects of learners. According to the Affective Filter Hypothesis (Krashen, 1985), lowering the affective filters is conducive to language acquisition. By examining learners' learning outcomes across centres, it is uncovered in Section 6.3.3 that the quality of peer tuition is an important external factor pertinent to learners' performance and literacy attainment.

With a social perspective of literacy, the UK researchers perceived the ethnographic approach as the way of collecting learning materials and recommended one technique, clock activity, to elicit real-life English literacy practices of Deaf learners. With the inspiration of the clock activity, Deaf peer tutors and research assistants described at the focus group that they led Deaf learners to collect learning materials from their study, work and daily life by simply taking photos or bringing in the print copies. Afterwards, Deaf learners led by their peer tutor developed real life English topics on the SLEND.

Learners' experience of real life English has been scrutinised via conducting a learner experience questionnaire and pinpointed group interviews. As elaborated in Section 5.2, learners were generally content with learning real life English which accommodated them well in real life with both English and life skills. For instance, while learners acquired English language used in the context of the railway station, they demonstrated their new skills in purchasing railway tickets, and locating their seats on the train.

Based on the feedback from Deaf learners, several changes were made to real life English learning sessions on the SLEND. As indicated in Section 4.1.2, the peer tutors adjusted the steps of the learning session on the SLEND platform and refined the titles of each step which were proposed by the researchers. Meanwhile, the necessity of grouping and sequencing topics was exposed and emphasized in view of a surge of sessions development on the SLEND after the training workshop in November 2015. Some topics were more subordinate topics and could be merged into one main topic. Upon further scrutinizing each particular literacy skill in Section 6.4, it is clear that learners tend to perform well in the topics repeated on the SLEND or frequently practiced in real life. This sheds light on the sequencing and organization of real life English topics on the SLEND embedded with corresponding skills. Appropriate repetition of real life English topics and literacy skills accounts for better learning outcomes and could be one guideline added to the sub-component, real life English, under the component of the pedagogy 2.0. However, the grouping and sequencing of real life English learning sessions was not realized due to the relatively short intervention period.

Learners also expressed their need of more exercises for new grammar and vocabulary. This indicates that there was a shortage of grammar and vocabulary exercises, and that learners and peer tutors were in need of support in developing exercises, as writing exercise items requires higher English proficiency and item-writing skills from them, and

consequently can be challenging and time-consuming. Future replication projects need to consider this call for more grammar and vocabulary exercises. A possible solution might be collecting and using existing relevant learning materials. Lastly, learners' self-assessment of their English literacy skills suggested a repetition of similar topics and enough provision of exercises which can potentially extend retention of learning (see Section 6.4.4).

The concept of learners creating learning materials is consistent with the pedagogy of "learning by doing". In this way, it is expected that learners engage themselves not only in learning the products but also in the process of developing learning materials. As indicated in 5.2.3, learners were engaged in both developing and learning real life English learning materials, with a slightly higher favour for collection and development. In Indore, Thrissur and Vadodara, learners were reported to be more participatory in collecting and developing materials than those from Coimbatore and Palakkad, which could potentially impact the learning process and outcomes.

Sign bilingualism, identified as one key characteristic of the SLEND, is another element of the component of the pedagogy 2.0. As for the perception of sign bilingualism (see Section 4.1.4), learners credited ISL as the key to attain English literacy, both ISL videos on the SLEND platform and face-to-face ISL communication. A peripheral gain of learning English literacy through the approach of sign bilingualism was that learners have improved their ISL literacy. As presented in 5.2.2, both face-to-face ISL communication and ISL videos were considered as useful by learners. It is also beneficial for multiliteracy attainment for Deaf learners as revealed in the interview with learners. In this way, the SLEND is dedicated to the development of multiliteracy for the Deaf learners. Seeing from Section 4.1.4, the research assistants and peer tutors revealed the use of ISL variants during learning and communication, and brought the argument of soft standardization of ISL into focus. Under the approach of sign bilingualism, the researchers endorsed the use of ISL dialects as language of instruction besides English.

A modified CEFR framework (A1-A2) is utilized to guide learning and assessment. In this way, the Deaf young adult learners' English literacy can be benchmarked against an internationally recognised standard. The UK researchers modified the CEFR descriptors to address Deaf learners' needs. One aspect divergent from the original design concept, as pointed out in Section 5.2.7 is that the CEFR can-do statements are missing as a self-evaluation means at the end of each learning session on the SLEND platform. In response to the feedback from Deaf learners and peer tutors, the UK researchers came up with a syllabus consisting of the modified CEFR descriptors, functions, language patterns and lexical fields.

However, the UK researchers did not intend to enforce the prescriptive CEFR-benchmarked syllabus. The intention is specially not at the sacrifice of the ethnographic and Freirean approaches underlying the notion of viewing literacy as a social practice and purporting an emergent syllabus. After mapping the content at the end of the intervention (see Appendix 13), it turned out that the CEFR-benchmarked syllabus had been partially covered, which might indicate the mismatch between the global CEFR benchmark and the emergent syllabus arising from the locally contextualized learning content. Further analysis of the learning outcome uncovers that there is gap between what is tested and what is learnt. Again, this is indicative of some tension between an ethnographic literacy approach/the emergent syllabus (with a focus on 'the local') and

the CEFR benchmarking (intended to be 'the global'). An eclectic option is that the participatory e-learning ecosystem prioritizes the emergent syllabus while making reference to the CEFR benchmarking. The reference to the CEFR benchmarking raises Deaf young adult learners and peer tutors' awareness of language progression.

7.1.3 The Component of the Web 2.0 Technology

The third component of the e-learning ecosystem is the Web 2.0 technology, featured as Moodle platform, multimedia materials, multi-access, computer-mediated communication, and subtitling/captioning (for details of each feature, see Section 4.1.6). The Web 2.0 technology-enhanced provision offers the habitat for the SLEND and plays an essential scaffolding role in the e-learning ecosystem. It enables co-development, sharing of learning materials, online collaborative learning and peer interaction across different centres.

The UK researchers decided to utilize the Web 2.0 technology-enhanced Moodle platform which embraced learners constructing knowledge of English literacy by collaboratively creating a shared culture. Multimedia materials were conceptualised as the essential components on the SLEND including ISL videos and pictures. The multimedia materials conveyed multiple facets of literacy: digital literacy, English literacy, ISL literacy and computer literacy. Learners' experience of multimedia materials (see Sections 5.2.4, and 5.2.6) revealed that there were no non-signing videos or animations on the SLEND and learners' experience of signing videos were not entirely positive due to slow Internet, lack of subtitles, long unclear in-class videos with ISL variants. In response to their feedback, the UK researchers suggested the development of short videos within the length of three minutes in good quality.

The SLEND was conceptualised to be accessed through various devices including computer, laptop, tablet and mobile phone. The UK researcher team considered mobile access corresponding to the soaring penetration and relatively more widespread ownership of mobile phones in India mentioned in Section 2.1.3. Learners' experience of access to the SLEND was generally fair but slow to some extent. This was a result of the large number of ISL videos on the SLEND on the one hand and relatively slow Internet on the other hand. The use of ISL as language of instruction makes a greater weighting given to videos inevitable, which is distinctive in comparison with online course for hearing learners.

As mentioned in Section 5.2.6, mobile access was not as good as the access via computer, laptop and tablet. Besides slow Internet mentioned above, several factors such as low-quality mobiles, SLEND display problems on mobiles, and slow mobile network led to the unpleasant experience. Considering the display problems, learners and peer tutors requested a SLEND mobile application. Although the APP was not used in the intervention, it became available for downloading in June 2016 for future users with the appropriate display of the SLEND on a mobile device.

The techniques of Web 2.0 social tools such as Facebook, Twitter and WhatsApp were recommended by the UK researcher team for dissemination and communication. Peer tutors and research assistants working with learners set up several WhatsApp group chats for communication such as PT-Learners group, five Centre groups and five Buddy groups. Based on learner experience reported in Section 5.2.5, the three categories of WhatsApp groups functioned differently from one another: the PT-Learners group for

English learning, Centre groups for administration of learning, timetable management, whereas Buddy groups for cross-centre experiment. Through WhatsApp group chat communication, learners were exposed to communication in English, and tackled the problem of less access to English mentioned by Cannon and Guardino (2012). At the same time, the instant communication through WhatsApp ensured the smooth operation of the intervention. The PT-learners group have been active even after the intervention, whereas the Buddy groups were inactive after establishment.

As subtitling/captioning could facilitate understanding of the videos and increase exposure to English language, the UK researchers acknowledged the necessity of subtitling/captioning on the SLEND. Learners also pointed out that subtitling/captioning could facilitate their learning. For example, in the scenario of unclear signing videos with Indian Sign Language variants, subtitling/captioning would be extremely helpful. Although the request was made, research assistants and peer tutors were not confident in their English. Therefore, most of the ISL videos on the SLEND have no subtitles and captions. Considering the large number of ISL videos on the SLEND, to subtitle each sentence seems challenging and unrealistic. A possible alternative could be provision of subtitles/captions for the keywords or key concept in the videos.

When investigating the learning outcomes (see Section 6.3) and learner experience of different centres (see Section 5.2.9) quantitatively, the Vadodara Centre achieved the greatest in learning outcomes and had the most highly rated learner experience in comparison to those of the other four centres. Looking into the technology environment at Vadodara, they owned a considerably higher device-student ratio and faster Internet compared to other centres. This might imply that a favourable tech-environment with appropriate device-student ratio and faster Internet contributes to positive learner experience and better learning outcomes.

With the evolution of each component, the SLEND has developed into an interactive and participatory e-learning system which empowers Deaf young adults to leverage Web 2.0 technologies including a Web 2.0-enhanced Moodle platform and a Web 2.0 social tool of WhatsApp, to enable learners' participation, personalisation and productivity in quest of English literacy attainment. The framework (see Figure 6.7) explicating the key characteristics and subordinating elements of this e-learning system is presented in Section 6.5.

7.1.4 The SLEND as an E-learning Ecosystem in a Low-Resource Context

The SLEND not only possesses the key components of an e-learning ecosystem, but also addresses the criteria established for e-learning ecosystems synthesized from previous studies (Palloff & Pratt, 1999; Leong & Miao, 2008; Jonassen, Peck, & Wilson, 1999; Pappas, 2015):

- Living organisms are networked for learning and social communication.

Members, including Deaf learners, peer tutors and research assistants in this e-learning ecosystem are networked for English learning as well as social communication. The Deaf NGOs/schools provide physical environment and necessary facilities for both offline and online networking. The research assistants maintain daily direct contact with the peer tutors during the intervention while the peer tutor for each centre maintains direct contact with their learners both online and offline. Leaners and peer tutors from different centres establish networking through the Web 2.0-enhanced Moodle learning

platform and WhatsApp Group chats. As the living organisms within the ecosystem of the SLEND, they are networked not only for the purpose of collaborative learning and knowledge sharing, but also for maintaining social communication and interaction. This resonates with the study of Palloff and Pratt (1999). They point out that an effective learning community consists not only academic aspect, but also social and emotional ones.

- Learners are “prosumers” as well as “consultants”.

First of all, content developers and content consumers are inseparable in the current e-learning ecosystem. Deaf learners and peer tutors are the “prosumers”, a term first used in Toffler’s book (1980). Toffler (1980) defines a prosumer as somebody who makes the distinction between a producer and a consumer blurred. According to Leong and Miao (2008), peer-to-peer interaction is also a system suited to e-learning ecosystem as it allows each learner to act as a service user as well as a service provider. The sole or excessive consumption or provision leads to imbalanced development with severe consequences of dropouts and shrinking environment. In the current context, learners and peer tutors are defined as prosumers who not only consume the content on the SLEND but also produce it. They learn the content on the SLEND developed by themselves and also more importantly, by other learning centres.

Second, instead of seeking consultation solely outside from an external third party, the current model encourages both internal consultation within the learning community and external consultation. The Deaf-led (see Section 4.1.1) content and peer-to-peer (see Section 4.1.5) approach enable Deaf learners and peer tutors to seek support and consultation from within the Deaf community in the first place. Each member is liable to become a consultant provided he/she owns the knowledge or skills in need. Meanwhile, Deaf peer tutors and research assistants can seek formal training and continuous support outside of the Deaf community from academic and technical consultants with substantial work experience with Deaf communities.

- Living organisms have complementing roles, needs and expertise.

Members on the SLEND differ from each other in roles and expertise. As presented in Sections 3.2.1, 3.2.2 and 3.2.3, Deaf research assistants, peer tutors and young adult learners are recruited by meeting certain criteria. Therefore, considering them as three groups of people, each group plays different roles according to their specific expertise. Deaf learners are the ones to choose learning materials from their real life. Their learning needs are the foci of learning in consonance with the learner-centric concept. Peer tutors as role models of learners act as the facilitators in terms of guiding, assisting, reporting learning and providing feedback. At the same time, they are also learners in terms of improving their teaching, English literacy, computer skills and research skills. As for Deaf research assistants, they have relatively higher English, computer and research skills. They facilitate learning and development of learning materials by providing guidance to the peer tutors promptly. They also observe, monitor and manage the learning at each centre. They advise the peer tutors provided it is necessary and ensure the smooth operation, implementation of the project. More notably, they play the leading role in data collection and translation in the field.

Meanwhile, among each group, each individual tends to possess unique skills and indispensably complement each other. For example, in the group of research assistants,

RA_A displayed experienced skills of working with hearing researchers and project coordination. Not surprisingly, he became the key person from the field to communicate with the researchers. RA_B has special talent in technology and contributes more to technical guidance for the peer tutors. The fact that learners and the peer tutors are in possession of different knowledge, skills and experiences is the prerequisite of successful collaborative learning.

Each centre has personalised needs and supplies different learning resources. Learners are entitled to select learning content based upon their own needs and interests through the ethnographic approach and the Freirean approach (for more details see Section 4.1.2). The resources supplied by different centres vary in topics and supplement each other (see a list of topics in Section 4.1.2). There are no restrictions to the sequence of learning sessions for the learners. Learners can prioritize their personalised needs to make choices of learning sessions.

Jonassen, Peck and Wilson (1999) considers common learning goals, mutual support, shared values and experiences as the key factors to bond learners in a learning community. In the current study, each learner or peer tutor is not necessarily a know-all, which would be unrealistic. Instead, for the ultimate purpose of English literacy attainment, they gather together to share knowledge and work out the unknown with peers. Therefore, they are bonded as members of the SLEND and are the indispensable biotic elements of this e-learning ecosystem.

- Learners and peer tutors select learning topics and develop learning materials autonomously.

The development of the SLEND platform is autonomous in terms of no pre-defined topics and no pre-designated content developers. Learners and their peer tutors develop materials they perceive as useful and select learning content from the platform according to their interests and needs. Although a syllabus mapped to the CEFR A1-A2 was provided for reference (see Section 4.1.7), they were not forced to follow. Instead, they view the syllabus as a guide when they develop learning materials based on Real life English collected initially. In this sense, learners are autonomous to decide learning content. Meanwhile, the way of developing the SLEND is also autonomous. Since learners and peer tutors are “prosumers”, the development of the SLEND does not rely on a third party. Learners detect their own literacy practices and select what topics are interested to them. Learners with peer tutor’s assistance develop these topics into materials, upload and share with other peer learners. In fact, the rights of making choices of target learning topics and materials can be categorized as the highest level of autonomy. As long as there are learners and peer tutors, the development of the SLEND should not become the concern. The more learners are involved, the more resources are developed and the more flourishing the platform becomes. Crowding-sourcing and collective intelligence are the typical features of the Web 2.0 era.

- The biotic (stakeholders) and abiotic (content and infrastructure) elements interact with one another as an integral system to produce positive outcomes.

Within the e-learning ecosystem, biotic/living elements such as learners, peer tutors and research assistants, and abiotic/non-living elements such as Moodle platform and available devices collaborate closely to maintain a system that is integral and encourage positive outcomes. Further to the adapted three main categories from Brodo’s model

(2006) presented in the last section – stakeholders, pedagogy 2.0 and Web 2.0 technology - the absence of each category will lead learning to nowhere. On the contrary, their orchestration can breed an e-learning ecosystem for the Deaf young adult learners in India. For instance, some features of the Moodle platform such as "database" enable each learner to upload their own learning materials. This guarantees that learners can be the consumers as well as the providers. That is to say, the features of the "Web 2.0 technology" support the "stakeholders" to develop "content/pedagogy 2.0". Furthermore, an e-learning ecosystem is expected to and should produce positive learning outcomes. Positive outcomes are viewed as one decisive attribute/ideology of an e-learning ecosystem. The SLEND in question did produce positive outcomes in terms of both learner experience and learning achievements which are introduced in detail in Chapter 5 and Chapter 6.

- Affordable technologies amplify pedagogies and learning.

Instead of considering modern technology in use as the ideology of the SLEND, it is probably more accurate to speak of pedagogy-amplified technology. Although the SLEND tends to be located in low-technology environments in India, the system utilizes the Web 2.0-enhanced Moodle platform and WhatsApp group chats to realise and amplify the pedagogies advocating learners' participation, personalisation and productivity within the realm of social constructivism. As discussed in Section 4.1.6, many features embedded in Moodle encourage collaborative learning and learner engagement. Meanwhile, the availability of SLEND app and WhatsApp not only accommodate the mobile-oriented situation in India, but also catch up with the fourth social phase of Computer-Assisted Language Learning (CALL) (Thomas, Reinders, & Warschauer, 2013). At the fourth social phase of Computer-Assisted Language Learning (CALL), social technology becomes the focus. According to Thomas et al. (2013), the shift to the fourth generation is underpinned by the surge of portable digital devices such as smartphones, tablets and e-readers and also triggered by the constructivist pedagogy in favour of collaborative learning, learners as the active agent of the target language.

- A solid support structure remains the key to sustainable development.

There is a great diversity of continuous formal and informal training and support before and during the implementation of the SLEND, including online and offline formal workshops and informal guidance; UK technician support; SLEND user guide, etc. As Pappas (2015) suggests, without instant help and feedback, learners easily drown in the waves of setbacks and problems during independent study and learning material development. Consequently, they are less likely to achieve positive learning outcomes. Therefore, it is essential to lay a solid support structure for maintaining sustainable development of an e-learning ecosystem.

In summary, with the orchestration of the stakeholders, pedagogy 2.0 and Web 2.0 technology, a viable e-learning ecosystem takes shape. The Deaf communities, from NGOs to individual academics, research assistants, peer tutors and young adult learners, are networked for communal academic, social and emotional purposes. Learners and their peer tutors play a leading role as the "prosumers" as well as "consultants" on the SLEND, and continuously harness a phenomenon of peer-to-peer interaction including peer tuition, collaborative learning and knowledge sharing via the pedagogical approaches oriented by participation, personalisation and productivity. Differing in roles

with corresponding expertise, each member contributes to the operation of the SLEND, and complements one another.

As a highly autonomous environment, the SLEND acknowledges no pre-defined topics and designated content. Emerging real-life English materials in accord with a dynamic syllabus are created and developed on the SLEND, which meet the personalised learning needs of the Deaf young adult learners. In this way, biotic (the component of stakeholders) and abiotic elements (the components of the pedagogy 2.0 and the Web 2.0 technology) interact to maintain an integral e-learning ecosystem for Deaf learners' English literacy attainment.

7.2 IMPLICATIONS

According to Patton (2015), systemic thinking is fundamental to developmental evaluation. The current study, as a developmental evaluation of the SLEND, facilitates the development of the wider innovative project. In a further step, it verifies the systemic changes brought to the existing system of teaching English literacy to Deaf young adult learners in India, which eliminate stereotyping concept and draw implications for policymaking.

7.2.1 Interaction Leading to Deaf Young Adults' English Literacy Attainment

Instantiated by the SLEND, many characteristics of the e-learning ecosystem reflect and abide by the interaction approach in SLA (Gass & Mackey, 2014). The current study has made a ground-breaking attempt to interpret and apply the interaction approach in SLA in the field of Deaf young adults' English literacy attainment. The learning conditions underlying some of the characteristics of the SLEND foster comprehensible input, interaction and output for learning English.

The peer-to-peer interaction such as peer tuition, support, collaborative learning and knowledge sharing within and across the learning centres is testified to be an essential driver for efficient interactive language acquisition and peer production in the e-learning ecosystem for Deaf young adults' literacy attainment. It is evident that peer-to-peer interaction helps to lower the affective filters (see the discussion on the Input Hypothesis and the Affective Hypothesis in 2.2.1) and enable acquisition with comprehensive input. It can also be of help in increasing interaction for negotiation for meaning.

Deaf adult learners' positive experience (see Section 5.2.3) with peer tuition further corroborates that peer tutors play a crucial role in the intervention through the SLEND. Participants consider that the use of Deaf peer tutors to support their English learning is a novel experience. They were shocked at the beginning, but they later realised that Deaf peer tutors are superior to hearing teachers to some extent. For instance, they perceived peer tutors as more flexible and patient in explaining the key points. Deaf learners tend to maintain better comfortable communication with peer tutors regarding both learning and affective aspects. More importantly, Deaf learners can increase their confidence during learning and social communication. Meanwhile, the two-way peer-to-peer interaction and collaboration are equally important. Deaf learners can freely and comfortably communicate with their peers for knowledge learning, information sharing

and content creation. They also provide feedback, comments and encouragement to each other.

Web 2.0 technology amplifies a wider and larger-scale peer-to-peer interaction. The interview with Deaf adult learners also elicits their favourable comments on the collaborative learning and peer content production within and across different centres. They affirm that cross-centre peer collaboration and production with wider participation and interaction is another factor to make the peer-to-peer course unique and constantly motivates them. The use of Web 2.0 technology-enhanced online learning environment affords Deaf young adults' wider exposure to English and enables the interaction for knowledge sharing and language learning within and across different centres. It is affirmed that cross-centre peer collaboration, sharing and production with wider interaction is another factor to make the SLEND course unique and constantly motivates them. In addition, the call for transfer of more literacy skills from the context of speaking and listening to online social communication is stressed in Section 6.4.4 for mitigating the effect of absence of listening input and speaking output for Deaf adult learners.

Sign bilingualism contributes to comprehensible input, interaction and output conducive to literacy development. The use of ISL as an internal factor liberates Deaf young adult learners to freely and actively engage in learning, knowledge sharing, production and communication. For example, the use of ISL videos for explaining and discussing English learning materials supports Deaf learners to grasp the subject and world knowledge, which is instrumental to successful reading and writing (Bailes, 2004). This is in line with Krashen's (1985) claim that the use of L1 to provide subject-matter information enhances learners' cognitive academic language proficiency (CALP)[27] and makes English input more comprehensible for learners.

Evidence from Section 5.2.2 revealed that Deaf learners use ISL efficiently for clarification and explanation, especially in terms of dealing with difficult learning points. The use of ISL for negotiation for meaning for Deaf learners when the use of spoken language such as English is impossible in a face-to-face communication context. The correlation test in Section 6.1.4 and the demographic information analysis in Section 6.3.3 prove that ISL is a stronger indicator of literacy improvement in the intervention. Sign bilingualism emphasizes both the positive effect of ISL on English (Mayer, 2009; Goldin-Meadow & Mayberry, 2001), and the maintenance of Deaf culture (Plaza-Pust & Morales-Lopez, 2008).

Teaching and learning of real life English offers Deaf young adults sufficient opportunities to output/use the acquired language in real life. This is supportive of producing target-like language and atomicity of use of L2 (Gass & Mackey, 2014). The standardized tests and self-assessment uncover that some literacy skills have significant increase in terms of self-assessment or long-term retention of learning. These skills are either practiced abundantly in their real life or learnt and tested substantially and repeatedly on the SLEND (see Section 6.4.4).

To sum up, a diagram (see Figure 7.1) illustrates how the interaction approach serves as a thread to link the characteristics of the e-learning ecosystem underpinning an interactive learning environment. This e-learning ecosystem corroborates the notion of

[27] It refers to the ability utilize language to learn and discuss abstract ideas Cummins (1979; 1981). This ability can be developed in any language and can be transferred to any other languages acquired later.

the ZPD (Vygotsky, 1978) which stresses the interaction with or scaffolding from more capable peers leading to the independent problem solving as the actual development level. The characteristics of sign bilingualism, peer-to-peer interaction, Web 2.0 technologies and real life English are synergized to maximize comprehensible input, interaction and output for an interactive e-learning environment, in which learners and peer tutors support and interact with each other for English language acquisition.

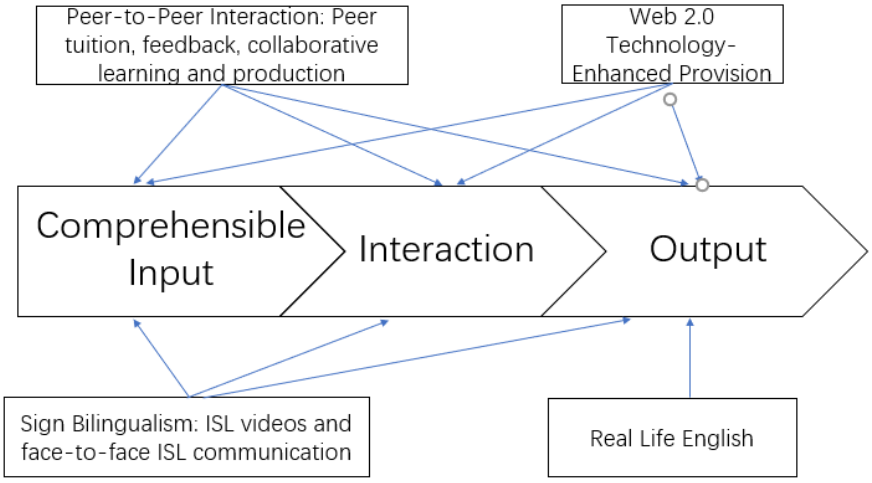


Figure 7.1 The interrelation between the interaction approach and some key characteristics of the e-learning ecosystem for Deaf young adults' English literacy attainment

7.2.2 Participation Making a Social Change for the Deaf Communities

Situated in the context of Deaf young adult learners' literacy attainment in an e-learning environment, the participatory approach is interrelated closely with the characteristics of Deaf-led implementation, real life English and learner-created content. These characteristics mirror learners' extent, area and way of participation in English literacy attainment and create the enabling learning conditions to place learners at the centre and yield a social change for them. The P2P Deaf Literacy project aspires to empower the Deaf communities for independent learning, teaching, research and life experiences.

By adopting the approach of "Deaf-led", the SLEND entails a context of engaging participation of the Deaf entities and participants including NGO, school, academic, peer tutor and learner. The successful development of the SLEND is in the context of "led by the Deaf". The Deaf community led the implementation of teaching, learning and research through the concerned e-learning ecosystem. This resonates with the epistemological consideration of the transformative paradigm (Mertens, 2007; Mertens, 2009) which purports the dominant role of Deaf people in Deaf research and practice.

The smooth operationalization of the SLEND with positive learner experience and learning outcomes corroborates the notion of "deaf-ability" proposed by McCracken and Sutherland (1991). Through several case studies, McCracken and Sutherland (1991, p. 30) underscore "deaf-ability rather than disability". Instead of viewing being Deaf as deficiency, they emphasize on the strengths of being Deaf. Similarly, Swanwick and Marschark (2010) call for attention to what the Deaf learners can do and how they do it differently. The positive experience and outcomes of "Deaf-led" and approach reassure

the policy makers in India that Deaf people can be empowered to act as the driving force in their own English literacy attainment.

On a par with the Deaf-led implementation, the use of real life English and learner-created content addresses Deaf learners' real needs by viewing literacy as a social practice (Street, 1997). Ethnographic and Freirean approaches are more likely to bring about emergent real-life learning content rather than predefined syllabus. These approaches are learner-centric and prioritize learners' real-life experience of English materials. According to Ivanic et al. (2007), the focus on the literacies that students privately think highly of can bring positive effect in education. In the end, a dynamic syllabus emerged naturally alongside the content creation by the Deaf young adults and their peer tutors on the SLEND in response to Deaf adults' real and dynamic learning needs.

In the e-learning ecosystem, English literacy development gives rise to a multitude of changes including living a more independent life with language and computer skills gained. Many excerpts from learners' feedback on real life English confirm the instant use in real life of what have learnt. Many participants articulated living examples in their life such as buying tickets at the railway station and travelling alone (see Section 5.4). Another striking case is that one Deaf research assistant, recruited for the wider P2P Deaf Literacy project in Ghana, has independently applied for a project and won a grant based on his own ideas. This would not have been possible if he had not accumulated research knowledge and experience from the inspiring wider project and other similar projects by working with both Deaf and hearing researchers.

To sum up, the ultimate goal of adopting a participatory literacy approach precedes learner-centred English literacy attainment and resides in making a social change for learners (Auerbach, 1993).

7.2.3 E-learning Ecosystems Possible in Low-resource Contexts with Specific Features

The success of the SLEND implies that Web 2.0 technology-enhanced learning is not a privilege for rich-resource environments, but also possible in low-resource contexts. The e-learning ecosystems in resource-constraint context for Deaf young adults' English literacy development carry their own design features to address the challenges of limited education opportunities, lack of qualified teachers and tailored learning resources, as well as low-tech environment.

In response to the limited education opportunities, lack of qualified teachers and tailored learning resources, e-learning on a Moodle platform and WhatsApp-assisted communication are adopted to enable crowdsourcing with the wisdom of the crowd and sharing of information and knowledge for a wider audience. Peer-to-peer interaction is prevalent in both rich-resource and low-resource contexts to encourage interaction for efficient teaching and learning. Peer-to-peer interaction is indispensable as, otherwise, there might not be any teachers and learning resources at all. Despite the so-called low-tech environment, learners from all five centres achieved remarkable learning outcomes after the intervention as presented in 6.1.1, although literacy attainment differed across five centres as illustrated in Figure 6.4. A possible explanation for Deaf learners' success in a low-tech environment could be the rewarding human factor which is another aspect of determining the tech environment proposed by Gonzalez and St. Louis (2013). Most of the Deaf learners, peer tutors and research assistants were skilled at using technology.

Some of them were professional experts in technology such as RA_B and PT_E. PT_E was pursuing a BA in computer science when he joined in the P2P Deaf Literacy project. One key ideology of an e-learning ecosystem is that the participants differ in their expertise and complement each other. A low-tech environment does not necessarily lead to human constraints. It is very likely that skilled learners of technology are able to mitigate the negative effect of a low-tech environment and make the best use of the available and affordable technology with their high-tech skills.

The argument that human factors can remedy under-resourced environments is not to underestimate the power of technologies, but to promote the innovative use of affordable technologies. A favourable tech environment could boost learning outcomes and improve learning experience. Based on the comparison of technology environments at five learning centres with their learning outcomes and learning experience at these five centres, the Vadodara Centre outperformed the other four centres. It might be arbitrary to assert that the equipment of technologies at Vadodara is optimal, yet it is at least favourable for learning, with a high computer and laptop to student ration and good Internet connection as specified in Section 3.6.2.

7.3 RECOMMENDATIONS

Based on the main findings and insights of the current study, several evidence-based recommendations are made to enlighten future practice and study.

7.3.1 Using the Developed Framework as a Guide rather than a Prescription

By synthesizing the evolution so far, a framework for a participatory e-learning system for Deaf young adults' English literacy attainment is distilled as shown in Figure 6.7. It is by no means the case that this model is a fixed “best practice”, similar to the claim that the e-learning theoretical framework is a not a prescription (Aparicio, Bacao, & Oliveira, 2016). In fact, according to Chang (2008), the internal and external influences affect the construction of an e-learning ecosystem and keep the model dynamic in specific context. Therefore, the current research welcomes further innovation or adaptive replication of the framework. As the innovation continues, this framework is subject to adaptation.

Considering the fact that this framework is an application of the existing e-learning ecosystem models into a new domain, it especially recommends the adaption in this specific field of Deaf young adults’ English literacy development in a low-resource context. To be more specific, the three main components (stakeholders, pedagogy 2.0 and Web 2.0 Technology) are less likely to be changed as it follows the generic dimensions of the e-learning systems. It is also highly recommended to refer to the key characteristics of this e-learning ecosystem including Deaf-led implementation, topic-based real life English, learner content creation, sign bilingualism, peer-to-peer interaction, Web 2.0 technology-enhanced provision, continuous training and support, as all of them are considered somewhat indispensable and not recommended for substantive changes. However, the subordinating features under each key characteristic are flexible for fundamental adaptations.

7.3.2 Professionalism of Peer Tutoring

It is evident that peer tutors’ competence affects learning outcomes and learner experience. The peer tutor at the Vadodara Centre already had two years of English teaching experience, although he has not achieved a Bachelor’s Degree like the other

peer tutors. His teaching experience seems especially decisive when other skills are equivalent to other peer tutors, such as computer and ISL skills. The experience of the model peer tutor from the Vadodara Centre raises the question of the professionalism of the peer tutors. In other words, what makes a good peer tutor for Deaf young adult learners of English in India? Previous studies document a series of standards of a good teacher for Deaf learners: empathy in tutors, good teaching skills and expertise with content knowledge (Scherer & Binder, 1989); fluency in sign language, understanding of Deafness, Deaf culture and Deaf people (Lang, Biser, Mousley, Orlando, & Porter, 2004; Lang, McKee, & Conner, 1993); and the influence of Deafness on learning (Marschark, Lang, & Albertini, 2002). Clearly, the five peer tutors meet the requirements of sharing empathy with the Deaf learners, fluency in ISL and understanding of the Deaf learners and cultures as one of them.

Nevertheless, from peer tutors' self-reflection and research assistants' observation, peer tutors are not confident about their English proficiency, which inhibits the identification and development of language patterns and relevant exercises. This reveals the problem of lack of expertise knowledge required by Scherer and Binder (1989). Meanwhile, the success of the Vadodara Centre in terms of better learner experience and learning outcomes uncovers the significance of prior teaching experience. This resonates with the claim of good teaching skills (Scherer & Binder, 1989). In addition, the natural use of sign language dialects on the SLEND implies that it is preferable for peer tutors to have knowledge and skills of sign language varieties. They can play essential roles in facilitating learners' understanding of ISL dialects. Corresponding training in relation to ISL dialects for peer tutors is recommended.

Although peer tutors are welcomed by Deaf learners and have contributed to learners' English attainment, they need to maintain professional development, especially in the expertise of subject matter, teaching skills and sign language skills. In this way, they can harness the professionalism of peer tutoring. In fact, a diploma course has been developed in India to train professional Deaf language teachers for Deaf children and adults with the impact of the implementation of the P2P Deaf Literacy project.

7.3.3 Follow-on Activities for Maintenance of Learners' Confidence

Seeing from 6.2, learners were able to retain what they learnt from the P2P Deaf Literacy course on the SLEND 70 days after the intervention, although their delayed self-assessment dropped to more or less the same level as their pre-intervention self-assessment. The divergence between the test performance and self-assessment indicated that this could be due to a decrease of confidence rather than English literacy proficiency. Thus, it is recommended that the wider P2P Deaf Literacy project should include follow-on activities to maintain Deaf learners' confidence.

The optimum follow-on activity could be the normalisation of the P2P Deaf Literacy project after the pilot period provided that all conditions of content, stakeholders and infrastructure are met. If full operationalisation is impossible, feasible partial functioning might be also beneficial to the maintenance of confidence, such as partial operationalisation of the SLEND platform, after-intervention communication via WhatsApp group chats or small-group collaborative learning in a physical venue. To keep Deaf learners connected with their peers in certain ways facilitates their fight against isolation in their local hearing community. A special focus group discussion regarding follow-on activities for the research assistants, peer tutors, and Deaf learners can be

conducted before the intervention ends. It is foreseeable that the discussion can bring about insightful solutions by the participants themselves.

7.3.4 Developmental Evaluation in Deaf Education and Deaf Studies

Unlike the recommendations aforementioned with foci on the development of the SLEND and its delivery context, the last one is a recommendation for research methodology to track the evolution of innovation via developmental evaluation in the field of Deaf education and Deaf studies in general. By adopting this approach, the current research suffices to record the changes made to research methods, conceptualisation and design of the SLEND, and to boost the evolution of the SLEND through proposing changes addressed to specific emergent problems. In so doing, it contributes to the originality of the current research in terms of research methodology as this is absent from the research literature in Deaf Studies and Deaf literacy in India, where only results are presented with the assumption that all are crystal-clear from the beginning of the research.

Reflecting on my experience of implementing developmental evaluation, use of research methods enabling timely recording and reporting of data and findings, and the establishment of a feedback mechanism are proposed to guarantee the efficient and effective implementation of developmental evaluation. Besides the research methods used in this research, periodically collecting communication records such as email, WhatsApp group chats history, Skype audios and videos ensures a full coverage of rich data regarding discussion and communication where problems, corresponding solutions and changes are embedded. The feedback mechanism refers to the process of reporting emerging problems, discussion on solutions and feeding into the development of the innovation by designated responsible stakeholders. Setting up the feedback mechanism is essential as it acknowledges the mission of developmental evaluation as official and recognizes its working mechanism. In this way, the research methods and techniques proposed for scrutinizing timely communication can produce rich data while the feedback mechanism ensures that the data are dealt with efficiently and effectively.

7.4 LIMITATIONS

The current researcher, myself, as the developmental evaluator has limited power in the P2P Deaf Literacy project, which might potentially constrain the effect of developmental evaluation. Engaged in the wider project as a PhD student, I was not officially appointed as a developmental evaluator. It is purely because my research work fell in the domain of developmental evaluation. Meanwhile, as the only student member in the wider project, I am less powerful with respect to gaining team members' attention. Although I attended the monthly project meeting, it is less realistic to obtain abundant time to discuss the emerging issues from my research within the period of one hour or one hour and a half. Sometimes, insufficient discussion or communication gave rise to pending issues, and delayed actions.

Although my absence from the field is substantially compensated for by shared human resources of the wider P2P Deaf Literacy project (see detailed explanation in 3.2.5, 3.3.8, and 3.6), it does not change the fact that my interaction with the field relies primarily on the mediated information via communication with the research assistants and peer tutors, and on the post-hoc evidence of the design concept, learner experience and

learning outcomes arising from the qualitative and quantitative data. In this regard, my absence does limit the methods used for data collection and the scope of the developmental evaluation. For instance, there was a lack of onsite observation of the implementation live in the field. I might have missed certain additional aspects of evaluation that could have been spotted with my presence in the field, e.g. interpersonal issues, a multitude of observable PT skills, Deaf learners' engagement in materials development, etc. Ideally, if my presence as the developmental evaluator had been ensured throughout the implementation in the field, the validity of the current study could have been enhanced.

Another limitation is the short life span of the intervention. As the P2P Deaf Literacy project is a pilot project and the intervention only lasts for seven months, it is challenging to address all the feedback and problems arising from the developmental evaluation, in particular those issues demanding long-term evolution. For example, grouping and sequencing topics are time-consuming and not fully addressed. In this sense, the developmental evaluation in the current research is less likely to fulfil the request of instant reaction, which is one key feature of developmental evaluation (Patton, 2011).

The nature of the current study is all-encompassing and centres around the evaluation of the whole e-learning ecosystem of the SLEND. It is advantageous in terms of comprehensive coverage of the P2P Deaf Literacy project. However, inevitably it is limited in the research depth for each single field, such as Deaf-led approach, multiliteracy, peer interaction, WhatsApp, sign bilingualism and the like. In fact, each area can be explored regarding its role in the encompassing e-learning ecosystem, its operationalization mechanism and its interaction with learner experience and learning outcomes in the process of English literacy attainment.

7.5 FURTHER RESEARCH

Underpinning the paradigm of developmental evaluation, the developmental evaluation of the SLEND is not the end; instead it is the beginning for the innovative practice to thrive. The current research not only facilitates the formation of an e-learning ecosystem for Deaf young adults' English literacy attainment in India, but also sheds light on further research on e-learning ecosystem for Deaf learners. The pursuit of the SLEND as an ecological environment for Deaf learners' English literacy attainment never ends.

Further research can expand into two aspects in parallel: replication studies in other developing countries or areas and studies for specific fields. The replication studies will further test this model of an e-learning ecosystem in different contexts and provide accumulated evidence for expanding practice. Through replication, these studies will also uncover the similarities and differences regarding the operationalization of the same model in the Global South countries or areas. They might generate insights to practicing this e-learning ecosystem model for Deaf young adult learners in an international environment. Further, studies with foci on each specific element of the model such as the SLEND Moodle platform, social networking via Web 2.0 social tool--WhatsApp group chats, ethnographic approach for English literacy and the like, will explore their individual role in depth and ultimately refine the model. In this way, the

model of an e-learning ecosystem for Deaf young adults' English literacy development targeting developing areas and countries will develop in both breadth and depth.

For instance, based on the current research, three groups of WhatsApp group chats were set up as a means for social networking and complementing the learning on the SLEND. One was for within-centre communication, one was for cross-centre communication and the final one was for mixed group communication. The first two were more active than the third one and maintained activities even after the intervention. It might be interesting to undertake research on the social and learning role of the WhatsApp group chats in the e-learning ecosystem, especially on how the English language used in the WhatsApp group chats is associated with what the learners acquire on the SLEND and what contributes to their productive/receptive English skills development. Previous research (Garberoglio, Dickson, Cawthon, & Bond, 2015) documented that communication technology may support Deaf learners' English literacy development. Deaf adolescents who tend to use emails and chats more exhibit better reading comprehension skills.

Further research can also look into the interpretation and application of the interaction approach in SLA (Gass & Mackey, 2014) for Deaf learners' second language learning, especially grammatical aspects and interaction, individual differences and interaction, and the most beneficial forms of interaction for learners in specific setting, as the current research covers only the social context such as the Affective Filter Hypothesis (Krashen, 1985) and the use of L1 for English acquisition in the context of bilingual interaction. It is instrumental in exploring more evidence of the facilitative role of the interaction approach for Deaf people's language acquisition and how it differs from its use on hearing learners.

As indicated in Section 6.2, Deaf learners' drop in self-assessment scores is strikingly in contrast with their retaining test performance at the point of delayed post-test 70 days after they left the course. This supports the arguments that Deaf young adult learners' confidence rather than their English literacy decreased, and that Deaf young adult learners underestimated their English literacy level in the isolated environment after the intervention. On the other hand, learners' overestimation of their English literacy was detected while comparing their self-assessment scores with their actual test performance in the pre-test and the post-test in Section 6.3.2. It is reasonable to conclude that Deaf learners' self-assessment is sensitive to the context, in consideration of the change from overestimation in a supportive environment to underestimation in an isolated environment. More research is encouraged to confirm whether Deaf learners' self-assessment is context-sensitive, and its implications for teaching, learning and assessment. Profoundly, these studies could further provide insights into the training on how Deaf learners can best assess their English literacy as well as other aspects of learning, life and work, with resilience to context change.

It might be also intriguing and meaningful to explore the use of the SLEND on mobile devices as the ownership of mobile-cellular telephones is almost four times higher than that of computers in India. There might be a great potential in using mobile devices for Deaf learners' English literacy attainment. Although learners' experience of mobile access to the SLEND is troublesome due to poor quality mobile handsets and limited Internet connection (see Section 5.2.6), further research can explore specific learning

activities that are deemed more mobile-friendly in taking forward Deaf learners' English literacy attainment.

REFERENCES

Adenwalla, D. D. (1999). Education of the Deaf in India. In H. W. Brelje, *Global Perspectives on the Education of the Deaf in Selected Countries* (pp. 181-189). Hillsboro: Butte Publications.

Anorve, R. L. (1989). Community-based literacy educators: Experts and catalysts for change. In H. A. Fingeret, & P. Jurmo, *Participatory literacy education* (pp. 35-41). San Francisco: Jossey-Bass, Inc.

Aparicio, M., Bacao, F., & Oliveira, T. (2016). An e-learning theoretical framework. *Educational Technology & Society, 19*(1), 292-307.

Archer, D., & Goreth, N. (2004). Participation, literacy and empowerment: The continuing evolution of refelct. *PLA Notes, 50*, 35-44.

Atkinson, P. A., & Coffey, A. (1997). Analysing documentary realities. In D. Silverman, *Qualitative research: Theory, method and practice* (pp. 45-2). London: Sage.

Auerbach, E. (1992). *Making meaning, making change: Participatory curriculum development for adult ESL literacy.* National Clearinghouse on Litercy Eucation: ERIC.

Auerbach, E. (1993). Putting the P back in participatory. *TESOL Quarterly, 27*, 543-545.

Auerbach, E., Barahona, B., Midy, J., Vaquerano, F., Zambrano, A., & Arnaud, J. (1996). *Adult ESL/Literacy: From the Community to the Community (A guidebook for participatory literacy training).* New York & London: Routledge (Taylor & Francis Group).

Bailes, C. N. (2004). Bridging Literacy: Integrating ASL and English into the Language Arts. In E. Power, & G. Leigh, *Educating Deaf Students: Global Perspectives* (pp. 127-138). Washington D. C.: Gallaudet University Press.

Baker, C., & Padden, C. (1978). *American Sign Language: A Look at its Story Structure and Community.* Silver Spring, MD: T.J. Publishers Inc.

Baker, R., & Knight, P. (1998). 'Total Communication' - current policy and practice. In S. Gregory, P. Knight, W. McCracken, S. Powers, & L. Watson, *Issues in Deaf Education* (pp. 77-87). London: David Fulton Publishers.

Balch, G. I., & Mertens, D. M. (1999). Focus Group Design and Group Dynamics: Lessons from Deaf and Hard of Hearing Participants. *American Journal of Evaluation, 20*, 265-277.

Banerjee, A., Chitnis, U. B., Jadhav, S. L., Bhawalkar, J. S., & Chaudhury, S. (2009, Jul-Dec). Hypothesis testing, type I and type II errors. *Industrial Psychiatry Journal, 18*(2), 127-131.

Barak, A., & Sadovsky, Y. (2008). Internet use and personal empowerment of hearing-impaired adolescents. *Computers and Human Behaviour, 24*, 1802-1815.

Barriball, K. L., & While, A. (1994). Collecting data using a semi-structured interview: a discussion paper. *Journal of Advanced Nursing, 19*, 328-335.

Barton, D. (1994). *Literacy: An Introduction to the Ecology of Written Language.* Cambridge: Blackwell.

Barton, L. (2005). Emancipatory research and disabled people: some observations and questions. *Educational Review, 57*(3).

Batten, G., Oakes, P. M., & Alexander, T. (2014). Factors Associated with Social Interantions between Deaf Children and their Hearing Peers: A Systemic Literature Review. *Journal of Deaf Studies and Deaf Education, 19*(3), 285-302.

Beal-Alvarez, J. S., & Cannon, J. E. (2014). Technology intervention research with D/HH learners: Levels of Evidence and Causal Factors. *American Annals of the Deaf, 158*(5), 486-505.

Beal-Alvarez, J. S., & Cannon, J. E. (2015). Captions, Whiteboards, Animation, and Videos: Technology Improves Access. *Odyssey, 16*, 4-9.

Beal-Alvarez, J. S., & Easterbrooks, S. R. (2013). Increasing children's ASL classifier production: A multicomponent intervention. *American Annals of the Deaf, 158*(3), 311-333.

Begum, A. (2014). Importance of English Language in India: Its Role in Present National and International Set Up. *International Journal of Interdisciplinary and Multidisciplinary Studies (IJIMS), 1(10)*, 126-128.

Benati, G. B., & Lee, J. F. (2008). *Grammar Acquisition and Processing Instruction: Secondary and Cumulative Effects.* Bristol: Multilingual Matter.

Bernard, H. R. (1988). *Research methods in cultural anthropology.* Newbury Park, CA: Sage.

Bharat Broadband Network Limited. (2018, 1 28). *About BBNL.* Retrieved from Bharat Broadband Network Limited: A Government of India Undertaking: http://www.bbnl.nic.in/index1.aspx?lsid=18&lev=1&lid=18&langid=1

Bhattacharya, T., & Randahawa, S. P. (2014). *Legislation and Policies in Relation to Sign Language and Sign Language Rights.* Retrieved from http://people.du.ac.in/~tanmoy/papers/tanmoy_SL_policies.pdf on 22nd Feb, 2017

Block, D. (2003). *The Social Turn in Second Language Acquisition.* Georgetown University Press.

Boone Jr., H. N., & Boone, D. A. (2012). Analyzing Likert Data. *Journal of Extension, 50*(2).

Borga, G., Convertino, C., Marschark, M., Morrison, C., & Rizzolo, K. (2011). Enhancing deaf students' learning from sign language and text: Metacognition, modality, and the effectiveness of content scaffolding. *Journal of Deaf Studies and Deaf Education, 16*(1), 79-100.

Boyatzis, R. E. (1998). *Transforming Qualitative Information.* Cleveland: Sage.

Brandt, D., & Clinton, K. (2002). Limits of the local: Expanding perspectives on literacy as a social practice. *Journal of Literacy Research, 34*(3), 337-356.

Brodo, J. A. (2006). Today's Ecosystem of e-learning. *Trainer Talk, Professional Societyfor Sales & Marketing Training, 3*(4).

Brown, J. D. (1996). *Testing in Language Programs.* New Jersey: Prentice Hall Regents.

Bryman, A. (2012). *Social research methods* (4th ed.). Oxford: Oxford University Press.

Buch, E. D., & Staller, K. M. (2007). The feminist practice of ethnography. In S. N. Hesse-Biber, & P. L. Leavy, *Feminist research practice* (pp. 187-222). Thousand Oaks, CA: Sage.

Buyukkurt, M., Morin, D., Li, Y., & Doreen, D. (2013). Technology-enhanced Engagement: Impact of an In-class Engagement Activity on Out-of-class Engagement in Learning. *International Academic Conference Proceedings*, 13-17.

Campbell, D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental designs for research.* Boston: Houghton Mifflin.

Canale, M., Frenette, N., & Belanger, M. (1987). Evaluation of minority students writing in first and second languages. In J. Fine, *Second language discourse: A textbook of current research* (pp. 147-165). Norwood, NJ: Ablex.

Cannon, J. E., & Guardino, C. (2012). Literacy strategies for Deaf/Hard-of-hearing English language learners: Where do we begin? *Deafness and Education International, 14(2)*, 78-99.

Cannon, J. E., Easterbrooks, S. R., Gagne, P., & Beal-Alvarez, J. (2011). Improving DHH students' grammar through an individualed software program. *Journal of Deaf Studies and Deaf Education, 16*(4), 437-457.

Carifio, J., & Perla, R. (2008). Resolving the 50-year debate around using and misusing Likert scales. *Medical Education, 42*, 1150-1152.

Castanheira, M. L., Crawford, T., Dixon, C., & Green, J. L. (2001). Interactional ethnography: An approach to studying the social construction of literate practices. *Linguistics and Education, 11*(4), 353-400.

Cazden, C., Cope, B., Fairclough, N., & Gee, J. (1996). A Pedagogy of Multiliteracies: Designing Social Futures. *Harvard Educational Review, 66*(1), 60-92.

Chacoff, A. (1989). (Bi)literacy and empowerment: Education for indigenous groups in Brazil. In *Working Papers in Educational Linguistics* (pp. 43-62). Philadelphia: Language Education Division of the University of Pennsylvania.

Chang, V. (2008). *An evaluation instrument for e-Learning Ecosystem.* Paper presented at the IEEE International Conference on Industrial Informatics, in Daejeon, Korea on 13-16 July, 2008.

Chang, V., & Guetl, C. (2007). E-learning ecosystem (ELEs): a holistic approach for the development of more effective learning environment for small-and-medium sized enterprises (SMEs). In *Digital Ecosystems and Technologies Conference* (pp. 420-425). New York: IEEE Press.

Charlton, I. (1998). *Nothing About Us without Us: Disability Oppression and Empowerment.* Berkeley, Los Angeles, London: University of California Press.

CISCO. (2016). *Mobile forecast projects 70 percent of global population will be mobile users.*

Cohen, L., Manion, L., & Morrison, K. (2000). *Research Methods in Education* (5th ed.). London: RoutledgeFalmer.

Conrad, R. (1979). *The Deaf Schoolchild: Language and Cognitive Function.* Harper & Row.

Council of Europe. (2005). *The Status of Sign Languages in Europe.* Council of Europe Publishing.

Council of Europe. (2011). *Common Europan Framework of Reference for Languages: Learning, Teaching, and Assessment.* Council of Europe.

Cox, E. P. (1980). The optimal number of response alternatives for a scale: A reivew. *Journal of Marketing Research, 17*(4), 407-422.

Crawford, J., & Ottinger, P. (1980). The Sign Language Dimension of Total Communication for India. *Hearing Aid Journal, 12*.

CTIA. (2017). *Wireless Snapshot 2017.*

Cumming, A. (1989). Writing expertise and second language proficiency. *Language Learning, 39*, 81-141.

Cummins, J. (1979). Cognitive/academic language proficiency, linguistic interdependence, the optimum age question and some other matters. *Working Papers on Bilingualism, No. 19*, 121-129.

Cummins, J. (1981). The role of primary language development in promoting educational success for language minority students. In California State Department of Education, *Schooling and language minory students: A theoretical framework* (pp. 3-49). Los Angeles: Evaluation, Dissemination and Assessment Centre, California State University.

Dabbagh, N. (2005). Pedagogical models for e-learning: A theory-based design framework. *International Journal of Technology in Teaching and Learning, 1*(1), 25-44.

Dammeyer, J., & Marschark, M. (2016). Level of Educational Attainment Among Deaf Adults Who Attended Bilingual-Bicultural Programs. *Journal of Deaf Studies and Deaf Education, 21*(4), 394-402.

DeMonte, M. T., Groves, K. M., & Nuccetelli, G. (2011). *Deaf Indicators: Suggested Modifications of CEFR Learning Behaviors.* Internal Report, VISEL project consortium.

Deng, L., & Tavares, N. J. (2013). From Moodle to Facebook: Exploring students' motivation and experiences in online communities. *Computers & Education, 68*, 167-176.

Denmark, A. C. (2013). *An online learning platform for English as a second language for young Deaf Indian sign language users: Usage patterns and user engagement (MA Research thesis paper).* University of Central Lancashire.

Dennis, D. K. (2005). *A History of the Education of the Deaf in India and Nepal (A thesis submitted to University of Balimore).*

Denton, D. (1976). *The Philosophy of Total Communication, Supplement to British Deaf News.* Carlisle: British Deaf Association.

Dewey, J. (1983). The middle works, 1899-1924. In J. Boydston. SIU Press.

Dondi, C., & Delrio, C. (2006). Technology supported lifelong learning: the need for a new vision and implementation models. In *Proceeding of the 10th World Conference on Continuing Engineering Education (WCCEE).* Vienna University of Technology, Vienna, Austria.

Dornyei, Z. (2009). Individual differences: Interplay of learner characteristics and learning environment. *Language learning, 59 (Suppl. 1)*, 230-248.

Dotter, F. (2006). 'Soft' standardization of sign languages? *Veröffentlichungen des Zentrums für Gebärdensprache und Hörbehindertenkommunikation der Universität Klagenfurt 8*, 98-118.

Downes, S. (2006). *Understanding learning networks.* Castelldelfels, Spain: Keynote presentation delivered at the Fourth EDEN Research Workshop.

Drigas, A., Vrettaros, J., Tagoulis, A., & Kouremenos, D. (2010). Teaching a Foreign Language to Deaf People via Vodcasting & Web 2.0 Tools. In M. Lytras, *WSKS 2010, Part II, CCIS 112* (pp. 514-521). Verlag Berlin Heidelberg: Springer.

Easterbrooks, S. R., Lederberg, A. R., Antia, S., Schick, B., Kushalnagar, P., Webb, M. Y., . . . Connor, C. M. (2015). Reading among diverse DHH learners: what, how, and for whom? *American Annals of the Deaf, 159(5)*, 419-432.

Egbert, J., & Yang, Y. F. (2004). Mediating the digital divide in CALL classrooms: Promoting effective language tasks in limited technology contexts. *ReCALL, 16*, 280-291.

Erlandson, D. A., Harris, E. L., Skipper, B. L., & Allen, S. D. (1993). *Doing Naturalistic Inquiry: A Guide to Methods.* Newbury Park, CA: Sage.

European Centre for Education and Training. (2008). *Deaf Port Project: Descriptor Tables.*

Evans, C. (2004). Educating Deaf Children in Two Languages. In E. Power, & G. Leigh, *Educating Deaf Students: Global Perspectives* (pp. 139-149). Washington D. C.: Gallaudet University Press.

Falchikov, N. (2001). *Learning Together: Peer Tutoring in Higher Education.* London: Routledge Falmer.

Fani, T., & Ghaemi, F. (2011). Implications of Vygotsky's Zone of Proximal Development (ZPD) in Teacher Education: ZPTD and Self-scaffolding. *Procedia - Social and Behaioral Sciences*, 1549 - 1554.

Field, A. (2009). *Discovering statistics using SPSS: and sex and drugs and rock 'n' roll.* SAGE.

Fingeret, A. (1989). The social and historical context of participatory literacy education. *New Directions for Continuing Education, 42*, 5-15.

Folkestad, B. (2008). Analysing Interview Data: Possibilities and Challenges. *EUROSPHERE Online Working Paper, 13*, 2-16.

Freire, P. (1921-2007). *Pedagogy of the Oppressed.* London: Continuum, c2000.

Gamble, J. A. (2008). *A developmental evaluation primer.* Montreal: JW McConnell Family Foundation.

Garberoglio, C. L. (2013). *Acknowledging attitudes andaccessibility: Motivational characteristics of deaf college students studying English and the potential of computer-mediated communication. .* PhD thesis.

Garberoglio, C. L., Dickson, D., Cawthon, S., & Bond, M. (2015). Bridging the communication divide: CMC and deaf individuals' literacy skills. *Language Learning and Technology, 19*(2), 118-133.

Garcia, O. (2009). Education, multilingualism and translanguaging in the 21st century. In A. Mohanty, M. Panda, R. Phillipson, & T. Skutnabb-Kangas, *Multilingual Education for Social Justice: Globalising the local* (pp. 128-145). New Delhi: Orient Blackswan.

Gass, S., & Mackey, A. (2014). Input, Interaction and Output in Second Language Acquisition. In B. VanPatten, & J. Williams, *Theories in Second Language Acquisition: An Introduction* (pp. 180-206). ProQuest Ebook Central: Taylor & Francis Group.

Gee, J. (1990). *Social Linguistics and Literacies: Ideology in Discourse.* Basingstoke: Falmer Press.

Gee, J. P. (2015). The New Literacy Studies. In J. Rowsell, & K. Pahl, *The Routledge Handbook of Literacy Studies* (pp. 35-48). London: Routledge.

Glenn, A. B. (2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal, 9*(2), 27-40.

Goldin-Meadow, S., & Mayberry, R. I. (2001). How do profoundly deaf children learn to read? *Learning Disabilities Research & Practice, 16*(4), 222-229.

Golos, D. B. (2010). Deaf children's engagement in an educational video in American Sign Language. *American Annals of the Deaf, 155*(3), 360-368.

Gonzalez, D., & St. Louis, R. (2013). CALL in Low-Tech Contexts. In M. Thomas, H. Reinders, & M. Warschauer, *Contemporary Computer-Assisted Language Learning.* London & New York: Bloomsbury.

Government of India. (1963). *The Official Language Act.*

Government of India. (2018, 1 28). *About Digital India*. Retrieved from Digital India: http://digitalindia.gov.in/content/about-programme

Graddol, D. (2010). *English Next India: The Future of English in India.* British Council.

Gregory, S., Smith, S., & Wells, A. (1997). Language and identity in sign bilingual deaf children. *Deafness and Education, 21*(3), 31-38.

Guetl, C., & Chang, V. (2008a). Ecosystem-based Theoretical Models for Learning in Environments of the 21st Centuary. *International Journal of Emerging Technologies in Learning, 3*.

Guetl, C., & Chang, V. (2008b). *The use of Web 2.0 technologies and services to support e-learning ecosystem to develop more effective learning environments.*

Guetl, C., Chang, V., Edwards, A., & Boruta, S. (2013). Flexible and affordable foreign language learning environment based on Web 2.0 technologies. *iJET, 8*(2), 16-28.

Gynee, A., & Bagga-Gupta, S. (2013). Young people's languaging and social positioning. Chaining in "bilingual" eucational settings in Sweden. *Linguistics and Education*, 479-496.

Hamuy, E., & Galaz, M. (2010). Information versus communication in course management systems. *Computers & Education, 54*(1), 169-177.

Haron, H., Aziz, N., & Harun, A. (2017, October 13-14). A conceptual model particpatory engagement within e-learning community. *2nd International Conference on Computer Science and Computational Intelligence 2017*.

Harris, R., Holmes, H. M., & Mertens, D. M. (2009). Research Ethics in Sign Language Communities. *Sign Language Studies, 9*(2), 104-131.

Haythornthwaite, C. (2009). Crowds and communities: Light and Heavyweight Models of Peer Production. *Proceedings of the Hawaii International Conference on System Sciences*.

Heath, S. B. (1982). Protean shapes in literacy events: Ever-shifting oral and literate traditions. In D. Tannen, *Spoken and written language: Exploring orality and literacy* (pp. 91-117). Norwood,NJ: Ablex.

Heiling, K. (1998). Nilingual vs.oral education. In A. Weisel, *Issues unresolved: New perspectives on language and deaf education* (pp. 141-147). Washington D.C.: Gallaudet University Press.

Herman, R., Roy, P., & Kyle, F. E. (2013, May). Dyslexia and deaf children. *British Association of Teachers of the Deaf Newsletter*, pp. 47-48.

Heron, T. E., Villareal, D. M., Yao, M., Christianson, R. J., & Heron, K. M. (2006). Peer tutoring systems: Applications in classrooms and specialized environments. *Reading & Writing Quarterly, 22*, 27-45.

Herring-Harrison, T. J., Gardner III, R., & Lovelace, T. S. (2007). Adapting peer tutoring for learners who are deaf or hard of hearing. *Intervention in School and Clinic, 43*(2), 82-87. doi:10.1177/10534512070430020801

Horner, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The Use of Single-Subject Research to Identify Evidence-based Practice in Special Education. *Exceptional Children, 71*(2), 165-179.

Hrastinski, L., & Wilbur, R. B. (2016). Academic Achievement of Deaf and Hard-of-Hearing Students in an ASL/English Bilingual Program. *Journal of Deaf Study and Deaf Education, 21*(2), 156-170.

Hyde, M., Punch, R., Power, D., Hartley, J., Neale, J., & Brennan, L. (2009). The experiences of deaf and hard of hearing students at a Queensland university:1985-2005. *Higher Education Research and Development, 28*(1), 85-98.

Hymes, D. (1974). *Foundations in Sociolinguistics: An Ethnographic Approach.* University of Pennsylvania Press.

Hymes, D. (1982). Narrative Form as Grammar of Experience: Native American and a Glimpse of English. *Journal of Education, 164*(2), 121-142.

ICED Vancouver 2010 Organizing Committee. (2010). *Vancouver 2010: A new era: Deaf participation and collaboration.* Author: Vancouver, BC.

India. (2009). *The Right of Children to Free and Compulsory Education Act, 2009.*

India. (2012). *National Policy on Information and Communication Technology (ICT) in School Education.* New Delhi: Department of School Education and Literacy, Ministry of Human Resource Development, Government of India.

India Census. (2001). *Census Data*. Retrieved from http://www.censusindia.gov.in/2011-common/census_data_2001.html

India Census. (2011). *Distribution of disabled by type of disability, sex, literacy status and residence.* Retrieved from http://www.censusindia.gov.in/2011census/population_enumeration.html

Int Institute for Sign Language and Deaf Studeis. (2014). *Literacy Development with Deaf Communities Using Sign Language, Peer Tuition, and Learner-Generated Online Content：Sustainable Educational Innovation.*

International Telecommunication Union. (n.d.). *ICT Development Index 2017: India*. Retrieved from International Telecommunication Union: http://www.itu.int/net4/ITU-D/idi/2017/index.html#idi2017economycard-tab&IND

Ivanic, R., Edwards, R., Satchwell, C., & Smith, J. (2007). Possibilities for pedagogy in futher education: harnessing the abundance of literacy. *British Educational Research Journal, 33*(5), 703-721.

Ivankova, N. V. (2015). *Mixed Methods Application in Action Research: From Methods to Community Action.* SAGE Publications.

Jamieson, S. (2004). Likert scales: how to (ab)use them. *Medical Education, 38*, 1212-1218.

Janks, H., & Comber, B. (2006). Critical literacy across the continents. In K. Pahl, & J. Rowsell, *Travel Notes from the New Literacy Studies* (pp. 95-117). Clevedon: Multilingual Matters.

Johnson, B., & Turner, L. A. (2003). Data collection strategies in mixed methods research. In A. Tashakkori, & C. Teddlie, *Handbook on mixed methods in the behavioural and social sciences* (pp. 297-320). Thousand Oaks, CA: Sage Publications.

Johnson, R., Liddell, S., & Erting, C. (1989). *Unlocking the curriculum: principles for achieving access in deaf education. Working Paper 89-3.* Washington D.C.: Gallaudet Research Institute.

Jonassen, D. H., Peck, K. L., & Wilson, B. G. (1999). *Learning with technology: A constructivist perspective.* Upper Saddle River, NJ: Prentice Hall.

Jones, C., & Carter, R. (2012). Forum: Literature and Language Awareness: Using Literature to Achieve CEFR Outcomes. *Journl of Second Language Teaching and Research, 1*(1), 69-82.

Jones, C., Orme, M., & Waller, D. (2011). Interpreting the Common European Framework of Reference for Languages(CEFR): applying the global to the local. In C. Rust, *Improving Student Learning (ISL) 18: Global Theories and Local Practices: Institutional, Disciplinary and Cultural Variations* (pp. 215-223). Oxord: The Oxford Centre for Staff and Learning Development.

Jurmo, P. (1987). *Learner participation practices in adult literacy in the United States.* Unpublished doctoral dissertation, University of Massachusetts.

Jurmo, P. (1989). The case for participatory literacy education. *New Directions for Continuing Education, 42*, 17-34.

Kaewjumnong, C. (2013). The model development of participatory learning process related to community environmental management. *European Scientific Journal, 9*(2), 232-240.

Karpicke, J. D., & Roediger III, H. L. (2007). Repeated retrieval during learning is the key to long-term retention. *Journal of Memory and Language, 57*(2), 151-162.

Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings.* New York: Oxford University Press.

Kell, C. (2006). Crossing the margins: Literacy, semiotics and the recontextualisation of meanings. In K. Pahl, & J. Rowsell, *Travel notes from the new literacy studies: Instances of practice* (pp. 147-164). Clevedon: Multilingual Matters.

Kesim, M., & Altinpulluk, H. (2013). The Future of LMS and Personal Learning Environments. *Social and Behavioral Sciences*.

Kliewer, C., Fitzgerald, L. M., Meyer-Mork, J., Hartmn, P., English-Sand, P., & Raschke, D. (2004). Citizenship for all in the literate community: An ethnography of young children with significant disabilities in inclusive early childhood settings. *Harvard Educational Review, 74*, 373-403.

Knapp, T. R. (1990). Treating ordinal scales as interval scales: An attempt to resolve the controversy. *Nursing Research, 39*, 121-123.

Knowles. (1984). *Andragogy in Action: Applying modern principles of adult education.* San Francisco: Jossey Bass.

Knowles, M. (1975). *Self-directed learning: A guide for learners and teachers.* New York: Association Press.

Koedinger, K. R., Corbett, A. C., & Perfetti, C. (2012). The Knowledge-Learning-Instruction (KLI) framework: Briding the science-practice chasm to enhance robust student learning. *Cognitive Science, 36*(5), 757-798.

Kontra, E. H. (2013). Language learning against the odds: retrospective accounts by Deaf adults. In E. Domagala-Zysk, *English as a foreign language for Deaf and Hard of Hearing persons in Europe* (pp. 93-112). Lublin: Wydawnictwo KUL.

Krashen, S. (1985). *The Input Hypothesis: Issues and Implications.* New York: Longman.

Kratochwill, T. R., Hitchcock, J., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2010). *Single-Case Designs Technical Documentation. What Works Clearinghouse.*

Kundu, C. L. (2000). *Status of Disability - 2000.* New Delhi: Rehabilitation Council of India.

Kusters, A. (2012). Being a deaf white anthropologist in Adamorobe: Some ethical and methodological issues. In U. Zeshan, & C. de Vos, *Sign Languages in village communities: Anthropological and linguistic insights* (pp. 27-52). Berlin: De Gruyter Mouton.

Kusters, A., De Meulder, M., & O'Brien, D. (2017). Innovations in deaf studies: critically mapping the field. In A. Kusters, M. De Meulder, & D. O'Brien, *Innovations in deaf studies: the role of deaf scholars* (pp. 1-56). London: Oxford University Press.

Kyle, F. (2015). Research Methods in Studying Reading and Literacy Development in Deaf Children Who Sign. In E. Orfanidou, B. Woll, & G. Morgan, *Research Methods in Sign Language Studies: A Practical Guide* (pp. 300-318). Chichester: John Wiley & Sons.

Ladd, G. W., & Coleman, C. C. (1997). Children's classroom peer relationships and early school attitudes: Concurrent and longitudinal associations. *Early Education and Development, 4*, 51-66.

Ladd, P. (2003). *Understanding Deaf Culture: In Search of Deafhood.* Clevedon: Multilingual Matters.

Laerd Statistics. (2018). *Measures of Central Tendency.* Retrieved 1 21, 2018, from https://statistics.laerd.com/statistical-guides/measures-central-tendency-mean-mode-median.php

Lane, H. (1984). *When the Mind Hears.* New York: Random House.

Lane, H., Hoffmeister, R., & Bahan, B. (1996). *A Journey into the Deaf-World.* San Diego, CA: Dawnsign Press.

Lang, H. G., Biser, E., Mousley, K., Orlando, R., & Porter, J. (2004). Tutoring Deaf Students in Higher Education: A Comparision of Baccalaureate and Sub-baccalaurete Student Perceptions. *Journal of Deaf Studies and Deaf Education, 9*(2), 189-201.

Lang, H. G., McKee, B. G., & Conner, K. N. (1993). Characteristics of Effective Teachers: A Descriptive Study of Perceptions of Faculty and Deaf College Students. *American Annals of the Deaf, 138*, 252-259.

Lawton, D., & Gordon, V. (1996). *Dictionary of Education.* London: Hodder and Stoughton.

Leonard, S. N., Fitzgerald, R. N., & Riordan, G. (2015). Using developmental evaluation as a design thinking tool for curriculum innovation in professional higher education. *Higher Education Research & Development, 35*(2), 309-321. Retrieved from https://doi.org/10.1080/07294360.2015.1087386

Leong, P., & Miao, C. (2008). *Ubiquitous digital e-Learning ecosystem. Second IEEE International Conference on Digital Ecosystems and Technologies.*

Leow, F., & Neo, M. (2013). Students' perceptions of a constructivist classroom: a collaborative learning approach. In *IEEE 63rd Annual Conference International Council for Educational Media* (pp. 1-11).

Likert, R. (1932). A Technique for the Measurement of Attitudes. *Archives of Psychology, 140*, 1-55.

Lindgren, R., & McDaniel, R. (2012). Transforming Online Learning through Narrative and Student Agency. *Educational Technology and Society, 15(4)*, 344-355.

Long, M. (1996). The role of the linguistic environment in seond language acquisition. In W. Ritchie, & T. Bhatia, *Handbook of second language acquisition* (pp. 413-468). San Diego: Academic Press.

Luckner, J. L., & Handley, C. M. (2008). A summary of the reading comprehension research undertaken with students who are deaf or hard of hearing. *American Annals of the Deaf, 153(1)*, 6-36.

Luo, T. (2013). Web 2.0 for language learning: Benefits and challenges for educators. *STEMPS Faculty Publications*.

Mackey, A. (1999). Input, interaction, and second language development: An empirical study of question formation in ESL. *Studies in Second Language Acquisition, 21*, 557-587.

Maheady, L., Harper, G. F., & Mallette, B. (2001). Peer-mediated instruction and interventions and students with mild disabilities. *Remedial and Special Education, 22*(1), 4-14.

Makosch, M. (2011). *Deaf Port Project: Final External Evaluation Report.*

Marschark, M. (2003). Interactions of language and cognition in deaf learners: from research to practice. *International Journal of Audiology, 42: sup 1*, 41-48.

Marschark, M., Lang, H. G., & Albertini, J. A. (2002). *Educating deaf students: From research to practice.* New York: Oxford University Press.

Marschark, M., Sapere, P., Convertino, C., Seewagen, R., & Maltzen, H. (2004). Comprehension of sign language interpreting: Deciphering a complex task situation. *Sign Language Studies, 4*, 345-368.

Marzano, G., Lubkina, V., & Siguencia, L. (2016). Key issues in adult non-formal participatory e-learning. *Proceedings of the International Scientific Conference, IV*, 69-79.

Mayer, C. (2009). Issues in Second Language Literacy Eucation with Learners who are Deaf. *The Interntional Journal of Bilingual Education and Bilingualism, 12(3)*, 1-11.

McCracken, W., & Sutherland, H. (1991). *Deaf-ability Not Disability: A Guide for Parents of Hearing Impaired Children.* Clevedon: Multilingual Matters Ltd.

Mchichi, T., & Afdel, K. (2012). The use of Web 2.0 Innovations on Education and Training. *Education, 2*(5), 183-187.

McLoughlin, C., & Lee, M. (2007). Social software and participatory learning: Pedagogical choices with technology affordances in the Web 2.0 era. In *ICT: Providing choices for learners and learning. Proceddings ASCILITE.* Singaore.

McLoughlin, C., & Lee, M. (2008). The Three P's of Pedagogy for the Networked Society: Personalization, Participation, and Productivity. *International Journal of Teaching and Learning in Higher Education, 20*(1), 10-27.

Mejias, U. (2005). A nomad's guide to learning and social software. *The Knowledge Tree: An E-Journal of Learning Innovation, 7*.

Merriam, S. (2001). Something Old, Something New: Adult Learning Theory for the Twenty-First Century. In S. Merriam, *The new update on adult learning theory* (pp. 92-96). The H.W. Wilson Company.

Merriam, S., Caffarella, R., & Baumgartner, L. (2007). *Learning in adulthood: A comprehensive guide* (3 ed.). San Francisco: John Wiley & Sons, Inc.

Mertens, D. M. (2007). Transformative Paradigm: Mixed Methods and Social Justice. *Journal of Mixed Methods Research, 1*(3), 212-225.

Mertens, D. M. (2009). *Transformative Research and Evaluation.* New York: Guilford Press.

Mertens, D. M. (2010). *Research and evaluation in education and psychology: Integrating diversity with quatitative, qualitative, and mixed methods* (3rd ed.). Thousand Oaks, CA: Sage.

Mertens, D. M. (2012). Transformative Mixed Methods: Addressing Inequities. *American Bahavioral Scientist, 56*(6), 802-813.

Mertens, D. M. (2013). What does a transformative lens bring to credible evidence in mixed methods evaluations. In D. M. Mertens, & S. Hesse-Biber, *Mixed methods and credibility of evidence in evaluation: New Directior for Evaluation No.138* (pp. 27-35). Wiley.

Mertens, D. M. (2015). Mixed Methods and Wicked Problems. *Journal of Mixed Methods Research, 9*(1), 3-6.

Miles, M. (2001). *Signs of Development in Deaf South and South-West Asia: Histories, cultural identities, resistance to cultural imperialism.* Retrieved from http://www.independentliving.org/docs7/miles200604.html

Miller, A. D., Barbetta, P. M., Drevno, G. E., Martz, S. A., & Heron, T. E. (1996). Math peer tutoring for studnets with specific learning disabilities. *Learning Disabilities Forum, 21*(3), 21-28.

Miller, D. (2006). Podcasting at the University of Connecticut: Enhancing the educational experience. *Campus Technology*.

Ministry of Law, Justice and Company Affairs India. (1995). *The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act.*

Moodle. (n.d.). *About Moodle: Philosophy*. Retrieved January 21, 2018, from Moodle: https://docs.moodle.org/33/en/Philosophy

Moores, D. F. (1996). *Educating the deaf: psychology, principles, and practices* (4th ed.). Boston: Houghton Mifflin.

Morris, T. (1986). The effect of education/communication mode on aspects of the deaf child's development. In G. Montgomery, *Beyond Hobson's Choice: The Appraisal of Methods of Teaching Language to Deaf Children.* Edinburgh: Scottish Workshop Publications.

MSJE. (2007). *Disability Policy and Programs: Experiences and Prospects for Future. Presentation made at the People with Disabilities in India: Status, Challenges and Prospects Workshop held at World Bank.* New Delhi: India.

Napier, J., & Leeson, L. (2016). *Sign Language in Action.* New York, NY: Palgrave Macmillan.

NDCS. (2007). *Joint memorandum submitted by the National Deaf Children's Society (NDCS) and the Royal National Institute for the Deaf (RNID).* Retrieved from Parliament UK: https://publications.parliament.uk/pa/cm200809/cmselect/cmchilsch/70/70we18.htm

Newman, L., Wagner, M., Knokey, A. M., Marder, C., Nagle, K., Shaver, D., & Schwarting, M. (2011). *The post-high school outcomes of young adults with disabilities up to 8 years after high school. A report from the national longitudinal transition study-2 (NLTS2) [NCSER 2011-3005].* Menlo Park, CA: SRI International.

Newton, L. (1985). Linguistic environment of the deaf child. *Journal of Speech and Hearing Research, 28*, 336-344.

Niederberger, N., & Prinz, P. (2005). La connaissance d'une langue des signes peut-elle faciliter l'apprentissage de l'écrit chez l'enfant sourd? (Does the knowledge of a natural sign language facilitate deaf children's learning to read and write?). *Enfance, 4*, 285-297.

Nikolaidou, M., Sofianopoulou, C., Alexopoulou, N., Abeliotis, K., Detsis, V., Chalkias, C., & Lasaridi, K. (2010). The Blended Learning Ecosystem of an Academic Institution in Greece. *International Journal of Web-Based Learning and Teaching Technologies, 5*(3), 14-35.

Norman, G. (2010). Likert scales, levels of measurement and the "laws" of statistics. *Adv in health Sci Educ, 15*, 625-632.

Norton, M. (2000). Participatory approaches in adult literacy education: Theory and practice. In M. Norton, & G. Malicky, *Learning about participatory approaches in adult literacy education* (p. Chapter 2). Edmonton: Learning at the Centre Press.

Nunan, D. (1999). *Second Language Teaching and Learning.* Boston, Massachusetts: Heinle and Heinle.

Nyhan, B., Cressey, P., Tomassini, M., Kelleher, & Poell, R. (2003). *Facing up to the learning organisation challenge Volume 1: Key issues from a European*

perspective. Luxembourg: Office for Offical Publications of the European Communities.

O'Brien, D. (2017). Deaf-led Deaf Studies: using Kaupapa Maori principles to guide the development of Deaf research practices. In A. Kusters, M. De Mulder, & D. O'Brien, *Innovations in Deaf Studies: the role of deaf scholars.* London: Oxford University Press.

O'Brien, D., & Kusters, A. (2017). Visual methods in deaf studies: using photography and filmmaking in research with deafpeople. In A. Kusters, M. De Meulder, & D. O'Brien, *Innovations in deaf studies: the role of deaf scholars* (pp. 265-296). Oxford: Oxford University Press.

O'Connell, J. (2016). Networked participatory online learning design and challenges for academic integrity in Higher Education. *International Journal for Educational Integrity, 12*(4), 1-15.

Okuyama, Y., & Iwai, M. (2011). Use of text messaging by deaf adolescents in Japan. *Sign Language Studies, 11*(3), 375-407.

Oliver, M. (1992). Changing the social relations of research production. *Disability, handicap & society, 7*(2), 101-114.

P2P Deaf Literacy Project Team. (2016). *Policy Report on "Peer to Peer Deaf Literacy" (P2PDL).*

Padden, C., & Ramsey, C. (1998). Reading ability in signing deaf children. *Topics in Language Disorders, 18*, 30-46.

Pahl, K., & Rowsell, J. (2006). Introduction. In K. Pahl, & J. Rowsell, *Travel Notes from the New Literacy Studies: Instances of Practice.* Clevedon: Multilingual Matters Ltd.

Palloff, R. M., & Pratt, K. (1999). *Building learning communities incyberspace: Effective strategies for the online classroom.* San Francisco, CA: Jossey-Bass.

Pappas, C. (2015). *The e-Learning Ecosystem Metaphor: Key Characteristics and Basic Components.*

Patton, M. Q. (1990). *Qualitative Evaluation and Research Methods.* Newbury Park, CA: Sage.

Patton, M. Q. (1996). A World Larger than Formative and Summative. *Evaluation Practice, 17*(2), 131-144.

Patton, M. Q. (2011). *Developmental Evaluation: Applying Complexity Concepts to Enhance Innovation and Use.* New York: Guilford Press.

Patton, M. Q. (2015). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed.). Thousand Oaks, CA: Sage.

Patton, M. Q. (2016). State of the Art and Practice of Developmental Evaluation: Answers to Common and Recurring Questions. In M. Q. Patton, K. McKegg, & N.

Wehipeihana, *Developmental Evaluation Exemplars: Principles in Practice* (pp. 1-24). New York: The Guilford Press.

Patton, M. Q. (2016). State of the Art and Practice of Developmental Evaluation: Answers to Common and Recurring Questions. In M. Q. Patton, K. McKegg, & N. Wehipeihana, *Developmental evaluation exemplars: principles in practice* (pp. 1-24). New York, NY: The Guilford Press.

Paul, P. V. (1998). *Literacy and deafness: The development of reading, writing, and literate thought.* Boston, MA: Allyn and Bacon.

Paulin, D., & Haythornthwaite, C. (2016). Crowdsourcing the curriculum: Redefining elearning practices through peer-generated approaches. *The Information Society, 32*(2), 130-142.

Pell, G. (2005). Use and misuse of Likert scales. *Medical Education, 39*(9).

Peterson, N. R., Pisoni, D. B., & Miyamoto, R. T. (2010). Cochlear implants and spoken language processing abilities: Review and assessment of the literature. *Restorative Neurology and Neuroscience, 28*(2), 237-250.

Philp, J. (2014). *Peer interaction and second language learning: What are the possibilities?* Ho Chi Minh City: TESOL Conference .

Pica, T., Holliday, L., Lewis, N., & Morgenthaler, L. (1989). Comprehensible output as an outcome of linguistic demands on the learner. *Studies in Second Language Acquisition, 11*, 63-90.

Pilling, D., & Barrett, P. (2008). Text communication preferences f deaf people in the United Kingdom. *Journal of Deaf Studies and Deaf Education, 13*(1), 92-103.

Plaza-Pust, C. (2016). *Bilingualism and Deafness: On Language Contact in the Bilingual Acquisition of Sign Language and Written Language.* De Gruyter Mouton.

Plaza-Pust, C., & Morales-Lopez, E. (2008). Sign bilingualism: Language development, interaction, and maintenance in sign language contact situations. In C. Plaza-Pust, & E. Morales-Lopez, *Sign bilingualism: Language development, interaction, and maintenance in sign language contact situations* (pp. 333-379). Philadelphia/Amsterdam: John Benjamins Publishing Company.

Power, D., Hyde, M., & Leigh, G. (2008). Learning English from signed English: an impossible task? *American Annals of the Deaf, 153(1)*, 37-47.

Power, M. R., Power, D., & Horstmanshof, L. (2007). Deaf people communicating via SMS, TTY, relay service, fax, and computers in Australia. *Journal of Deaf Studies and Deaf Education, 12*(1), 80-92.

Protsiv, M., & Atkins, S. (2016). Lecturers' experiences of preparing and delivering blended courses on African, Asian and European university campuses: A qualitative study. *Global Health Action, 9*.

Rana, M. S. (2014). A Brief Study of Language Specified in Schedule VIII of the Indian Constitution. *Express*.

Randhawa, S. P. (2005). *A status study of special schools for the Deaf and identification of intervention areas (PhD thesis).* Indian Institute of Technology Roorkee.

Rogers, A. (1999). Improving the quality of adult literacy programmes in developing countries: the 'real literacies' approach. *International Journal of Educational Development, 19*, 219-234.

Rogers, P., Liddle, S., Chan, P., Doxey, A., & Isom, B. (2007). Web 2.0 Learning platform harnessing collective intelligence. *Turkish online journal of distance education, 8*(3).

RPDA. (2016). *The Rights of Persons with Disabilities Act.* Gazette of India.

Rydberg, E., Gellerstedt, L. C., & Danermark, B. (2009). Toward an equal level of educational attainment between deaf and hearing people in Sweden? *Journal of Deaf Studies and Deaf Education, 14*, 312-323.

Sadoski, M., & Paivio, A. (2004). A dual coding theoretical model of reading. In R. B. Buddell, & N. J. Unrau, *Theoretical models and processes of reading* (5th ed., pp. 1329-1362). Newark, DE: Interntional Reading Association.

Saenz, L. M., Fuchs, L. S., & Fuchs, D. (2005). Peer-Assisted Learning Strategies for English language learners with learning disabilities. *Exceptional Children, 71*(3), 231-247.

Sahasrabudhe, S. (2010). *Online elementary-level English literacy programme for young deaf adults using Indian Sign Language (MA Research Paper).* Preston: University of Central Lancashire.

Satchwell, C. (2006). Literacy around the Clock: An Examination of the 'Clock Activity' as a Method for Identifying Everyday Literacy Practices with Further Education Students. *Proceedings of 3rd International CRLL Conference*.

Scherer, M. J., & Binder, G. E. (1989). *The Department of Science and Engineering Support (DSES): A Phase 2 Report on Student Perceptions.* National Technical Institute for the Deaf.

Schick, B. (2003). The Development of American Sign Language and Manually-Coded English Systems. In M. Marschark, & P. Spencer, *Handbook of Deaf Studies, Language and Educaton* (pp. 219-231). New York: Oxford University Press.

Schley, S., & Albertini, J. (2005). Assessing the Writing of Deaf College Students: Reevaluating a Direct Assessment of Writing. *Journal of Deaf Studies and Deaf Education, 10*(1), 96-105.

ShohamS., & HeberM. (2012). Characteristics of a virtual community for individuals who are d/Deaf and hard of hearing. American Annals of the Deaf, 157(3), 251-263.

Siemens, G. (2005). *Connectivism: Learning as Network Creation.* e-Learning Space.org.

Singal, N. (2010). *Education of Children with Disabilities in India: Background Paper Prepared for the Education for All Global Monitoring Report, Reaching the Marginalized.*

Singleton, J. L., Martin, A. J., & Morgan, G. (2015). Ethics, deaf-friendly research, and good practice when studying sign languages. In E. Orfanidou, B. Woll, & G. Morgan, *Research methods in sign language studies. A practical guide* (pp. 7-20). London: Wiley Blackwell.

Small, A., & Cripps, J. (2004). Questions parents ask. In K. Snoddon, A. Small, & J. Cripps, *A parent guidebook: ASL and early literacy* (pp. 45-63). Mississauga, ON: Ontario Cultural Society of the Deaf.

Snowman, J., & Biehler, R. (2000). *Psychology applied to teaching.* Boston: Houghton Mifflin Company.

Spady, G. (2001). *Beyond counterfeit reforms: Forging an authentic future for all our learners.* Lanham, Maryland: The Scarecrow Press.

Stanovich, K. E. (1993). Does reading make you smarter? Literacy and the development of verbal intelligence. In H. Reese, *Advances in Child Development and Behavior* (Vol. 24, pp. 133-180). New York, NY: Academic Press.

Stein, P., & Slominsky, L. (2006). An eye on the text and an eye on the future: Multimodal literacy in three Johannesburg families. In K. Pahl, & J. Rowsell, *Travel notes from the new literacy studies: Instances of practice* (pp. 118-146). Clevedon: Multilingual Matters.

Stinson, M. (2010). Current and Future Technologies in the Education of Deaf Students. In M. Marschark, & P. E. Spencer, *The Oxford handbook of deaf studies, language, and education* (Vol. 2, pp. 93-107). Oxford: Oxford University Press.

Street, B. V. (1984). *Literacy in theory and practice.* New York: Cambridge University Press.

Street, B. V. (1993). *Cross-Cultural Approaches to Literacy.* Cambridge: Cambridge University Press.

Street, B. V. (1997). The implications of the 'New Literacy Studies' for literacy education. *English in Education, 31*(3), 45-59.

Street, B. V. (2003). What's "new" in New Literacy Studies?: Critical approaches to literacy in theory and practice. *Current Issues in Comparative Studies in Education, 5*(2), 77-91.

Street, B. V. (2016). *Literacy and Development: Ethnographic Perspectives. .* Presented at a Symposium at Ramphal Institute.

Sullivan, G. M., & Artino, A. R. (2013). Analyzing and interpreting data from Likert-type scales. *Journal of Graduate Medical Education, 5*, 541-542.

Surowiecki, J. (2005). *The wisdom of crowds.* New York, NY: Random House.

Sutherland, H., & Rogers, K. D. (2014). The hidden gain: A new lens of research with d/Deaf children and adults. In H. D. Bauman, & J. Murray, *Deaf Gain: Raising the stakes for human diversity* (pp. 269-282). Minneapolis: University of Minnesota Press.

Svartholm, K. (2010). Bilingual education for deaf children in Sweden. *International Journal of Bilingual Education and Bilingualism, 13*(2), 154-174.

Swain, M. (1984). A review of immersion education in Canada: Research and evaluation studies. *ELT Documents*, 35-51.

Swain, M. (1995). Three functions of output in second language learning. In G. Cook, & B. Seidlhofer, *Principle and practice in applied linguistics: Studies in honour of H. G. Widdowson* (pp. 125-144). Oxford: Oxford University Press.

Swanwick, R. (2016). Scaffolding learning through classroom talk: The role of translanguaging. In M. Marschark, & P. E. Spencer, *The Oxford handbook of deaf studies in language.* Oxford, UK: Oxford University Press.

Swanwick, R., & Marschark, M. (2010). Enhancing Eduation for Deaf Children: Research into Practice and Back Again. *Deafness and Education International, 12*(4), 217-235.

Swanwick, R., Hendar, O., Dammeyer, J., Kristoffersen, A., Salter, J., & Simonsen, E. (2014). Shifting contexts and practices in sign bilingual education in Northern Europe. Implications for professional development and training. In M. Marschark, G. Tang, & H. Knoors, *Bilingualism and bilingual deaf education* (pp. 292-310). New York: Oxford Unversity Press.

Tan, A., & Chang, V. (2008). An ecosystem approach to knowledge management: Case studies of two Australian SMEs. In *19th Australasian Conference on Information Systes: An ecosystem approach to KM: Case studies of SMEs.* Christchurch.

Tansley, A. G. (1935). The use and abuse of vegetational concepts and terms. *Ecology, 16*, 284-307.

The New London Group. (1996). A pedagogy of multiliteracies: Designing social futures. *Harvard educational review, 66*(1), 60-93.

Thomas. (2009). Handbook of research on Web 2.0 and second language learning. In P. Hershey, *IGI Global Reference.*

Thomas, D., & Brown, J. (2011). A new culture of learning: cultivating the imagination for a world of constant change. Lexington: CreateSpace.

Thomas, M., Reinders, H., & Warschauer, M. (2013). The role of digital media and incremental change. In M. Thomas, H. Reinders, & M. Warschauer, *Contemporary Commputer-Assisted Language Learning.* Bloomsbury.

Toffler, A. (1980). *The Third Wave.* New York: Bantam Books.

Traina, I. (n.d.). *Participatory & emancipatory approch in disability research. Possible allies for supporting active citizenship, civil rights and actions of social innovation.*

Traxler, C. B. (2000). The Stanford Achievement Test, 9th edition: National norming and performance standards for deaf and hard of hearing students. *Journal of Deaf Studies and Deaf Education, 5*, 337-348.

Treger, B., & Wong, B. K. (1984). The relationship between native and second language reading comprehension and second language oral ability. In C. Rivera, *Placement procedures in bilingual education: Education and policy issues.* Oevedon: Multilingual Matters.

U.S. Department of Education. (2003). *Identifying and implementing eucatonal practices supported by rigorous evidence: A user friendly guide.*

Valentine, G., Skelton, T., & Levy, P. (2006). *The role of the Internet in D/deaf people's inclusion in the information society. Report on questionnaire survey for AHRC grant of the same title .* Leeds: University of Leeds.

Valentine, J. C., & Cooper, H. (2004). *What Works Clearinghouse Study Design and Implementation Assessment Device* (1.1 ed.). Washington, DC: U.S. Department of Education.

Vanve, A., Gaikwad, R., & Shelar, K. (2016). A new trend e-learning in education system. *International Research Journal of Engineering and Technology, 4*(3), 299-302.

Vasishta, M. (2002). *Education of the Deaf in India: A Panoramic View.* Paper Presented at Deaf Way II (An International Conference and Festival of the Deaf), Gallaudet University.

Vasishta, M. M., Woodward, J., & Wilson, K. (1978). Sign Language in India: Regional Variation Within the Deaf Population. *Indian Journal of Applied Linguistics, Vol IV*(2), 1-13.

Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes.* Harvard Univeersity Press.

Wallace, C. (2002). Local literacies and global literacy. In D. Block, & D. Cameron, *Globalization and Language Teaching* (pp. 101-114). New York: Routledge.

Waller, D., & Jones, C. (2015). *Peer to Peer Deaf Literacy Project Document: Adapted CEFR A1-A2 Descriptors .*

Wang, X., Love, P., Klinc, R., Kim, M., & Davis, P. (2012). Integration of E-learning 2.0 with Web 2.0. *Journal of Information Technology in Construction (ITcon), 17*, 387-396.

Watson, L. (1998). Oralism - current policy and practice. In S. Gregory, P. Knight, W. McCracken, S. Powers, & L. Watson, *Issues in Deaf Education* (pp. 69-76). London: David Fulton Publishers.

WFD. (2018, 1 28). *Sign Language*. Retrieved from World Federation of the Deaf: https://wfdeaf.org/human-rights/crpd/sign-language/

Willis, A. J. (1997). The Ecosystem: An Evolving Concept Viewed Historically. *Functional Ecology, 11*(2), 268-271.

Wilson-Grau, R. (2015). *Outcome Harvesting.* Better Evaluation.

World Bank. (2007). *People with Disabilities in India: From Commitments to Outcomes.* New Delhi: Human Development Unit, South Asia Region.

World Health Organization. (2011). *World Report on Disability.* Retrieved from http://www.who.int/disabilities/world_report/2011/report.pdf

World Health Organization. (2017). *Deafness and hearing loss: Fact sheet*. Retrieved from World Health Organization: http://www.who.int/mediacentre/factsheets/fs300/en/

Young, A., & Ackerman, J. (2001). Reflections on validity and epistemology in a study of deaf/hearing professional working relations. *Qualitative Health Research, 11*(2), 179-189.

Yu, A. Y., Tian, S. W., Vogel, D., & Kwok, R. C. (2010). Embedded Social Learning in Online Social Networking. *ICIS 2010 Proceedings, 100*.

Zarb, G. (1992). On the road to Damascus: First steps towards changing the relations of disability research production. *Disability, handicap and society, 7*(2), 125-138.

Zeshan, U. (2000). *Sign Language in Indopakistan: A Description of a Signed Language.* Philadelphia, Pa., Amesterdam: John Benjamins.

Zeshan, U. (2007). *Indian Sign Language - A Status Report.*

Zeshan, U. (2009). *Official Recognition for Indian Sign Language Proposal.* Unpublished manuscript.

Zeshan, U., & Panda, S. (2017). Sign-speaking: The structure of simultaneous bimodal utterances. *Applied Linguistics Review*. doi:https://doi.org/10.1515/applirev-2016-1031

Zeshan, U., Vasishta, M. M., & Sethna, M. (2005). Implementation of Indian Sign Language in Educational Settings. *Asia Pacific Disability Rehabilitation Journal, 16(1)*, 16-40.

Appendix 1 Prompts of First-round Focus Group Discussion for Research Assistants and Peer Tutors

Categories	Characteristics	Guidelines	Suggested Questions for Focus Group
Design Concept	Sign Bilingual	1. To use both Indian sign language and English as the instruction language.	1. Is it appropriate to use both ISL and English as the instruction language? 2. In what situations is it necessary to use ISL?
	Functional	1. To choose authentic real-life materials as the main teaching content. 2. To associate the teaching content with learners' actual social need.	1. Is it appropriate to adopt functional approach? 2. What functional areas do you think learners are interested in?
	Multimodal	1. To use different formats of materials, like text, pictures, videos and audios.	1. Do you agree to use multimodal materials on the platform? 2. Are there any suggestions or cautions to use multimodal materials?
	Peer Support	1. To provide peer support during learning. 2. To conduct peer tutoring for language difficulties.	1. What else of peer support is necessary?
	Learner-Centred	1. To generate learning topics and materials by learners themselves. 2. To encourage learners' self-assessment.	1. Is it appropriate for learners to generate their own topics and materials? 2. How to ensure they generate quality materials? 3. What do you think of self-assessment? 4. Any other suggestions for learner-centred

			teaching and learning?
	Explicit teaching	1. To introduce grammar in an explicit way. 2. To introduce vocabulary in an explicit way.	1. Is it appropriate to conduct explicit teaching of grammar and vocabulary? 2. Any other suggestions for teaching grammar and vocabulary?
	Interactive	1. To encourage peer interaction through sharing space and sharing learning materials. 2. To encourage interaction between peer and teachers, developers. 3. To encourage using interactive activities on the platform.	1. Do you agree to strengthen interaction through the platform? 2. What kinds of interaction can be added?
Components	General Introduction	1. Introduction to the platform 2. Announcements	1. Do you think the components are appropriate? Anything you want to add or remove? 2. Do you think each component has good content?
	Sharing Space	Self-Introduction to all the participants	
	Real life English	To be created	
	Grammar	To be distilled and convey in ISL	
	Glossary	To be added, with ISL video, English explanation	
Structure Flow	See the attachment		1. Do you think the structure flow is appropriate? 2. Any other suggestions to make it better?

Appendix 2 Prompts of Second-round Focus Group Discussion for Research Assistants and Peer Tutors

1. Advantages/Key features of SLEND (Things you are happy with SLEND)
2. Disadvantages of SLEND (Things you are not happy with SLEND)
3. Indian Sign Language and English learning (Can ISL help with English learning? In what ways? How can we reflect it on the SLEND?)
4. Real Life English and Adult learners. (Can RLE meet adult learners' English learning needs? How can RLE learning materials be collected?)
5. Once real-life Materials are collected, how to work this materials for learning? What is the best way?
6. Peer to Peer (How can peer tutor and peer students help with learning English?)
7. CEFR benchmarking and English learning (What is CEFR? Is it useful?)
8. Multimedia (How can multimedia be used in English learning on the SLEND?)
9. What else technology can be used to help learning English on SLEND (For example, captioning. Anything else)?
10. How to reflect Deaf culture during learning English literacy?
11. Any other comments, suggestions? (For example, how to improve SLEND)

Appendix 3 Likert-scale Learner Experience Questionnaire

Video 1: General Introduction to the activity

Try not to use "😐 = *Not Sure"* unless you really have to, or if it cannot apply to you. Tick "√" the option that best express your ideas.

Statements	☹️ Disagree	🙁 Disagree somewhat	😐 Not Sure	🙂 Agree Somewhat	😃 Agree
1. I find the English topics on the SLEND interesting and they are useful for my learning of English. Video 2 (Statement 1)					
2. Learning new words and grammar can help me understand Real life English better. Video 3 (Statement 2)					
3. I enjoy walking out of classroom to collect Real Life English learning materials (pictures, videos etc.) at any places (Railway station, Mall, Zoo, etc.) (Statement 3)					
4. I enjoy learning materials posted by other groups on the SLEND. (Statement 4)					
5. Indian Sign Language Videos on the SLEND helps me learn English well. (Statement 5)					
6. Multimedia materials (pictures, non-signing videos, animations) on the SLEND support and enhance my learning. (Statement 6)					
7. I use Indian Sign Language face-to-face with classmates and this improves my English literacy learning. (Statement 7)					
8. Peer Tutor supports and guides my learning of English. (Statement 8)					
9. I enjoy sharing my own experience and knowledge on the SLEND to help classmates with English learning. (Statement 9)					
10. After class, I communicate with peers by email or WhatsApp or text messages in English. This helps to improve my English literacy. (Statement 10)					

11. I feel this Peer to Peer course is easy for me. (Statement 11)					
12. SLEND access					
12a. Accessing the SLEND on the internet works well. (Statement 12)					
12b. Accessing the SLEND on a mobile phone works well. (Statement 13)					
13. I can tell others (boss, friends, university, and school) about my English level. (Statement 14)					
14. I feel more confident to use English now. (Statement 15)					
15. I can understand written English in real life better now. (Statement 16)					
16. I use more English than before. (Statement 17)					
17. Generally, I am satisfied with Peer to Peer course. (Statement 18)					
18. I will keep using the SLEND in the future. (Statement 19)					
19. For key components of the SLEND, Video 20	 Disagree	 Disagree somewhat	 Not sure	 Agree somewhat	 Agree
19.1 I like “Our sharing space”. (Statement 20)					
19.2 I like “real life English materials” (collected from real life as pictures with video and text explanation). (Statement 21)					
19.3 I like “Real-life Vocabulary/Glossary”. (Statement 22)					
19.4 I like “Quiz/Exercise”. (Statement 23)					
19.5 I like “In-Class Video”. (Statement 24)					

Appendix 4 Interview Questions for the Learners

1. Do you feel real life English topics useful from Peer to Peer deaf literacy course? Why?

2. Have you been involved in collecting and developing learning materials for SLEND? How? What have you developed?

3. Do you learn materials or topics developed by other groups on the SLEND? Is it useful? Why or why not?

4. Can you describe how you learn each session on the SLEND?

5. What multimedia materials do you like on the SLEND? Any other multimedia materials you suggest for the SLEND?

6. What do you think of the role of sign language in learning English?

7. In what ways you think peer tutors are helpful or not helpful?

8. Do you talk a lot in WhatsApp group chat? How can we improve the group chat?

9. Is it working well for you to use mobile phone to access SLEND? If not, why?

10. How can you show your English proficiency to your boss, friends, university or school? What is the strong evidence?

11. Any suggestions to improve the Peer to Peer Deaf Literacy Course (including SLEND development)?

Appendix 5 Pre-test Paper on the SLEND

P2P Deaf Literacy

Search courses: Go

Question 1
Not yet answered
Marked out of 1.00

What does it say?

2 HOUR PARKING

Select one:
- A. You can't park here all day
- B. Don't park here
- C. Ask someone to park here

Question 2
Not yet answered
Marked out of 1.00

What does it say?

LIFT OUT OF ORDER

Select one:
- A. The lift isn't working.
- B. Ask someone if you need help with the lift.
- C. The lift is only for employees.

Question 3
Not yet answered
Marked out of 1.00

What does it say?

DANGER: CONSTRUCTION WORK IN PROGRESS

Select one:
- A. You must wear special clothing in this area.
- B. You can't walk here.
- C. Be careful in this area.

Question 4
Not yet answered
Marked out of 1.00

What does it say?

PLASTIC BOTTLES ONLY

Select one:
- A. Put glass bottles here.
- B. Put all bottles here.
- C. Put bottles made of plastic here.

Question 5
Not yet answered
Marked out of 1.00

What does it say?

NO FOOTWEAR BEYOND THIS POINT

Select one:
- A. You can wear shoes anywhere.
- B. You need to take off your shoes here.
- C. You can't buy any shoes here.

Appendix 6 Post-test Paper on the SLEND

P2P Deaf Literacy

Information

Look at the text in each question.
What does it say?
Click the letter next to the correct explanation - A, B or C.

Question 1
Not yet answered
Marked out of 1.00

Passenger waiting room

Select one:

- a. You must ask someone to come in here.
- b. You must wait to come in here.
- c. You can sit in here.

Question 2
Not yet answered
Marked out of 1.00

Conference Notice

Lunch time 11:30 - 11:50

Select one:

- a. Closed for lunch from 11:50
- b. Open from 11:30 to 11:50
- c. Closed at 11:30 for 20 minutes.

Question 3
Not yet answered
Marked out of 1.00

This is your lunch area. Keep it clean.

Select one:

- a. You can buy food here.
- b. Be tidy here.
- c. Do not eat here.

Question 4
Not yet answered
Marked out of 1.00

INSIDE THE PALACE, CAMERA (INCLUDING MOBILE CAMERA) IS STRICTLY PROHIBITED.

Select one:

- a. Turn off your mobile phone.
- b. You cannot talk on your phone here.
- c. You cannot take pictures in here.

Question 5
Not yet answered
Marked out of 1.00

Using cell phone not allowed in ATM.

Select one:

- a. The phone does not work.
- b. There is no phone here.
- c. Do not use your phone here.

Return to: Tests (Pre, Post, an...

P2P Deaf Literacy

Information

Select the most appropriate phrase from the choices below and place in the gap.

Question 6
Not yet answered
Marked out of 1.00

- Where are you?
- [ ]

Question 7
Not yet answered
Marked out of 1.00

- [ ]
- Thank you. Tea, please.

Question 8
Not yet answered
Marked out of 1.00

- I'm late!
- [ ]

No I am not. | At the station. | Four o'clock

Question 9
Not yet answered
Marked out of 1.00

- [ ]
- I'm going to walk.

Do you like tea? | Do you drink tea? | Would you like a drink?

Question 10
Not yet answered
Marked out of 1.00

- [ ]
- It's near the school.

I'm sorry. | No I'm not. | Don't worry. See you later.

Question 11
Not yet answered
Marked out of 1.00

- _____
- I'm eighteen.

How will you get there? | Do you like walking? | Where are you?

Question 12
Not yet answered
Marked out of 1.00

- Where are we meeting?
- In the hotel.
- How are you coming here?
- _____

Where is your house? | Where are you? | Where is the school?

Question 13
Not yet answered
Marked out of 1.00

- What's your address?
- Yes.
- _____

How old are you? | How old is your brother? | How old is your sister?

Question 14
Not yet answered
Marked out of 1.00

- I'm 21 today!
- _____

Tomorrow morning. | By taxi. | What time is dinner?

Question 15
Not yet answered
Marked out of 1.00

- Are you coming tomorrow?
- _____
- Why?
- I am going to Mumbai.

Sorry, I don't understand. | There aren't any. | I don't know.

Return to: Tests (Pre, Post, an...

Happy Birthday!	Well done!	How old are you?

There is a class today.	Yes, it is.	Well, I'm not sure I can.

P2P Deaf Literacy

Information

Search courses: Go

Select the most appropriate phrase from the choices below and place in the gap.

Question 16

Not yet answered

Marked out of 5.00

APPLICATION FOR REPLACEMENT OF SIM

Read the information (A- F) below and put a letter in each section (16 – 20). The first one has been completed for you.

Example: Full Name: Riya Chatterjee

16. SIM No.:

17. City:

18. Complete address:

19. Date of Birth:

20. Proof of identity:

Flat No. 602, Triveni Apartments, Pitam Pura, NEW DELHI 110028, INDIA	New Delhi
44933 99902 87752 20202	Passport
05/05/1983	Riya Chatterjee

Return to: Tests (Pre, Post, an...

P2P Deaf Literacy

Information

Read the text and then decide whether the statements (21 – 25) are

correct (right), incorrect (wrong) or whether no information is given (NI).

Question 17

Not yet answered

Marked out of 3.00

IMPORTANT INFORMATION FOR ALL

If you find a lost passport, driving license, PAN card or voter ID or any government related identity document(s), then please post it at your nearest post box. The Postal department will make sure that it is returned to the rightful owner. The postal fee will be paid for by the document owner or by the postal department.

THIS IS AN AMENDED RULE FROM THE INDIAN GOVERNMENT...
PLEASE FOLLOW IT !!

A request to everyone; please kindly share this pic.

This information is for everyone. Choose...

Give a lost passport to the police. Choose...

If you find a driving license, put it in a post box. Choose...

Question 18

Not yet answered

Marked out of 2.00

Swami Vivekanand Library
Library Services

Books for borrowing and reference

The book collection consist of a variety of subjects such as management, self development, computers, engineering and technology; English language and literature; fiction and recreational books; children's books and even student's reference books.

Periodicals and Newspapers

It includes a wide range of subject areas from current affairs to management and from travel to health issues.

Movie DVD Collection

For your entertainment, the collection offers feature films for adults and children.

Cyber Zone

A customized section that offers online and offline material to improve English Language skills for both adults and children.

Children's Library

This section offers a variety of resources including books, DVDs, multimedia, CD-Roms, educational learning aids and more. Special activities and competitions are also organized for children throughout the year.

There are no DVDs for children. Choose...

The library is closed on Mondays. Choose...

Return to: Tests (Pre, Post, an...

P2P Deaf Literacy

Information

Put the sentences below into the correct order

Question 19

Not yet answered

Marked out of 5.00

Example:

are/how/you? = How are you?

26. address/your/what's? =

27. like/you/to/would/tomorrow/meet? =

28. next/you/see/week =

29. borrow/can/please/I/a/pen? =

30. Krishnan's/phone/this/is? =

Return to: Tests (Pre, Post, an...

P2P Deaf Literacy

Information

Fill in the blanks with the right sentence.

Question 1
Not yet answered
Marked out of 1.00

- _____ ?
- I live in flat number 100.

Question 2
Not yet answered
Marked out of 1.00

- _____ ?
- It takes 1 hour on the train.

Question 3
Not yet answered
Marked out of 1.00

- See you on Thursday.
- _____ ?
- Yes, Anu is coming too.

Question 4
Not yet answered
Marked out of 1.00

- _____ ?
- It's seven o'clock.

Question 5
Not yet answered
Marked out of 1.00

- I forget to bring the book.
- _____ . You can give it to me tomorrow.

Question 6
Not yet answered
Marked out of 1.00

- I'm coming to Mumbai tomorrow.
- _____ ?
- At the Orchid Hotel.

Question 7
Not yet answered
Marked out of 1.00

- Do you want to meet tomorrow?
- _____ . What about Friday?
- Okay.

Question 8
Not yet answered
Marked out of 1.00

- _____ ?
- The train ticket is quite cheap.

Question 9
Not yet answered
Marked out of 1.00

- Cadddlliiiiiii?
- _____ ?
- Sorry! Problem with my phone!

Question 10
Not yet answered
Marked out of 1.00

- See you at six o'clock.
- _____ ?
- Go out of the station and turn left. The café is next door.

Return to: Tests (Pre, Post, an...

P2P Deaf Literacy

Information

Complete the form with information about you.

Question 11

Not yet answered

Marked out of 5.00

APPLICATION FOR REPLACEMENT OF A SIM

Name (Full):

Sex:

- ○ Male
- ○ Female
- ○ Other

Date of Birth (DD, MM, YYYY):

Permanent address:

Mobile phone number:

Return to: Tests (Pre, Post, an...

P2P Deaf Literacy

Information

You are on a school website and get messages from other people. Answer the messages.

Question 12

Not yet answered

Marked out of 4.00

Hi! Welcome to the group. Tell us about what work or study you do. (20 words)

Question 13

Not yet answered

Marked out of 4.00

Hello and welcome. Where are you from? What's it like there? (30 words)

Question 14
Not yet answered
Marked out of 6.00

How long have you learnt English? Do you enjoy it? Why? (50 words)

Question 15
Not yet answered
Marked out of 6.00

Hi. Can you tell us about you? What are your hobbies? What do you like to do in your free time? (50 words)

Return to: Tests (Pre, Post, an...

Appendix 7 Delayed-test Paper on the SLEND

P2P Deaf Literacy

Information

Look at the text in each question.
What does it say?
Click the letter next to the correct explanation - A, B or C.

Question 1
Not yet answered
Marked out of 1.00

Passenger waiting room

Select one:

- a. You must wait to come in here.
- b. You must ask someone to come in here.
- c. You can sit in here.

Question 2
Not yet answered
Marked out of 1.00

Conference Notice

Lunch time 11:30 - 11:50

Select one:

- a. Closed for lunch from 11:50
- b. Open from 11:30 to 11:50
- c. Closed at 11:30 for 20 minutes.

Question 3
Not yet answered
Marked out of 1.00

This is your lunch area. Keep it clean.

Select one:

- a. You can buy food here.
- b. Do not eat here.
- c. Be tidy here.

Question 4
Not yet answered
Marked out of 1.00

INSIDE THE PALACE, CAMERA (INCLUDING MOBILE CAMERA) IS STRICTLY PROHIBITED.

Select one:

- a. You cannot talk on your phone here.
- b. You cannot take pictures in here.
- c. Turn off your mobile phone.

Question 5
Not yet answered
Marked out of 1.00

Using cell phone not allowed in ATM.

Select one:

- a. There is no phone here.
- b. Do not use your phone here.
- c. The phone does not work.

Return to: Tests (Pre, Post, an...

P2P Deaf Literacy

Information

Select the most appropriate phrase from the choices below and place in the gap.

Question 6
Not yet answered
Marked out of 1.00

- _____
- I'm eighteen.

Question 7
Not yet answered
Marked out of 1.00

- _____
- Thank you. Tea, please.

Question 8
Not yet answered
Marked out of 1.00

- I'm late!
- _____

How old is your brother? | How old is your sister? | How old are you?

Question 9
Not yet answered
Marked out of 1.00

- Where are you?
- _____

Do you like tea? | Would you like a drink? | Do you drink tea?

Question 10
Not yet answered
Marked out of 1.00

- _____
- I'm going to walk.

Don't worry. See you later. | I'm sorry. | No I'm not.

Question 11
Not yet answered
Marked out of 1.00

- [ ]
- It's near the school.

At the station. | No I am not. | Four o'clock

Question 12
Not yet answered
Marked out of 1.00

- I'm 21 today!
- [ ]

Where are you? | How will you get there? | Do you like walking?

Question 13
Not yet answered
Marked out of 1.00

- Are you coming tomorrow?
- [ ]
- Why?
- I am going to Mumbai.

Where are you? | Where is your house? | Where is the school?

Question 14
Not yet answered
Marked out of 1.00

- Where are we meeting?
- In the hotel.
- How are you coming here?
- [ ]

Happy Birthday! | Well done! | How old are you?

Question 15
Not yet answered
Marked out of 1.00

- What's your address?
- Yes.
- [ ]

Well, I'm not sure I can. | Yes, it is. | There is a class today.

Return to: Tests (Pre, Post, an...

What time is dinner?	By taxi.	Tomorrow morning.

There aren't any.	I don't know.	Sorry, I don't understand.

P2P Deaf Literacy

Information

Search courses: Go

Select the most appropriate phrase from the choices below and place in the gap.

Question 16

Not yet answered

Marked out of 5.00

APPLICATION FOR REPLACEMENT OF SIM

Read the information (A- F) below and put a letter in each section (16 – 20). The first one has been completed for you.

Example: Full Name: Riya Chatterjee

16. SIM No.:

17. City:

18. Complete address:

19. Date of Birth:

20. Proof of identity:

44933 99902 87752 20202	New Delhi
Flat No. 602, Triveni Apartments, Pitam Pura, NEW DELHI 110028, INDIA	Riya Chatterjee
05/05/1983	Passport

P2P Deaf Literacy

Information

Read the text and then decide whether the statements (21 – 25) are

correct (right), incorrect (wrong) or whether no information is given (NI).

Question 17

Not yet answered

Marked out of 3.00

IMPORTANT INFORMATION FOR ALL

If you find a lost passport, driving license, PAN card or voter ID or any government related identity document(s), then please post it at your nearest post box. The Postal department will make sure that it is returned to the rightful owner. The postal fee will be paid for by the document owner or by the postal department.

THIS IS AN AMENDED RULE FROM THE INDIAN GOVERNMENT...
PLEASE FOLLOW IT !!

A request to everyone; please kindly share this pic.

Give a lost passport to the police. Choose...

This information is for everyone. Choose...

If you find a driving license, put it in a post box. Choose...

Question 18

Not yet answered

Marked out of 2.00

Swami Vivekanand Library
Library Services

Books for borrowing and reference

The book collection consist of a variety of subjects such as management, self development, computers, engineering and technology; English language and literature; fiction and recreational books; children's books and even student's reference books.

Periodicals and Newspapers

It includes a wide range of subject areas from current affairs to management and from travel to health issues.

Movie DVD Collection

For your entertainment, the collection offers feature films for adults and children.

Cyber Zone

A customized section that offers online and offline material to improve English Language skills for both adults and children.

Children's Library

This section offers a variety of resources including books, DVDs, multimedia, CD-Roms, educational learning aids and more. Special activities and competitions are also organized for children throughout the year.

The library is closed on Mondays. Choose...

There are no DVDs for children. Choose...

Return to: Tests (Pre, Post, an...

P2P Deaf Literacy

Information

Put the sentences below into the correct order

Question 19
Not yet answered
Marked out of 1.00

address/your/what's? =

Question 20
Not yet answered
Marked out of 1.00

like/you/to/would/tomorrow/meet?

Question 21
Not yet answered
Marked out of 1.00

next/you/see/week =

Question 22
Not yet answered
Marked out of 1.00

borrow/can/please/I/a/pen? =

Question 23
Not yet answered
Marked out of 1.00

Krishnan's/phone/this/is? =

Return to: Tests (Pre, Post, an...

P2P Deaf Literacy

Information

Fill in the blanks with the right sentence.

Question 1
Not yet answered
Marked out of 1.00

- _____ ?
- It's seven o'clock.

Question 2
Not yet answered
Marked out of 1.00

- _____ ?
- It takes 1 hour on the train.

Question 3
Not yet answered
Marked out of 1.00

- _____ ?
- I live in flat number 100.

Question 4
Not yet answered
Marked out of 1.00

- See you on Thursday.
- _____ ?
- Yes, Anu is coming too.

Question 5
Not yet answered
Marked out of 1.00

- I forget to bring the book.
- _____ . You can give it to me tomorrow.

Question 6
Not yet answered
Marked out of 1.00

- Cadddlliiiiiii?
- _____ ?
- Sorry! Problem with my phone!

Question 7
Not yet answered
Marked out of 1.00

- I'm coming to Mumbai tomorrow.
- _____ ?
- At the Orchid Hotel.

Question 8
Not yet answered
Marked out of 1.00

- Do you want to meet tomorrow?
- _____ . What about Friday?
- Okay.

Question 9
Not yet answered
Marked out of 1.00

- _____ ?
- The train ticket is quite cheap.

Question 10
Not yet answered
Marked out of 1.00

- See you at six o'clock.
- _____ ?
- Go out of the station and turn left. The café is next door.

Return to: Tests (Pre, Post, an...

P2P Deaf Literacy

Information

Complete the form with information about you.

Question 11

Not yet answered

Marked out of 5.00

APPLICATION FOR REPLACEMENT OF A SIM

Name (Full):

Sex:

- ○ Male
- ○ Female
- ○ Other

Date of Birth (DD, MM, YYYY):

Permanent address:

Mobile phone number:

Return to: Tests (Pre, Post, an...

P2P Deaf Literacy

Information

You are on a school website and get messages from other people. Answer the messages.

Question 12

Not yet answered

Marked out of 3.00

Hi! Welcome to the group. Tell us about what work or study you do. (20 words)

Question 13

Not yet answered

Marked out of 5.00

Hello and welcome. Where are you from? What's it like there? (30 words)

Question 14
Not yet answered
Marked out of 6.00

How long have you learnt English? Do you enjoy it? Why? (50 words)

Question 15
Not yet answered
Marked out of 6.00

Hi. Can you tell us about you? What are your hobbies? What do you like to do in your free time? (50 words)

Return to: Tests (Pre, Post, an...

Appendix 8 Pre-test Answers and Marking Criteria

Reading Part

1. B 2. A 3.A 4.B 5.A 6. C 7. A 8. A 9. A 10. B
11. B 12. A 13. A 14. C 15. C

16. Riya 17. Female 18. 05/05/1983 19. Bombay
20.Flat No. 100, Triveni Apartments, Pitam Pura, NEW DELHI 110034, INDIA

21. Incorrect 22. Incorrect 23. NI

24. NI 25. Incorrect

26. See you on Wednesday. 27. Would you like to meet tomorrow?

28. Can I have some water please? 29. Don't forget your book.

30. Do you know Sibaji? (1-25 system automatic marking; 26-30 manual marking)

Writing Part (all require manual marking)

1. What is your name? 2. What time is the train?

3. Where is the office? / What's the address of the office?

4. What time is it? 5. No problem. / It's OK. / Alright.

6. Do you want to come for some food? (Very flexible answer for this question)

7. Sorry, I can't. 8. How much is the computer?

9. May I have his email address? 10. Please bring the book.

Q11 (original no. 41-49) no fixed answers

Marking criteria for Q12-15 (original no. 50-53) (Q12 3marks, Q13 5marks, Q14 6marks, Q15 6 marks)

Components	Description	Weighting
Task Achievement	Presenting relevant information Appropriate length Appropriate content	1 for Q12-15 2 for Q12-15
Lexical Resource	Use a range of words & phrases Using collocations Spelling Avoid errors	1 for Q12 1.5 for Q13 2 for Q14-15
Grammar Range & Accuracy	Using a range of sentence structures Correct grammar Punctuation Avoiding errors	1 for Q12 1.5 for Q13 2 for Q14-15

Appendix 9 Post-test Answers and Marking Criteria

Reading Part

2. A 2. B 3.B 4.B 5.B 6.At the station. 7. Would you like a drink?
8. Don't worry. See you later. 9. How will you get there?

10. Where is your house? 11. How old are you?

12. By taxi. 13. Sorry. I don't understand.

14. Happy birthday. 15. Well, I'm not sure.

16. 44933 99902 87752 20202 17. Bombay

18. Flat No. 100, Triveni Apartments, Pitam Pura, NEW DELHI 110034, INDIA

19.05/05/1983 20. Passport

21. Wrong 22. Right 23. No information is given.

24. Right 25. No information is given.

26. What's your address? 27. Would you like to meet tomorrow?

28. See you next week. 29. Can I borrow a pen please?

30. Is this Krishnan's phone? (1-25 system automatic marking; 26-30 manual marking)

Writing Part (all require manual marking)

1. Which flat do you live in? 2. How long does it take to get there?

3. OK. Is Anu coming?

4. What time is it? 5. No problem. / It's OK. / Alright.

6. Where will you stay in Mumbai? /Which hotel will you stay?

7. Sorry, I can't. 8. Is the train ticket expensive?

9. What's wrong?/What do you mean? 10. Where is the café?

11-15. no fixed answers

Marking Criteria for Q12(4 marks), Q13 (4 marks), Q14-15 (6 marks each)

Components	**Description**	**Weighting**
Task Achievement	Presenting relevant information Appropriate length Appropriate content	2 for Q12-15
Lexical Resource	Use a range of words & phrases Using collocations Spelling	1 for Q12-13 2 for Q14-15

	Avoid errors	
Grammar Range & Accuracy	Using a range of sentence structures Correct grammar Punctuation Avoiding errors	1 for Q12-13 2 for Q14-15

Appendix 10 Delayed-test Answers and Marking Criteria

Reading Part

1. C 2. B 3.C 4.B 5.B
6. How old are you? 7. Would you like a drink? 8. Don't worry. See you later. 9. At the station. 10. How will you get there? 11. Where is your house? 12. Happy Birthday! 13. Well, I am not sure I can. 14. By taxi.
15. Sorry, I don't understand.
16. No fixed answers 17. Wrong, Right, Right 18. NI, Wrong 19. What's your address? 20. Would you like to meet tomorrow? 21. See you next week. 22. Can I borrow a pen please? 23. Is this Krishnan's phone?

(1-18 system automatic marking; 19-23 manual marking; 16. Five marks, 17. Three marks, 18. Two marks.)

Writing Part (all require manual marking)

1. What time is it? 2. How long does it take on the train? 3. Which flat do you live? 4. Is Anu coming? 5. Don't worry. 6. Sorry. 7. Where will you stay? 8. Sorry. 9. Is the train ticket expensive? 10. Where is the café? 11-15 no fixed answers

Marking criteria for Q12-15 (Q12 3marks, Q13 5marks, Q14 6marks, Q15 6 marks)

Components	Description	Weighting
Task Achievement	Presenting relevant information Appropriate length Appropriate content	1 for Q12-15 2 for Q12-15
Lexical Resource	Use a range of words & phrases Using collocations Spelling Avoid errors	1 for Q12 1.5 for Q13 2 for Q14-15
Grammar Range & Accuracy	Using a range of sentence structures Correct grammar Punctuation Avoiding errors	1 for Q12 1.5 for Q13 2 for Q14-15

Appendix 11 Likert-scale Self-assessment Questionnaire of English literacy

P2P Deaf Literacy

Advanced settings | Questions | Preview | Your response | View All Responses | Non-respondents

Previewing Questionnaire

Print Blank

English Literacy Skills Questionnaire (Along with Pre-test)

1 I can understand short, simple text messages.

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

2 * I can interact in a simple way if the other person helps me with what I'm trying to communicate.

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

3 * I can understand familiar names, words and basic phrases. For example, simple notices in most common everyday situations like "no smoking", "toilets", "staff only".

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

4 * I can ask and answer simple questions for immediate need or on very familiar topics. For example, "Can I have…?" "Do you…?" etc.

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

5 * I can ask people for things and give people things.

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

6 * I can handle numbers, quantities, cost and time.

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

7 * I can read simpler informational materials and short simple descriptions, especially with visual support (picture, video, etc.).

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

8 * I can follow short, simple written directions.

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

9 * I can describe places I live in and people I know in short simple phrases and sentences.

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

10 * I can link words or groups of words with 'and', 'then' or 'because' properly.

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

11 * I can write simple phrases and sentences about myself and other people, such as hobbies, jobs, education, abilities, etc.

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

12 * I can write down my personal details, like name, address, nationality, etc.

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

13 * I can use dictionary, online search or make enquiry to friends to work out the meaning of the important unfamiliar words.

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

14 * I can ask questions to check understanding in communication.

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

15 * I can tell the conversational partner I can't understand him or her.

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

16 * I can talk about my own level of English.

- ☐ agree
- ☐ agree somewhat
- ☐ unsure
- ☐ disagree somewhat
- ☐ disagree

Submit preview Reset

Return to: Tests (Pre, Post, an...

Appendix 12 The Syllabus for Peer to Peer Deaf Literacy Course on the SLEND

Can do statements	Functions	Example exponents	Lexis
Can understand short, simple text messages.	Giving information Locating key information Making arrangements Saying hello and closing	I'm_____ Class is on Friday, 10 am Come on 10 July See you Friday. What time shall we meet? Hello/Hi/How are you? Thanks for the information See you soon/then, BYE	See A1 of the English Vocabulary Profile (http://vocabulary.englishprofile.org/) **Lexical fields** Classroom language (e.g. how do you spell? I don't understand. Etc.) Familiar countries & nationalities (e.g. Britain/British, America/American, China/Chinese, Europe/European, Asia/Asian) Family relationships (e.g. father, mother, brother, sister, grandfather, grandmother, uncle, aunt, cousin) Family occasions Providing personal information Simple stative verbs (e.g. live, to be (am, is, are)) Descriptive adjectives (e.g. big, small, old, young, happy, sad, hot, cold etc.) Comparative and superlative adjectives Hobbies and activities Colours Body parts Clothes Labels and packaging Tickets and timetables Signs and notices Food and drink House vocabulary Holidays, leisure activities and entertainment Numbers Time (days, weeks, months, seasons) Basic jobs Transport Familiar geographical features Public spaces & equipment (park, playground, beach etc) Weather Technology (phones, internet, computer, camera and associated verbs (scroll, click, attach etc.) Action verbs (look at/for, watch, wash, watch, etc) Verbs to request, offer, invite etc (e.g. can/would) Verbs of communication (speaking, signing, tell, ask, agree, argue) Verbs of cognition (believe, think, remember)
Can interact in a simple way provided the other person is prepare to assist and help me formulate what I'm trying to communicate.	Congratulating Provide basic information Reminding Greetings Farewells Social exchanges Making arrangements Giving an opinion Express doubt Reassuring	Well done! You can buy stamps at the post office. Don't forget… Good morning/afternoon etc Bye / Goodbye Happy birthday! See you tomorrow/on Wednesday I think… Well, I'm not sure. Don't worry (about)…	
Can understand familiar names, words and very basic phrases for example on simple notices in most common everyday situations.	Understanding information Inferring meaning from ellipted phrases (e.g. No smoking = do not smoke here)	Drinking water No smoking Toilets Staff only	
Can ask and answer simple questions in areas of immediate need or on very familiar topics.	Stating likes and dislikes Stating preferences Offering Inviting Requesting Asking and answering questions about self and others Telling the time Requesting information Apologising Agreeing	Can I have…? Please I'd like… Would you like (to)… What's your/the address…? Are you/they? Is he/she? Do you/we/they? Is he/she Are you? Did you/they? What do /what does? Do you know…? Sorry, I don't know. I'm sorry. Okay / OK	
Can ask people for things and give people things.	Asking for and providing personal information	What's your/the e-mail address… Can you add me (on whatsapp)? Can you pass the…? Where are you staying?	
Can handle numbers, quantities, cost and time.	Asking how much/many Asking about the price Asking for the time	This is/These are..has / have It is... They are... There is/are... Nick's book (Possessive 's) Personal subject pronouns Possessive adjectives How much/many…? How much is…? How long…? (time/distance)	
Can get an idea of the content of simpler informational materials and short simple descriptions, especially if there is visual support.	Locating key information		
Can follow short, simple written directions.	Understand simple instructions / directions Understand how to use a website	Get a taxi / train / bus Get off at… Turn left/right Go straight on Scroll up/ down Click on… On the left/right	
Can describe where I live and people I know in short simple phrases and sentences.	Describing people Describing places Talking about family relationships Comparing things	How old…? I am…he/she is…you/we/they are.. I/you/we/they have… He/she has… I/you etc. had X is bigger than Y X is the biggest….	
Can link words or groups of words with very basic linear connectors like *and, then or because*	Link simple ideas in written text using linear linkers	I went to the bank and the office I can't go because…	
Can write simple phrases and sentences about themselves and imaginary people, where they live and what they do.	Talking about frequency Describing hobbies/interests Describing jobs Describing abilities Talk about your life and when things happened	Always/sometimes/often/never / every I'm… I like/enjoy… I play/do… I can/can't… I went…	

		I worked/studied…	
Can ask for or pass on personal details in written form (e.g. personal details such as filling in name, nationality and address on a hotel registration form).	Giving personal information in written form	First name: Family name: Date of birth: Nationality: Address: Passport number:	
Can identify important unfamiliar words and use strategies to find the meaning of these unfamiliar words (e.g. dictionary, thesaurus, online search)	Confirming understanding		
Can ask appropriate questions to overcome gaps in communication.	Checking understanding	What does X mean? What do you mean by X?	
Can inform a conversational partner about gaps in communication	Repairing a miscommunication	I didn't understand… I don't know what X is. Can you spell that? Can you write that down for me?	
Can talk about one's own level of English	Giving information Describing language ability	I know a little English. I can write X but not Y I need to learn more English for X I would like to know more about X I don't know the English word for X	

Appendix 13 The Matching of Syllabus and Learning Materials by Research Assistants and Peer Tutors

Can do statements	Functions	Example exponents	Lexis
Can understand short, simple text messages. *Can read very short, simple texts. (Original statement in the CEFR)*	Giving information Locating key information Making arrangements Saying hello and closing	I'm_____ Class is on Friday, 10 am Come on 10 July See you Friday. What time shall we meet? Hello/Hi/How are you? Thanks for the information See you soon/then, BYE	See A1 of the English Vocabulary Profile (http://vocabulary.englishprofile.org/) **Lexical fields** Classroom language (e.g. how do you spell? I don't understand. Etc.) Familiar countries & nationalities (e.g. Britain/British, America/American, China/Chinese, Europe/European, Asia/Asian) Family relationships (e.g. father, mother, brother, sister, grandfather, grandmother, uncle, aunt, cousin) Family occasions Providing personal information Simple stative verbs (e.g. live, to be (am, is, are)) Descriptive adjectives (e.g. big, small, old, young, happy, sad, hot, cold etc.) Comparative and superlative adjectives Hobbies and activities Colours Body parts Clothes Labels and packaging Tickets and timetables Signs and notices Food and drink House vocabulary Holidays, leisure activities and entertainment Numbers Time (days, weeks, months, seasons) Basic jobs Transport Familiar geographical features Public spaces & equipment (park, playground, beach etc) Weather Technology (phones, internet, computer, camera and associated verbs (scroll, click, attach etc.) Action verbs (look at/for, watch, wash, watch, etc) Verbs to request, offer, invite etc (e.g. can/would) Verbs of communication (speaking, signing, tell, ask, agree, argue) Verbs of cognition (believe, think, remember)
Can interact in a simple way provided the other person is prepared to assist and help me formulate what I'm trying to communicate. *Can interact in a simple way provided the other person is prepared to repeat or rephrase things at a slower rate of speech and help me formulate what I'm trying to say.*	Congratulating Provide basic information Reminding Greetings Farewells Social exchanges Making arrangements Giving an opinion Express doubt Reassuring	Well done! You can buy stamps at the post office. Don't forget… Good morning/afternoon etc Bye / Goodbye Happy birthday! See you tomorrow/on Wednesday I think… Well, I'm not sure. Don't worry (about)…	
Can understand familiar names, words and very basic phrases for example on simple notices in most common everyday situations. *Can understand familiar names, words and very basic phrases for example on simple notices and posters or in catalogues.*	Understanding information Inferring meaning from ellipted phrases (e.g. No smoking = do not smoke here)	Drinking water No smoking Toilets Staff only	
Can ask and answer simple questions in areas of immediate need or on very familiar topics. *Can ask and answer simple questions in areas of immediate need or on very familiar topics.*	Stating likes and dislikes Stating preferences Offering Inviting Requesting Asking and answering questions about self and others Telling the time Requesting information Apologising Agreeing	Can I have…? Please I'd like… Would you like (to)… What's your/the address…? Are you/they? Is he/she? Do you/we/they? Is he/she Are you? Did you/they? What do /what does? Do you know…? Sorry, I don't know. I'm sorry. Okay / OK	
Can ask people for things and give people things. New	Asking for and providing personal information	What's your/the e-mail address… Can you add me (on whatsapp)? Can you pass the…? Where are you staying?	
Can handle numbers, quantities, cost and time. New	Asking how much/many Asking about the price Asking for the time	This is/These are..has / have It is... They are... There is/are... Nick's book (Possessive 's) Personal subject pronouns Possessive adjectives How much/many…? How much is…? How long…? (time/distance)	
Can get an idea of the content of simpler informational materials and short simple descriptions, especially if there is visual support. *I can find specific, predictable information in simple everyday material such as advertisements, prospectuses, menus and timetables and I can understand short simple persona letters.*	Locating key information		
Can follow short, simple written directions.	Understand simple instructions / directions Understand how to use a website	Get a taxi / train / bus Get off at… Turn left/right Go straight on Scroll up/ down Click on… On the left/right	
Can describe where I live and people I know in short simple phrases and sentences. *Can use simple phrases and sentences to describe where I live and people I know.*	Describing people Describing places Talking about family relationships Comparing things	How old…? I am…he/she is…you/we/they are.. I/you/we/they have… He/she has… I/you etc. had X is bigger than Y X is the biggest….	

Can link words or groups of words with very basic linear connectors like *and, then or because* *New*	Link simple ideas in written text using linear linkers	I went to the bank and the office I can't go because…	
Can write simple phrases and sentences about themselves and imaginary people, where they live and what they do. *Can write a short, simple postcard, for example sending holiday greetings.*	Talking about frequency Describing hobbies/interests Describing jobs Describing abilities Talk about your life and when things happened	Always/sometimes/often/never / every I'm… I like/enjoy… I play/do… I can/can't… I went… I worked/studied…	
Can ask for or pass on personal details in written form (e.g. personal details such as filling in name, nationality and address on a hotel registration form). *Can fill in forms with personal details, for example entering my name, nationality and address on a hotel registration form.*	Giving personal information in written form	First name: Family name: Date of birth: Nationality: Address: Passport number:	
Can identify important unfamiliar words and use strategies to find the meaning of these unfamiliar words (e.g. dictionary, thesaurus, online search)	Confirming understanding		
Can ask appropriate questions to overcome gaps in communication.	Checking understanding	What does X mean? What do you mean by X?	
Can inform a conversational partner about gaps in communication	Repairing a miscommunication	I didn't understand… I don't know what X is. Can you spell that? Can you write that down for me?	
Can talk about one's own level of English	Giving information Describing language ability	I know a little English. I can write X but not Y I need to learn more English for X I would like to know more about X I don't know the English word for X	

1. Adapting according to Deaf Learners' visual access to information *to repeat or rephrase things at a slower rate of speech, to more broad definition of help. Including sign language, repeat or rephrase.* especially if there is visual support
2. Adapting according to their learning needs and real life experience, text into text message.
3. Including strategic competence. Confirming understanding. Checking understanding. Repairing a miscommunication.

NOTE:
YELLOW- SLEND & WHATSAPP
GREEN- WHATSAPP
TURQUOISE- SLEND

Appendix 14 Template for Session Planning Developed by UK Researchers

Session No.: **Group Name:** **Peer Tutor Name:**

Context (What is the situation & setting? E.g. post office, library)

Activities (What do learners need to be able to do in the setting? E.g. request a form/book)

Can do statements (Which can do statements from the syllabus fit with the setting?)

Useful language (phrases/patterns/lexical items. Which language would be transferable to other settings/which language could be recycled from previous classes?)

Planned learning activities (What could you get the learners to do to practice the language?)

Resources (What resources might you need for the classroom/e-learning platform?)

Appendix 15 An Example Session Planning by UK Researchers

Session No.: 1 Group Name: UK Researchers PT Name: D. W.

Context (What is the situation & setting? E.g. post office, library)
In a library
Study on a programme
Carrying out personal research (e.g. into a topic of interest)

Activities (What do learners need to be able to do in the setting? E.g. request a form/book
Request books, articles
Ask for help

Can do statements (Which can do statements from the syllabus fit with the setting?)

Can understand familiar names, words and very basic phrases for example on simple notices in most common everyday situations.
Can ask and answer simple questions in areas of immediate need or on very familiar topics.
Can ask people for things and give people things.
Can ask for or pass on personal details in written form (e.g. filling in name, address, age etc on a library membership application.

Useful language (phrases/patterns/lexical items. Which language would be transferable to other settings/which language could be recycled from previous classes?)

Transferable items in **bold**

I'd like to….. borrow a book/return a book/find a book about…
Can I….use my phone/study here/ drink here?
I can't find….. can you help me?
How long can I borrow this for?
Switch off your mobile phone
Bookshelves
Section
Returns desk
Help desk
Short-term loans
Long-term loans
Reference number
Silence
No smoking
No eating
No drinking
Return a book

Borrow a book
First name:
Family name:
Date of birth:
Address:

Planned learning activities (What could you get the learners to do to practice the language?)

Fill in a library members application form
Write a short message requesting information
Role play asking questions (possibly using text messaging)
Reading signs and information

Resources (What resources might you need for the classroom/e-learning platform?)
Pictures of signs from a library
Sample application form

Appendix 16 An Example Session Planned by Research Assistants and Peer Tutors

Session No: 5 **Group Name: RAS &PTS** **Peer Tutor Name: RA_B**

Context (What is the situation & setting? E.g. post office, library)

Read all the signs in zoo.
Zoo is cleaned in campus.

Activities (What do learners need to be able to do in the setting? E.g. request a form/book)

Discussions signs sentence of **"Do not cross barriers". ''Follow the Golden Zoo Rules''.**

Can do statements (Which can do statements from the syllabus fit with the setting?)

Can understand familiar names, words and very basic phrases for example on simple notices in most common everyday situations.

Can ask and answer simple questions in area of immediate need or on very familiar topics.

Useful language (phrases/patterns/lexical items. Which language would be transferable to other settings/which language could be recycled from previous classes?)

Follow
The Golden Zoo Rules
The signs
Bring
Plastics
In to zoo
Do not smoke
Please do not litter
No loud noises
In the zoo
Cross
Barriers
Spit
Tease
Wildlife
Plastic pouches
Bottles **are not allowed**

here
free zone
A punishable offence
This is
Your garden
Clean

Planned learning activities (What could you get the learners to do to practice the language?)

Students could write to practice sentences. Example Sign language translate sentence **''Please do not allow food here''. ''Do not touch danger''. "Please do not shut down laptop''. ''You must keep to clean in your garden''.**

Resources (What resources might you need for the classroom/e-learning platform?)

Appendix 17 Learners' Demographic Information

Identity Code	**Gender**	**Age**	**Education**	**ISL**	**Computer literacy**
C_S1	Female	23	B.Tech passed	Good user	Good user
C_S2	Female	27	10th passed	Good user	Basic user
C_S3	Female	20	12th passed	Basic user	Basic user
C_S4	Female	28	10th passed	Basic user	Basic user
C_S5	Male	19	10th passed	Good user	Good user
C_S6	Male	27	CSE passed	Good user	Excellent user
P_S1	Male	24	B.Com passed	Good user	Excellent user
P_S2	Male	23	B.Com passed	Basic user	Good user
P_S3	Female	26	B.SC passed	Good user	Good user
P_S4	Female	27	12th passed	Basic user	Basic user
P_S5	Female	27	B.Sc passed	Excellent user	Good user
P_S6	Female	28	12th passed	Bad user	Basic user
P_S7	Female	24	B.SC passed	Basic user	Good user
P_S8	Female	23	B.SC passed	Excellent user	Excellent user
P_S9	Male	24	B.Com passed	Basic user	Good user
P_S10	Male	24	B.Com passed	Excellent user	Excellent user
T_S1	Female	22	B.SC passed	Excellent user	Excellent user
T_S2	Male	24	12th passed	Good user	Good user
T_S3	Male	25	B.Tech passed	Good user	Basic user
T_S4	Male	37	B.Com passed	Excellent user	Excellent user
T_S5	Male	24	Diploma (Animation)	Excellent user	Excellent user
T_S6	Female	23	Fashion designing andgarment technology	Good user	Excellent user
T_S7	Male	23	12th passed	Excellent user	Excellent user
T_S8	Male	24	Diploma Mechanical passed	Excellent user	Excellent user
T_S9	Female	24	B.SC passed	Excellent user	Excellent user
I_S1	Male	20	B.COM STILL	Good User	Good User
I_S2	Male	24	B.COM STILL	Good User	Good User
I_S3	Male	26	B.ASTILL	Excellent User	Good User
I_S4	Female	23	B.COM STILL	Good User	Good User
I_S5	Female	25	B.A PASSED	Good User	Basic user
I_S6	Male	24	B.COM STILL	Good User	Good User
I_S7	Male	22	B.COM STILL	Good User	Good User
I_S8	Male	26	DCA PASSED	Basic User	Good User
I_S9	Male	21	B.COM STILL	Basic User	Excellent User
I_S10	Male	23	DCA PASSED	Good User	Excellent User
I_S11	Female	25	B.A PASSED	Basic User	Basic user

V_S1	Female	19	12th passed	Excellent User	Good User
V_S2	Male	21	10th passed	excellent	Good User
V_S3	Male	20	10th passed	Excellent User	Excellent User
V_S4	Male	20	10th passed	Good User	Basic User
V_S5	Male	21	8th passed	Good User	Basic User
V_S6	Male	21	10th passed	Excellent User	Basic User

Appendix 18 Peer Tutors' Demographic Information

Peer Tutors	Gender	Age	Education	ISL	Computer literacy	Pre-test Score	Years of Teaching Experience
PT_A	Male	30	BAASLS	Excellent User	Good User	He didn't take the test	6 months
PT_B	Female	24	BAASLS	Excellent User	Basic User	46.5	0 year
PT_C	Male	26	BAASLS	Excellent User	Good User	46.5	0 year
PT_D	Male	26	BAASLS	Excellent User	Good User	35	one week
PT_E	Male	24	Pursuing BCA	Excellent User	Excellent User	60.5	2 years

BCA: BA in Computer Application

BAASLS: BA in Applied Sign Language Studies

Appendix 19 Friedman's Test Results for Each Literacy Skill Statement

Q01=S01

Ranks

	Mean Rank
Q01_Pre	2.00
Q01_Post	2.09
Q01_Delayed	1.91

Test Statistics[a]

N	16
Chi-Square	.429
df	2
Asymp. Sig.	.807

a. Friedman Test

Ranks

	Mean Rank
Q02_Pre	2.19
Q02_Post	2.13
Q02_Delayed	1.69

Test Statistics[a]

N	16
Chi-Square	3.897
df	2
Asymp. Sig.	.142

a. Friedman Test

Ranks

	Mean Rank
Q03_Pre	1.72
Q03_Post	2.34
Q03_Delayed	1.94

Test Statistics[a]

N	16
Chi-Square	5.150
df	2
Asymp. Sig.	.076

a. Friedman Test

Ranks

	Mean Rank
Q04_Pre	1.78
Q04_Post	2.28
Q04_Delayed	1.94

Test Statistics[a]

N	16
Chi-Square	2.735
df	2
Asymp. Sig.	.255

a. Friedman Test

Ranks

	Mean Rank
Q05_Pre	1.75
Q05_Post	2.34
Q05_Delayed	1.91

Test Statistics[a]

N	16
Chi-Square	3.731
df	2
Asymp. Sig.	.155

a. Friedman Test

Ranks

	Mean Rank

Q06_Pre	1.91
Q06_Post	2.28
Q06_Delayed	1.81

Test Statistics[a]

N	16
Chi-Square	3.150
df	2
Asymp. Sig.	.207

a. Friedman Test

Ranks

	Mean Rank
Q07_Pre	1.78
Q07_Post	2.56
Q07_Delayed	1.66

Test Statistics[a]

N	16
Chi-Square	10.978
df	2
Asymp. Sig.	.004

a. Friedman Test

Ranks

	Mean Rank
Q08_Pre	1.91
Q08_Post	2.13
Q08_Delayed	1.97

Test Statistics[a]

N	16
Chi-Square	.605
df	2
Asymp. Sig.	.739

a. Friedman Test

Ranks

	Mean Rank
Q09_Pre	2.00
Q09_Post	2.16
Q09_Delayed	1.84

Test Statistics[a]

N	16
Chi-Square	1.282
df	2
Asymp. Sig.	.527

a. Friedman Test

Ranks

	Mean Rank
Q10_Pre	1.78
Q10_Post	2.13
Q10_Delayed	2.09

Test Statistics[a]

N	16
Chi-Square	2.000
df	2
Asymp. Sig.	.368

a. Friedman Test

Ranks

	Mean Rank
Q11_Pre	1.91
Q11_Post	2.41
Q11_Delayed	1.69

Test Statistics[a]

N	16
Chi-Square	6.178
df	2
Asymp. Sig.	.046

a. Friedman Test

Ranks

	Mean Rank
Q12_Pre	2.00
Q12_Post	1.94
Q12_Delayed	2.06

Test Statistics[a]

N	16
Chi-Square	.267
df	2
Asymp. Sig.	.875

a. Friedman Test

Ranks

	Mean Rank
Q13_Pre	1.59
Q13_Post	2.38
Q13_Delayed	2.03

Test Statistics[a]

N	16
Chi-Square	7.476
df	2
Asymp. Sig.	.024

a. Friedman Test

Ranks

	Mean Rank

Q14_Pre	2.03
Q14_Post	2.41
Q14_Delayed	1.56

Test Statistics[a]

N	16
Chi-Square	8.318
df	2
Asymp. Sig.	.016

a. Friedman Test

Ranks

	Mean Rank
Q15_Pre	1.78
Q15_Post	2.41
Q15_Delayed	1.81

Test Statistics[a]

N	16
Chi-Square	5.080
df	2
Asymp. Sig.	.079

a. Friedman Test

Ranks

	Mean Rank
Q16_Pre	1.88
Q16_Post	2.31
Q16_Delayed	1.81

Test Statistics[a]

N	16
Chi-Square	3.378
df	2
Asymp. Sig.	.185

a. Friedman Test

Appendix 20 Wilcoxon Signed Ranks Test Results

Ranks

		N	Mean Rank	Sum of Ranks
Q07_Post - Q07_Pre	Negative Ranks	1[a]	3.50	3.50
	Positive Ranks	9[b]	5.72	51.50
	Ties	6[c]		
	Total	16		
Q07_Delayed - Q07_Pre	Negative Ranks	6[d]	5.33	32.00
	Positive Ranks	5[e]	6.80	34.00
	Ties	5[f]		
	Total	16		
Q07_Delayed - Q07_Post	Negative Ranks	10[g]	5.50	55.00
	Positive Ranks	0[h]	.00	.00
	Ties	6[i]		
	Total	16		
Q11_Post - Q11_Pre	Negative Ranks	2[j]	5.25	10.50
	Positive Ranks	7[k]	4.93	34.50
	Ties	7[l]		
	Total	16		
Q11_Delayed - Q11_Pre	Negative Ranks	7[m]	7.57	53.00
	Positive Ranks	5[n]	5.00	25.00
	Ties	4[o]		
	Total	16		
Q11_Delayed - Q11_Post	Negative Ranks	9[p]	5.72	51.50
	Positive Ranks	1[q]	3.50	3.50
	Ties	6[r]		
	Total	16		
Q13_Post - Q13_Pre	Negative Ranks	1[s]	3.50	3.50
	Positive Ranks	9[t]	5.72	51.50
	Ties	6[u]		
	Total	16		
Q13_Delayed - Q13_Pre	Negative Ranks	2[v]	5.25	10.50
	Positive Ranks	7[w]	4.93	34.50
	Ties	7[x]		
	Total	16		
Q13_Delayed - Q13_Post	Negative Ranks	7[y]	6.14	43.00
	Positive Ranks	3[z]	4.00	12.00
	Ties	6[aa]		
	Total	16		
Q14_Post - Q14_Pre	Negative Ranks	3[ab]	7.00	21.00

	Positive Ranks	8[ac]	5.63	45.00
	Ties	5[ad]		
	Total	16		
Q14_Delayed - Q14_Pre	Negative Ranks	8[ae]	5.88	47.00
	Positive Ranks	2[af]	4.00	8.00
	Ties	6[ag]		
	Total	16		
Q14_Delayed - Q14_Post	Negative Ranks	9[ah]	5.39	48.50
	Positive Ranks	1[ai]	6.50	6.50
	Ties	6[aj]		
	Total	16		

a. Q07_Post < Q07_Pre

b. Q07_Post > Q07_Pre

c. Q07_Post = Q07_Pre

d. Q07_Delayed < Q07_Pre

e. Q07_Delayed > Q07_Pre

f. Q07_Delayed = Q07_Pre

g. Q07_Delayed < Q07_Post

h. Q07_Delayed > Q07_Post

i. Q07_Delayed = Q07_Post

j. Q11_Post < Q11_Pre

k. Q11_Post > Q11_Pre

l. Q11_Post = Q11_Pre

m. Q11_Delayed < Q11_Pre

n. Q11_Delayed > Q11_Pre

o. Q11_Delayed = Q11_Pre

p. Q11_Delayed < Q11_Post

q. Q11_Delayed > Q11_Post

r. Q11_Delayed = Q11_Post

s. Q13_Post < Q13_Pre

t. Q13_Post > Q13_Pre

u. Q13_Post = Q13_Pre

v. Q13_Delayed < Q13_Pre

w. Q13_Delayed > Q13_Pre

x. Q13_Delayed = Q13_Pre

y. Q13_Delayed < Q13_Post

z. Q13_Delayed > Q13_Post

aa. Q13_Delayed = Q13_Post

ab. Q14_Post < Q14_Pre

ac. Q14_Post > Q14_Pre

ad. Q14_Post = Q14_Pre

ae. Q14_Delayed < Q14_Pre

af. Q14_Delayed > Q14_Pre

ag. Q14_Delayed = Q14_Pre

ah. Q14_Delayed < Q14_Post

ai. Q14_Delayed > Q14_Post

aj. Q14_Delayed = Q14_Post

Test Statistics[a]												
	Q07_Post - Q07_Pre	Q07_Delayed - Q07_Pre	Q07_Delayed - Q07_Post	Q11_Post - Q11_Pre	Q11_Delayed - Q11_Pre	Q11_Delayed - Q11_Post	Q13_Post - Q13_Pre	Q13_Delayed - Q13_Pre	Q13_Delayed - Q13_Post	Q14_Post - Q14_Pre	Q14_Delayed - Q14_Pre	Q14_Delayed - Q14_Post
Z	-2.511[b]	-.093[b]	-3.051[c]	-1.461[b]	-1.125[c]	-2.506[c]	-2.506[b]	-1.461[b]	-1.642[c]	-1.136[b]	-2.066[c]	-2.176[c]
Asymp. Sig. (2-tailed)	.012	.926	.002	.144	.261	.012	.012	.144	.101	.256	.039	.030
a. Wilcoxon Signed Ranks Test												
b. Based on negative ranks.												
c. Based on positive ranks.												