Blended Simulation Based Medical Education: a Complex Learning/Training Opportunity

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Abstract. Simulation Based Medical Education (SBME) as an innovative approach in Medical and Professionals Allied to Medicine (PAM) education has received international attention in the past few years to support improvement of patient safety and providing better health care services within hospitals. Blended SBME (B-SBME) is a new instructional model recently introduced into the field, which blends on-line briefing sessions followed by a simulation session, and concluded with immediate face-to-face debriefing sessions. In this paper we discuss the complexity of learning in B-SBME and how individualistic learning theories do not support understanding of all these processes. A shift in theoretical lens to socio-cultural theories may develop our understanding of how we depict and theorise the learning that goes on in B-SBME and whether B-SBME can act as a "boundary crossing tool" and support expanding of learning into clinical setting.

1   Introduction

The use of Technology Enhanced Learning (TEL) in different educational and working environments has been increased significantly in the past few years to provide more educational opportunities for learners to catch up with the rapid changing world and the overload of new information, knowledge, and skills required for operating in different aspects of their career and life. Med-

ical and healthcare organisations, among them English National Health Services (NHS) Trusts, are not exempt from these changes and there is a constant need to train and retrain the staff and refresh their employees' knowledge around new technologies, products, and services that are being introduced in their environment. "The need to meet the Department of Health's Standards for Better Health and the NHS Litigation Authority's Risk Management Standards has been instrumental in increasing attention to, and appetite for, providing alternative methods of training using technology" [1][page.4].

Simulation as an alternative educational approach has received significant international attention in the past few years within health care education and services. SBME is becoming popular for providing medical students and practitioners near real-life opportunities to practice and improve their clinical and non-clinical skills to "reduce the risk of complications for patients" [2] [page.5] and improve health care services as a result.

This paper focuses on B-SBME as a new instructional model introduced in the Lancashire Teaching Hospitals NHS Trust (LTHTR) simulation centre training program. The preliminary analysis of the data revealed that in B-SBME learning is very complex. Therefore, "standard learning theories have little to offer if one wants to understand [these] processes" [3][page, 66] and a shift in theoretical lens from individualistic learning theories to socio-cultural theories may provide a new perspective in understanding B-SBME in this particular context.

2 Simulations in Medical and PAM Education

Simulation Based Education (SBE) has been successfully integrated in the educational programmes of high-risk professional industries, such as aviation, astronomy, defence, and nuclear energy for decades [4-6]. The main two reasons for using SBE in these industries has been the cost and danger involved in training or testing a system in real life context [5] and the opportunity it provides for learners to practice rare events and prepare them to

react quickly and efficiently in real-life events [7]. However, in medical professions only from the second half of the 20th century different types of low cost, low fidelity part task trainers started to be used and towards the end of the 20th century SBME received greater attention [6]. ~~I and i~~t is argued that simulations "in all its forms will be a vital part of building a safer healthcare system" in future [7] [page.55]. SBME has been introduced to health care services for the following reasons:

1. Medical Education shifted to more outcomes-based approach where demonstration of competence became important rather than how the competence was acquired. The need for training more effective junior doctors after undergraduate education [8] and "continuing education after higher specialist education" [6] [page.256] gained special attention. Moreover, the revalidation of doctors every five years was introduced to make sure doctors remain up-to-date [9].
2. Some of the changes in health care delivery such as shorter hospital stays and clinic visits, and greater numbers of patients with higher acuity of illnesses resulted **in** reduced number of patients available for learning purposes in hospitals (10). Moreover, reduction of working hours to 48 hour a week by introducing European Working Time Directive (EWTD) changed **the** working pattern and training opportunities [11] for clinical staff. Improving patients' safety and reduction of medical errors [10] and ethical issues around using patients for educational purposes to avoid unnecessary risks [12] also gained greater attention.
3. Constant technological and scientific advancement for both diagnosis and treatment purposes [10] require clinical staff to learn new techniques and skills or upgrade their knowledge around the use of new medical technology more than before.

Simulation in medical and PAM education evolves and improves very quickly; new simulators are being introduced in the field therefore "the boundaries of what can be simulated change frequently" [13]. It is important for educators to realise that the simulations and all the technology attached to it to simulate an event are tools in the hands of the educators and only skilful use of them can enhance educational practices and improve satisfaction among

learners and educators, which may ultimately lead to sustainable use of technology for educational purposes. In other words, education should not be driven by technology but the educational agenda should adopt the type of technology that will support learning [14].

Although SBME has been shown to provide rich learning opportunities [15] it has remained educationally under-theorised and is being used as an alternative medical and PAM educational approach. "[S]imulations are often accepted uncritically, with undue emphasis being placed on technological sophistication at the expense of theory-based design" [16] [page.549]. Research into the conceptual framework of SBME is very limited and teaching and learning designs are mainly developed in practice. SBME is "a complex service intervention" [17] [page.50] with various learning opportunities that has to be theorised and managed carefully to provide meaningful learning environment for the learners.

3   Blended Simulation Based Medical Education

Blended Learning (BL) or sometimes called Hybrid Learning (HL) has gained considerable attention after realising that "single mode of instructional delivery may not provide sufficient choices, engagement, social contact, relevance, and context needed to facilitate successful learning and performance" [18] [page. 51]. BL offers "a real opportunity to create learning experiences that can provide the right learning at the right time and in the right place for each and every individual" [19][page.18]. BL, if designed carefully to provide a meaningful learning environment, may provide flexibility in learning that can support student-centred and self-initiated learning [20].

Blended SBME (B-SBME) has recently been introduced into the Lancashire Teaching Hospitals NHS Trust (LTHTR) simulation centre training programme as an innovative instructional model. This instructional model blends on-line briefing sessions, which includes more theoretical aspects of clinical cases, an introduction to use of simulations, and some key points (both clinical and non-clinical) about management of acute situations. The online modules are followed by a simulation session, which includes hands on prac-

tice/experience in a near real life context. Sessions are concluded with immediate face-to-face debriefing sessions for reflection and feedback on experience. The introduction of the online modules as pre-session briefings provide learners with flexibility in preparing for sessions and allow facilitators and learners increased time for the hands-on sessions in the simulation centre.

4   Methodology

This work in progress is a qualitative case study which took place in LTHTR simulation centre over the course of two years. Ninety third year medical students and the simulation facilitators were the participants of this study. Data has been collected through participant observations of the practices taking place in the simulation centre and semi-structured interviews with fourteen medical students and four facilitators and medical educators. Data analysis was conducted in a five-phased cycle including compiling, disassembling, reassembling, interpreting, and concluding [21].

The aim of this study was to look at the activities taking place in B-SBME through the most discussed theoretical lenses in the field such as Situated Learning theory, and Experiential learning theory. It also aimed to explore how learning happens in this educationally rich environment where students have to interact with technology, texts and documents, medical instruments/drugs, other students, and facilitators.

5   Preliminary results

The preliminary analysis of the data revealed that in B-SBME learning is very complex. From the moment the learners started the online modules, they reported thinking and reflecting on different aspects of the simulation and scenarios. These individual and collaborative reflections continued throughout the debriefing session and even afterwards. Data indicates learners are learning by getting engaged in cognitive activities, by doing/experiencing, by observing their peers, by reflecting on their own and their peers' performances, by collaborating with their peers, and by referring to documents and guidelines. Formal, informal, and non-formal learning may take place across

activities, depending on the aims of a simulation session. There are opportunities to learn not only clinical skills but also non-clinical skills**, i.e. communication skills** required for providing safe practices in real life contexts.

The preliminary analysis of the data surfaced the complexity of learning in B-SBME and how individualistic learning theories are unable to capture the whole learning processes in this versatile learning environment. Activities taking place in B-SBME may be explored better if the theoretical lens shifts to socio-cultural theories.

5.1 Learning Theories

Situated Learning Theory. Lave and Wenger argue that the important elements in situated learning are having an authentic context and social interactions and collaborations [22]. They also argue that learners' involvement in a "community of practice" starts as a beginner or novice and gradually moves from the periphery of a community to its centre and becomes more active and engaged within the culture and eventually becomes an expert contributor [23]. Although situated learning might be able to explain the role of context and social interactions and collaborations that are taking place in a simulated scenario, this learning theory could not capture the whole set of learning activities taking place in SBME. The context is near authentic and learners are role-playing, thus do activities of SBME**, yet** do not closely align with the requirements of situated learning. Collaborative learning is taking place but the learners are not categorised as novices and experts in this particular setting with this particular set of participants.

Experiential Learning Theory. In SBME learners are active and engaged from the beginning, all participating in a simulated scenario collaboratively experience a new practice, reflect on their learning, and possibly take away the newly learned practice into real clinical setting. However, Kolb's experiential learning, which presents a cyclical learning process: experiencing/practicing, observation/reflecting on the practice, forming abstract concepts, and planning new experiment/active experiment is not enough to describe these learning processes. Kolb describes Experiential Learning from a constructivist point of view [24] and to him learning, is transformation of experience into

knowledge, skills, values and emotions [25]. One of the main criticisms that ELT has received is that experience cannot be shaped outside social relations [26]. Therefore, de-contextualising and individualising learning, and considering learning resulted from subjective experiences rather than "objective and rational process[es]" [27] [page.6] has little to say about contextually rich and social learning happening in B-SBME.

5.2   Social Practices Theory (SPT)

Considering a 'practice' as an opportunity for learning and extracting knowledge is a new approach which "turns to a consideration of the learning process but does so by figuring the locus of concern as learning in social or organizational contexts rather than individual cognitive process"[28] [page.15). Practices can include "the rooted identities and patterns of behaviour that characterise shape or constrain understanding of [that activity]" [29] [page.2].

In order to capture the dynamic learning environment in B-SBME 'social practices' might provide the right conceptual framework. Social practices are described as "recurrent, usually unconsidered, sets of practices or 'constellations' [clusters of activities] that together constitute the daily life" [29] [page.2]. Sometimes the clusters of practices "bound together by social groupings" [29] [page.3] and shape activity systems.

By applying SPT the clusters of practices taking place at universities and hospitals might be described differently. "If we depict educational organizations and the workplace as different activity systems, characterized by different communities of practice, then moving from one to another involves a form of social and cognitive 'brokerage' in which a variety of tools might aid and develop 'expansive' learning opportunities" [28] [page. 18). In this case B-SBME might act as a bridge between these two activity systems as a "boundary crossing tool" to prepare the learners for more productive and competent practices in the real context.

6   Conclusion

The demand for using Simulation Based Medical Education (SBME) has increased significantly in the past few years. However, SBME has remained as an alternative learning/training approach in medical and PAM education. Partially it can be related to the fact that SBME has been remained educationally under-theorised. Legislation mandates medical educators to provide evidence on the impact of SBME on patient safety and improvement of the services. However, evidence-based research in this complex learning environment may not be able to provide a comprehensive understanding of learning processes and how learning may be extended into the real clinical settings. Innovative research approaches need to be applied into the field to capture, analyse, and evaluate learning outcomes [30] and possibly integrate SBME in the core training programmes of medical and PAM education.

This work in progress may introduce a shift of understanding learning processes in SBME from individual to a social by using Social Practices Theory. By analysis of the social practices in B-SBME a new perspective may be introduced in using B-SBME as a "boundary crossing tool".

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