A digital invention in midwifery education, the Newborn and Infant Physical Examination app (NIPE) 'a textbook in your pocket'

Lindsey Rose[1], Clive Palmer[2], Claire Hooks[3] and Soo Downe[4]

[1] PhD by Portfolio candidate, University of Central Lancashire, and Senior Midwifery Lecturer, Anglia Ruskin University.

[2] Doctoral Education Lead, University of Central Lancashire.

[3] Department of Midwifery, Child and Community Nursing, Anglia Ruskin University.

[4] Associate Dean, School of Nursing and Midwifery, University of Central Lancashire.

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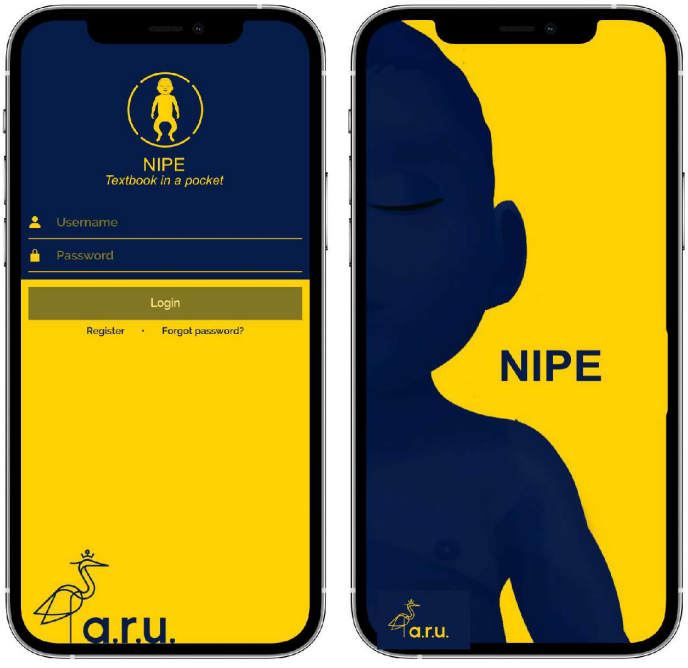

Introduction: NIPE screening and my digital app invention-intervention

The NHS Newborn and Infant Physical Examination (NIPE) Screening Programme offers parents of babies in England a physical examination for their baby within 72 hours of birth and an infant physical examination at 6 to 8 weeks old. The digital NIPE app screens for conditions relating to the hips, heart, eyes and (in boys) testes and can be performed by a suitably trained midwife, doctor, or neonatal nurse. Practitioners using the app can screen for congenital abnormalities which if detected and treated early, can reduce adverse outcomes in the longer term.

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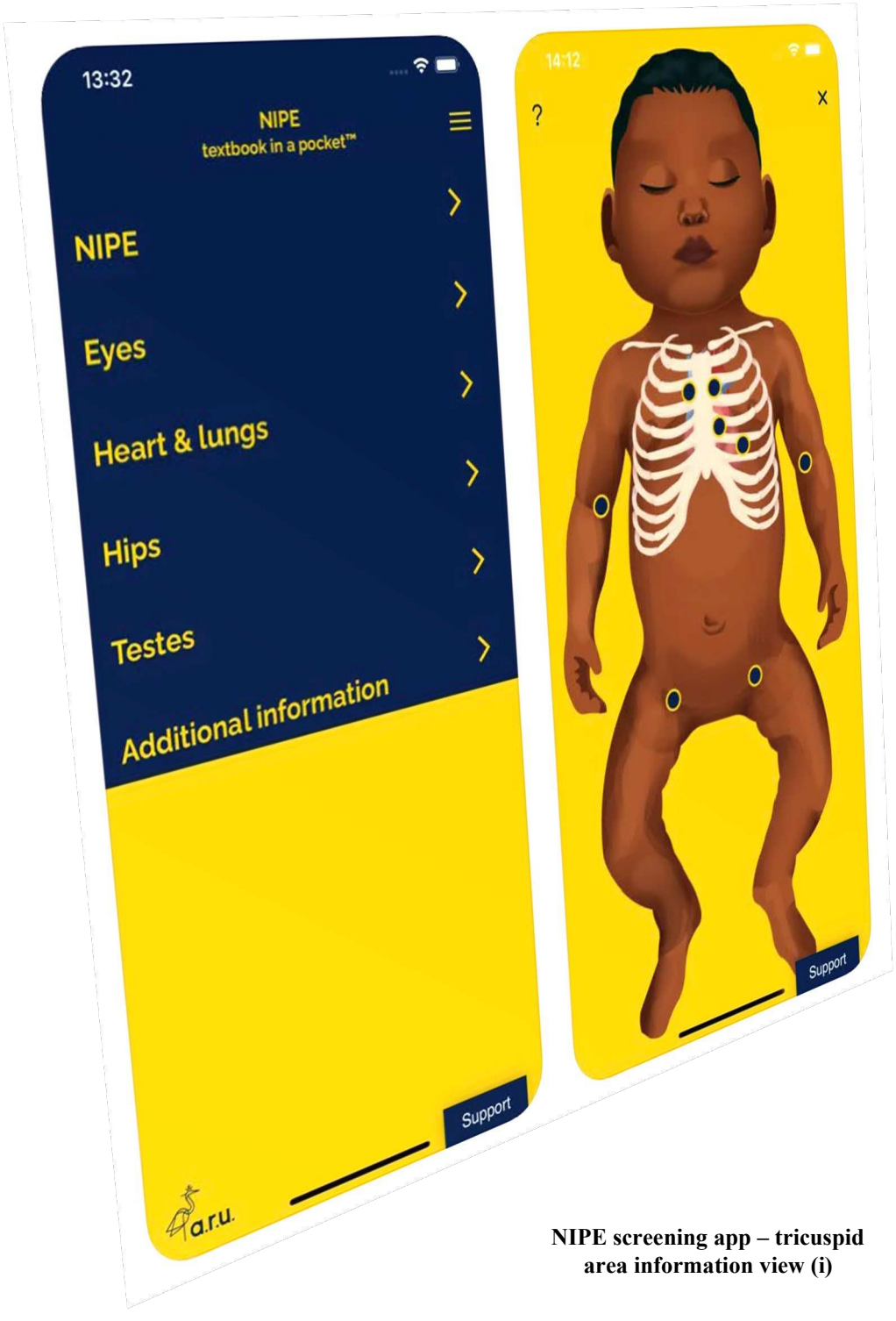


NIPE screening app – tricuspid area information view (i)

NIPE screening app – tricuspid area information view (ii)

***'Just in time'*: key information, in your hand, just when you need it**

Performing a NIPE screening assessment (a Newborn and Infant Physical Examination) requires the practitioner to draw upon and apply extensive knowledge, quickly and efficiently, of normal neonatal wellbeing to recognise deviations during the screening process. The physical examination is relatively straightforward; however, the application of the practitioner's knowledge is key to the process and requires the retention of complex information that is applied at the time of the examination.

Historically, NIPE was performed by a doctor in hospital or by the GP in the community (Clarke and Sims 2021; Yearley, Rogers and Jay, 2017). In 1996 NIPE training for midwives was initiated as an extension of their role and to aid continuity of care, to promote autonomous midwifery practice and to reduce doctors working hours (Mitchell, 2003). Since 2019, as part of the Standards framework for Nursing and Midwifery Education (NMC, 2019) it became compulsory for all HEIs to embed this NIPE training within their midwifery degree curriculum by 2024.

Practice has evolved whereby the majority of NIPEs are now completed by midwives, but the proportion varies between NHS Trusts. As there are different experience levels across the country, qualified midwives in some trusts will get less opportunity to carry out NIPEs on more complex neonates, which may reduce both their competence and confidence in making the assessment. Therefore, to facilitate professional development of midwives, there is a need to provide structured resources to support ongoing progression of clinical examination skills, particularly in relation to complex neonates. This is the broader contribution of my research as there is currently no standardised refresher training for midwives, other than an optional Health Education England (HEE) e-learning module (HEE, 2021). Supporting this, Lanlehin *et al.* (2011) found that there were barriers to midwives performing the NIPE which impacted on their ability to maintain competency post qualification. Barriers to professional development identified included:

- limited opportunity to undertake the examinations to maintain practice levels,
- no mandatory updates or specific number of required examinations to perform each year to maintain competency.

An initial motivation for developing the digital NIPE app was to overcome these barriers, helping midwifery students in their learning. Since the launch of the app in 2023 early indications are that the app may be proving to be efficient and effective in domains beyond education, into professional practice. This is in-part, what the PhD by Portfolio research sets out to discover and critically evaluate.

My PhD by Portfolio: Overview of Projects, Intentions and Evidence

Project 1 (retrospective)

Subtitle 1: *Where did it all start and what led to the NIPE, textbook in a pocket app?*

Intention: To review and critically reflect upon the origin of my invention.

- *Evidence:* Research into how pre-registration midwifery students used an ophthalmoscope to recognise congenital cataracts and other eye conditions in the newborn. (Anglia Ruskin University, 2015– 2018).

Project 2 (retrospective)

Subtitle 2: *From EYESCREEN to NIPE: research and development of the NIPE digital tool, 'textbook in a pocket' mobile phone app.*

Intention: To critically reflect upon the challenges and issues of creating a commercially viable educational tool to support midwifery education.

- *Evidence:* The research and design phase of the current NIPE app, involved learning from its experimental forerunner, called the 'EYESCREEN' app, which was purely for assessment of the eyes, just one of the four elements involved in newborn screening. (Anglia Ruskin University, 2018–2023).

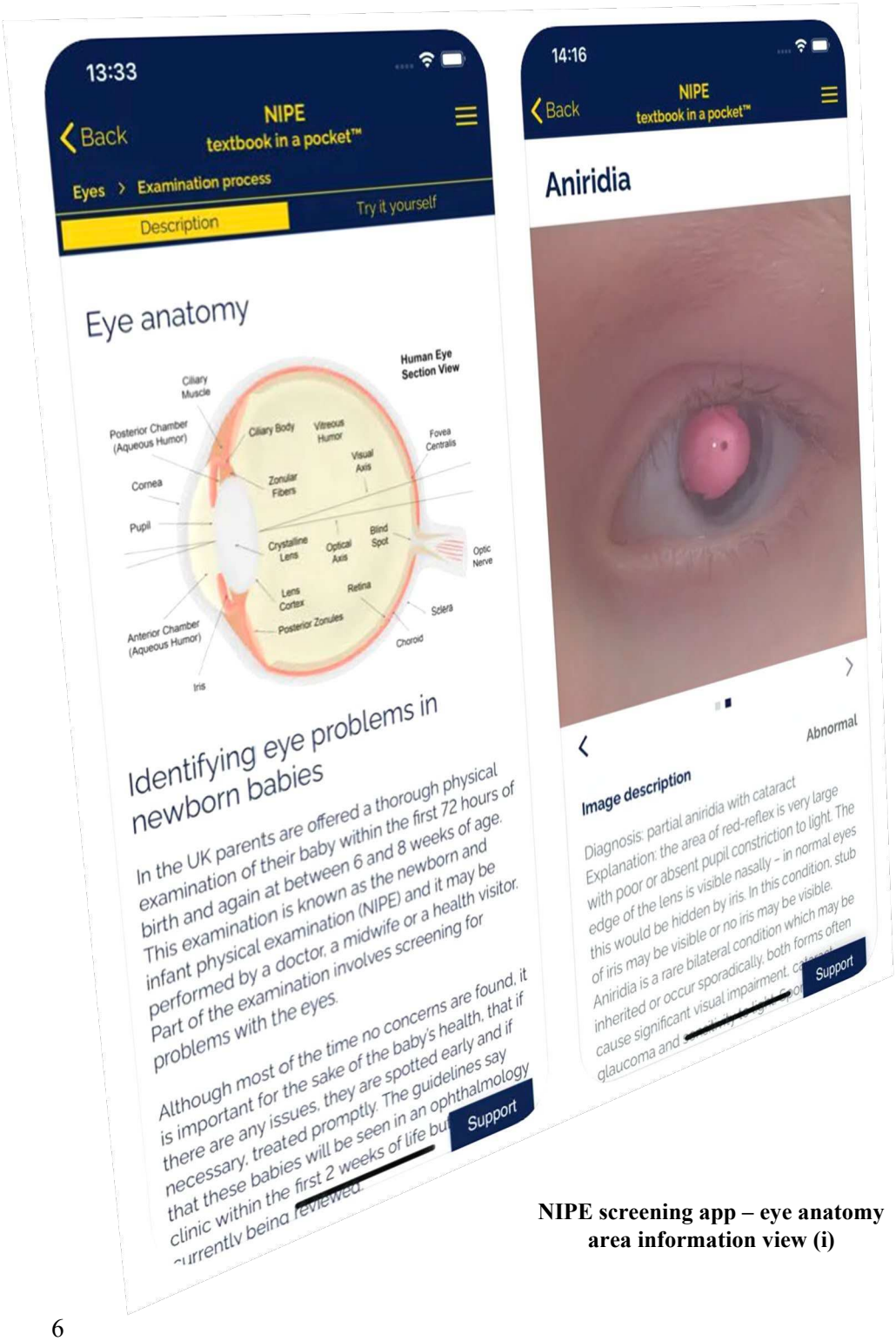
Project 3 (prospective/live)

Subtitle 3: *Evaluating the NIPE app: a transdisciplinary/multi-partner assessment of impact.*

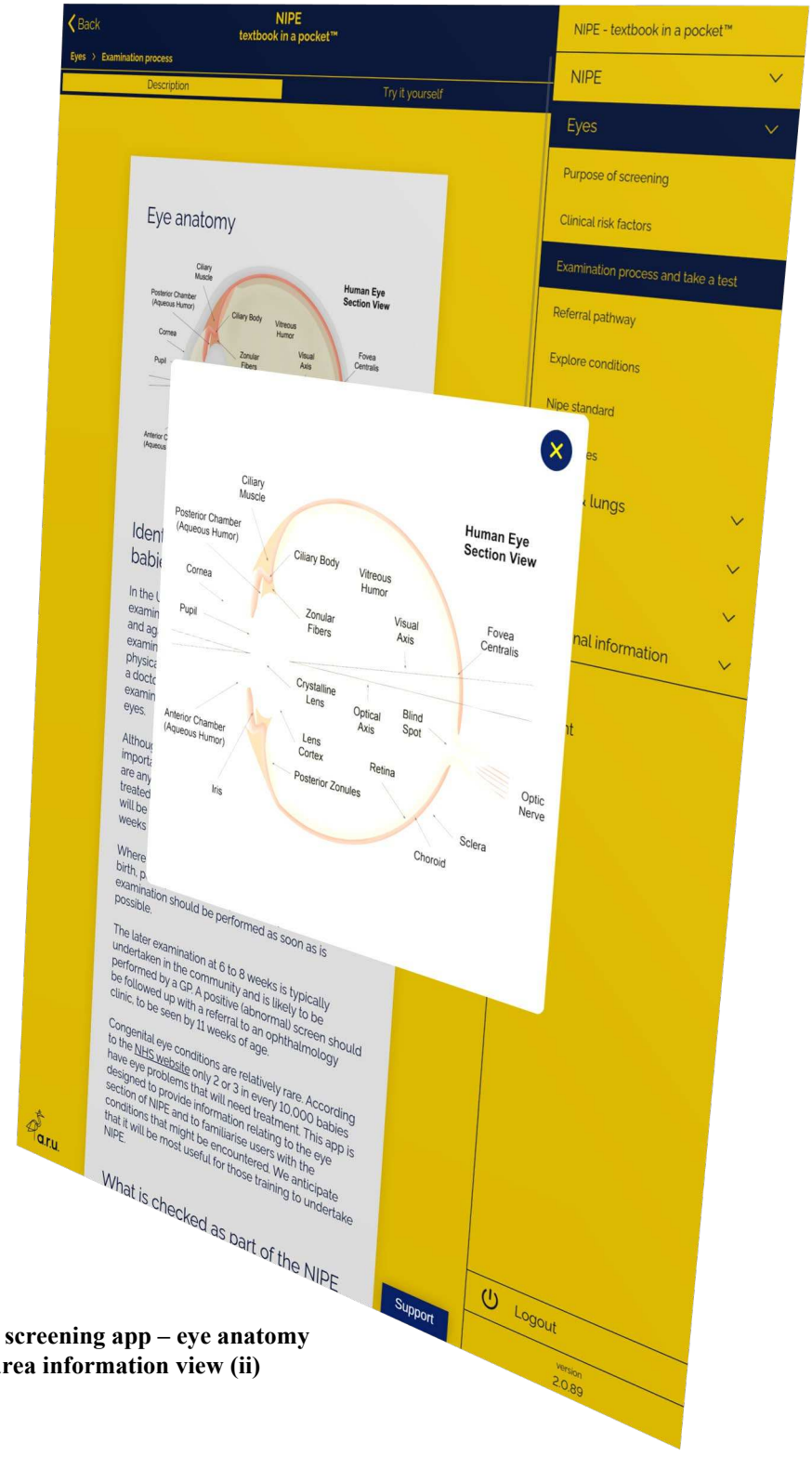
Intention: To evaluate, since the launch of the NIPE app in 2023, what the educational and industrial/practitioner impacts have been from its use as a means to critical review and making potential recommendations.

- Purpose: The NIPE mobile phone app was planned for/designed as an educative and professional practice *aide memoire*: an aid for practitioners to make informed judgements when conducting the NHS Newborn and Infant Physical Examination (NIPE) Screening Process.

- Investigation: Evaluation of the NIPE app will be through primary data collection via three channels. First, the questionnaires embedded in the NIPE app concerning user experience. Second, follow-up interviews with app users to explore 'user experience' concerning the NIPE app's application in professional contexts. Third, a Delphi/360 review panel with professional partners will be undertaken as part of the practice-based evaluation of my invention. (PhD by Portfolio research registered at UCLan 2023/4).



NIPE screening app – eye anatomy area information view (i)



NIPE screening app – eye anatomy area information view (ii)

Data collection for Project 3 (prospective/live)

A Delphi/360 review panel will be convened involving key parties and stakeholders in my NIPE mobile app invention. Their task will be to critically review the app from their perspectives, which may include, for example, an industrial voice, a health/clinical voice, an educational voice, a commercial voice, a creative voice, and importantly, student voice. The Delphi/360 review is an established means of evaluating innovations in a given field, (for example, Rowe and Wright, 2001; Okoli and Pawlowski, 2004; Skulmoski, Hartman and Kran, 2007; Brady, 2015) and therefore is an appropriate research method in the context of this PhD. The Delphi method has also been widely in health, medical/nuring and clinical environments: for example: (Adler and Ziglio, 1996; Thangaratinam and Redman, 2005; Fletcher and Childon, 2014; Toma and Picioreanu, 2016; Taylor, 2020; Barrett and Heale, 2020; Mead and Mosely, 2001; Schaap *et al.,* 2019).

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Ethics statement: This research was conducted with ethical approval from Anglia Ruskin University and the University of Central Lancashire.

JQRSS Author Profiles

Lindsey Rose[1] is a senior midwifery lecturer at Anglia Ruskin University. She has an interest in screening, particularly the Newborn and Infant Physical Examination (NIPE). Lindsey is the lead for NIPE at Anglia Ruskin and an education advisor for the UK Health Security Agency NHS Newborn and Infant Physical Examination programme.

Clive Palmer[2] is a research supervisor in the School of Health, Social Work and Sport, and Doctoral Education Lead in the Graduate Research School for the University of Central Lancashire. https://orcid.org/0000-0001-9925-2811 Email: capalmer@uclan.ac.uk

Claire Hooks[3] is Associate Professor in Midwifery and Women's Health with expertise in physiology, pharmacology, medical law and ethics, interprofessional research and e-learning.

Soo Downe[4] **OBE** is Professor of Midwifery Studies and leads the Research in Childbirth and Health team in the School of Nursing and Midwifery. Soo also co-Directs the THRIVE research centre, that has a focus on the first 1000 days of life.

Collegial Review

This researcher highlights a vital and urgent issue around necessary and appropriate refresher training for midwives and the need to address barriers to professional engagement, urgently required so that the practitioner can perform a NIPE screening assessment readily, quickly, and efficiently, drawing upon and applying up-to-date knowledge and clinical examination skills. The author's highly innovative digital NIPE app reflects her vast knowledge, experience and understanding of effective, successful neonatal NIPE screening, particularly in the complex neonatal cases. Employing the power of technology, the NIPE app can screen for congenital abnormalities, which if found and treated early, can decrease adverse outcomes in the long-term. Furthermore, this assessment, communication and training tool will promote confidence and competence in practitioners when conducting a crucial NIPE screening assessment and promote professional practice. This app is quite remarkable and will change lives as well as professional practice.

I think the first retrospective project is especially valuable, so the reader can fully understand the origins of the 'textbook in a pocket' app and appreciate the urgent need for it in current educational and clinical settings, whilst the second retrospective project will address the challenges and issues encountered in developing this much-needed tool to support midwifery education. The live project will evaluate the impact that the app has on both education and practice and explore potential recommendations in improving the tool. Data collection for the live project will allow the author to explore the impact of the tool deeply and thoroughly – the initial questionnaire, follow-up interviews and finally a Delphi/360 review panel is highly appropriate to explore the research questions. Additionally, I respect the researcher's commitment to exploring perspectives from numerous different areas and fields, by including an industrial voice, health/clinical voice, commercial voice, creative voice, educational voice, and student voice.

I also really enjoyed the use of visuals in this paper, which allowed me to 'see' and understand how the app works; these visuals undoubtedly bring the project closer to the reader. Given the author's vast experience in this field, and innovativeness in creating and developing this much needed and brilliant app, I am very excited to read the final results of her three projects.