Between worlds

Extending students' multimodal literacy practices
with augmented reality

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A catalogue record for this
book is available from the
National Library of Australia

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Foreword

Children are now growing up in a world where they are surrounded by the digital literacy practices of a virtual era. As digital technology has become a defining aspect of contemporary global society, children and adults experience the burgeoning variety of text forms and representational modes that are associated with multimedia technologies. Increasingly, communication involves both the construction and interpretation of meanings that are realised through the collaborative expression of multiple modes of meaning-making, such as audio, visual, spatial, gestural, movement etc., as well as language. Because of the distinctive materiality of their representational resources, these different modes contribute different facets of the meanings associated with the phenomena that are represented. In interpreting and creating digital multimodal texts, communicators need to be alert to what aspects of meanings are and could be contributed by different modes. This calls for a reconceptualisation of literacy and literacy pedagogy, extending the logocentric and paper-media-focused literacies of the past to include the new and evolving forms of digital multimodal literacy characterising 21st century communication.

Of course, our experience of literacy via the multiple screens and digital devices that now permeate our lives also intersects with our ongoing experience of pens, paper and books. A challenge for educators is to equip children with the range of literacy competencies that will enable them to negotiate the dynamic nature of the literacies required for effective participation in their personal, social, civic, educational and vocational lives. The title of this book speaks directly to this challenge. Augmented reality (AR) technologies overlay virtual content – such as animations and static representations of natural or artificial artefacts or texts – over real-world environments, so the user of AR is simultaneously interacting with elements of the real world and with computer-generated perceptual information. These AR displays are most commonly accessed with apps using the cameras on smart phones and tablets. AR technologies not only bridge the material and virtual worlds by facilitating the integration of still and moving images, sound, music and spoken and written language, but they also enable students to be represented as participants in the augmented reality worlds they experience via the AR apps and their digital devices.

The authors of this book have provided a very practical and accessible introduction to pedagogical practices that integrate AR into students' literacy and literary experience. As well as usefully reviewing readily available AR apps, the book provides detailed examples of classroom teaching programs across primary year levels. These programs clearly demonstrate the productive interconnection of digital multimodal literacies using AR with more familiar traditional literacy practices. They incorporate significant exploration of well-known literary picture books, and emphasise the importance of teacher modelling and

joint teacher-student interpretation and creation leading gradually to independent student-initiated application of AR affordances. The book crucially gives voice to the experience of the teachers' exploration of the new forms of literacy learning that were facilitated by the introduction of AR into their classrooms. This will be a most helpful handbook for teachers seeking to ensure that they are preparing students for the literacies of the 21st century.

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Acknowledgements

Online resources

Curriculum information in relation to this book can be found on PETAA's website: https://bit.ly/PET129extras

Credits

The authors and PETAA gratefully acknowledge the following:
Figure 5.1 (p. 58) and Figure 5.2 (p. 59) from *Here we are: Notes for living on planet Earth*. Reprinted by permission of HarperCollins Publishers Ltd. © 2017 Oliver Jeffers

Chapter 1

Preface

Introduction

As primary educators, many of the young students we teach will have experienced augmented reality (AR) in their everyday lives. Some have played *Pokémon GO* or have tried AR filters on social media platforms with their family members (see Figure 1.1). Many young students (and adults) have a lot of fun using these AR games and filters. On social media, when taking and posting a photo, a user can use AR to layer a virtual object over the physical space to create a comical or playful scene.

When creating such AR-infused visuals, users make meaningful choices for purposeful communication. These choices include using AR to choose a virtual object, and placing and pinching it to enlarge or minimise. Is a cute animal mask chosen to signal playfulness? To hide the face? (Or just the dark circles under our eyes from writing this book?) Many of our young students would have such digital experience and also be familiar with these choices. What our students are *not* familiar with is making the connection between these informal playful digital practices and purposeful literacy events.

Figure 1.1 An edited photo using an AR filter on Facebook

The aim of this book

The aim of this book is to introduce a pedagogical framework to empower primary literacy teachers to use AR applications (apps) for literacy learning and teaching. This is driven by the proliferation of AR apps and the need to foster a culture of critically literate engagement in an increasingly multimedia-focused world. Although teachers are expected to support students in learning – both with and through new digital forms – there is often a slow uptake of new media, such as AR, in our local contexts. We acknowledge that while teachers and students are very likely to have at least some experience with AR filters on social media, there may not be any systematic exploration and thinking about the integration and implementation of AR for literacy learning and teaching. This book aims to bridge the gap between personal digital practices and formal pedagogical practices.

2019 PETAA Research Grant and survey

This book was made possible by the 2019 PETAA Research Grant, 'Language and Literacy Learning and Teaching with Augmented Reality'. We are very grateful for the trust and support that the PETAA team has given us over the past two very challenging years. Our original plan was to design and implement a series of units of work from Foundation to Year 6 classrooms. However, COVID-19 disruption and restriction during this time meant we were only able to implement and share case studies from Foundation to Year 4 classrooms.

As teachers, teacher educators and researchers, we have been interested in the use of technologies for learning and teaching. Lynde has a keen interest in challenging the status quo in education using digital technologies. For more than two decades, she has been actively working with classroom teachers to redesign learning and teaching using emergent technologies. Alice has been interested in the use of technologies by second language students to learn English beyond the classroom. She is constantly amazed by students' intense interest, creativity and ingenuity to maximise learning opportunities when it comes to technologies. In this project, she was also impressed by the ways English as an Additional Language or Dialect (EAL/D) and Language other than English (LOTE) background students used technologies creatively to communicate across English and other languages.

Getting to know teachers' knowledge and confidence

In 2019, we designed a survey and distributed it to PETAA members (comprising teachers, pre-service teachers, principals, literacy consultants and teacher educators), and their networks of language and literacy primary school teachers. The survey covered their self-assessed knowledge and readiness to use technologies to teach multimodal literacies and their readiness to implement AR apps for literacy learning and teaching.

By multimodal literacies, we mean the literacies associated with multiple modes of representation and meaning-making. Many of the everyday and academic texts our students encounter are multimodal, meaning that they contain more than one mode of communication. Let's use a scientific poster as an example. When a student looks at a science poster of a butterfly's life cycle, teachers will teach the student to understand the life cycle by extracting meaning both from looking at the images of a butterfly at different life stages and written texts (or captions). The teacher will also draw students' attention towards understanding how, together, the visual (images) and the written (text) components communicate the butterfly life cycle. Then, when the student is required to make a poster

of a frog's life cycle, they will also include both visual and written texts. Similar to other literacy practices, multimodal literacy practice should be modelled and guided before students attempt independent practices.

A high number of survey respondents indicated that they had confidence in discussing and teaching multimodal literacies with printed materials. However, they expressed less confidence in applying multimodal literacies with new media. While AR is at the forefront of interactive digital technologies, there were responses indicating teachers were not certain about how an AR app worked and how it could be incorporated in the classroom context.

After reviewing the preliminary findings from the survey, we learned some valuable lessons:

1   Multiple iPads and tablets are available in most schools, so it is possible for at least one class to use these devices for an AR-incorporated unit of work. However, one of the teachers' major concerns was associated with the cost of installing an AR app. We decided we would only use freely available AR apps. (Some apps contain in-app purchases, which means users can choose to pay for additional features.)

2   Many teachers expressed concerns that they did not have a working knowledge of newly available AR apps. While we tried to introduce and adopt apps that were newly available in 2019, it has been two years since we were able to complete the implementation of AR lessons in school due to the COVID-19 disruption. At the time of publication of this book in early 2022, all AR apps used and mentioned are still available on the Apple App Store and/or Google Play. Though some of these apps might have been updated to new versions since we used them in classrooms, they still offer the same functions.

3   Many teachers did not know how to evaluate the quality of AR apps for use in the literacy classroom.

Learning and teaching with AR apps: Thinking like a teacher

Following our survey, we worked with a group of dedicated and motivated teachers and teacher leaders in Sydney across all primary school years. We ran a two-day workshop with these teachers to introduce the 'onboarding experience' and evaluation of different types of AR apps. The onboarding experience refers to personally experiencing a range of selected AR apps for the first time. The experience was essential as it allowed our teachers to understand and experiment with AR apps as new users.

At this stage, many teachers were attracted by the novelties of the apps, while some also expressed frustrations regarding limitations with some apps (e.g. a short interactive narrative or a limited selection of AR virtual objects). Such first-hand experience enabled teachers to move beyond personal enjoyment to assume pedagogical roles and critically evaluate the AR apps for literacy learning and teaching. The introduction and evaluation of some of these apps was published as PETAA Paper 220, *Teaching language, literacy and literature using augmented reality* (2020).

After exploring the pedagogical potential and limitations of AR apps with the teachers, we worked together to co-design four units of work suitable for Foundation to Year 6. These units are for literacy learning and teaching enhanced by the use of AR apps. Many of the AR apps used in this book were not designed for educational purposes. However, they can be used for educational purposes because they all include new opportunities in the new media environment where students can experiment and manipulate different available functions within the app for meaning-making.

Our theoretical orientation

Our work was informed by the social semiotic approach to multimodal literacies learning and teaching (Kress and van Leeuwen, 2006; see the box below for an explanation of social semiotics). This approach to multimodal literacies learning and teaching means understanding how students communicate in response to why and how they communicate. In using a social semiotic approach to understand and incorporate the use of technologies in the classroom, we drew on our understanding of semiotic technologies (see the pioneering work by Djonov and van Leeuwen, 2018; Zhao et al., 2014). The work on *semiotic technologies* highlighted the importance of thinking about technologies and their use as social practices, and how they have to link to other aspects of literacy learning and teaching practices.

SOCIAL SEMIOTICS

Social semiotics is a way of looking at how people understand and develop systems, principles and resources to make meaning of, and with, the world around them. Imagine yourself reading a recipe. You immediately have some ideas about what a recipe should look like ('systems'): ingredients (including quantity and measurements; 'resources') and cooking steps ('principles'). Now, you may have a recipe passed onto you from your grandmother, handwritten on an index card. The index card may be pasted together with a collection of other recipes in a scrapbook. You may also have other recipes cut out from magazines, only those are printed on glossy paper with illustrations or photos of the finished dishes ('resources'). Tonight, you want to find a quick recipe before going to the supermarket and so you check a new recipe online from a blog. The blog site even allows you to click and add all ingredients into your shopping basket for click and collect (more 'resources'). When you get home from your shopping, you forget where you got the online recipe, but there is a YouTube cooking demonstration video (another 'resource'). Here we can see that our understanding of a text, or how to communicate a text, has moved from handwritten, to printed with illustrations, to a multimedia format.

Meaning-making through modes and media: Key terms

When children engage in multimodal literacy activities, they do so in specific social contexts that shape and are shaped by such literacy activities. Adopting a 'social semiotic multimodal frame' (Kress, 2015, p. 58) means our approach is meaning-oriented, where the educational gaze is directed at 'meaning, meaning-making, meaning-makers, [and] agency' (Kress, 2015, p. 53). We'll go back to our earlier example of a scientific poster of the life cycle of a butterfly. When children read the poster, they understand it by comprehending both the visual and written components. They also make meaning in that it is not only with this particular poster that scientific fact is communicated multimodally, or through both visual and written texts (meaning-making). As we want our students to be more than simply looking at and understanding a science poster, we encourage them to create their own poster (meaning-makers) by making choices in their use and composition of visual and written components (agency). This approach requires a clear understanding of some key concepts related to multimodality framed by social semiotics. These key concepts are introduced below.

Semiotic resources

The Australian Curriculum: English is underpinned by Halliday's (1978) social semiotic view of language to support primary school students' learning *of* language, *through* language and *about* language (Derewianka, 2020; Derewianka & Jones, 2016; Humphrey et al., 2012). It is widely acknowledged that language is one of many semiotic resources for making meaning. This key term in social semiotics is defined as 'the actions and artefacts we use to communicate, whether they are produced physiologically – with our vocal apparatus; with the muscles we use to create facial expressions and gestures etc. – or by means of technologies – with pen, ink and paper; with computer hardware and software; with fabrics, scissors and sewing machines, etc.' (van Leeuwen, 2005, p. 3). The interpretations, uses of meaning-making resources, regulation of these uses and new ways of using them in specific contexts inevitably draw on the human senses.

Semiotic modes

An 'organised set of semiotic resources for making meaning' is known as a semiotic mode (Jewitt, 2006, p. 3). Modes are broadly understood as 'the outcome of the cultural shaping of a material' (Jewitt, 2009, p. 300), namely the linguistic, visual, gestural, audio and spatial modes. According to Kress and van Leeuwen (2001), each mode is a semiotic system with its own grammar of design and these grammars are semiotically organised and regularised, and have generalised rules for how they can be combined in meaning-making. For a linguistic mode to express and represent meanings, it needs to exhibit the three meta-functions – the experiential meaning, the interpersonal meaning and the textual meaning (Halliday, 1978; Eggins, 1994, Rowsell, 2013). For non-linguistic modes, Kress and van Leeuwen (2006) suggested using the representational, the interactional and the compositional meanings to describe, analyse and interpret how modes work together to construe the three meta-functions.

Media

Media refers to communication channels. In the Australian Curriculum, media texts are defined as those 'found in newspapers, magazines and on television, film, radio, computer software and the internet'. Another common term that educators often encounter is 'visual media', which can be understood as channels and platforms that can produce or present visual texts. The distinction between modes and media is not always clear. Modes of communication are semiotic modes for meaning-making and they comprise semiotic resources. Each mode is a system with a distinct grammar for organising and regularising the uses of semiotic resources. Media are the communication channels such as picture books, websites, films, podcasts, AR apps etc. (Tan et al., 2019). For instance, on a page of a picture book (media), we have various modes of communication, such as written texts, illustrations, spaces between texts and illustrations, and colours.

Multimodal texts

Multimodal texts are texts that are constructed by integrating at least two communication modes for meaning-making. These modes are generated using different media. Digital texts are multimodal texts as they are produced by converging different communication modes in the same software or application. However, multimodal texts are not always digital texts (Tan et al., 2019). For example, a pop-up book is printed, but is considered multimodal as it has words and images, with parts of the book popping up to construe particular meanings by drawing on the spatial mode.

How this book is organised

In Chapter 2 we will provide an introduction and overview of the potentials and benefits of AR multimodal literacies. A list of AR apps used in this book will also be reviewed in this chapter.

Chapter 3 discusses the pedagogical framework for enhancing multimodal literacies with AR. This framework will support teachers when they consider and use AR in context, by looking at the four stages of implementation: the onboarding experience, embodiment, talking to learn and multimodal designing.

Chapters 4 to 6 provide individual case studies to illustrate evidence-based strategies for learning and teaching literacy with AR. The units of work presented in these chapters were co-designed by teachers and researchers, and implemented in primary classrooms in late 2020. The units of work were co-taught by the year group teachers whose dedication to trying out new technology for learning should be applauded.

In Chapter 4, we will see how the use of AR can enhance a deep understanding of a shared picture book with a class of Foundation students. In Chapter 5, Year 2 students exploit the potentials of AR to become space explorers. Their new understanding of physical and virtual spaces gave students the chance to reimagine how physical spaces in school could be used to facilitate social learning. In the final chapter (Chapter 6), a composite class of Year 3 and 4 students use their AR app onboarding experience to deepen visual literacy for multimodal designing. In this chapter we will also see how AR apps provide social learning spaces for talking to learn and team work for multimodal composition.

To make this book as resource-rich as possible, we have included 'Tech tips' and QR codes for you to access online resources that support any reader's first foray into AR use, including the AR apps and experiences implemented in the cases, whenever possible.

Conclusion

We anticipate that the audience of this book primarily consists of classroom teachers, but we are aware that there will be principals, academics, teacher educators, pre-service teachers and literacy consultants who are joining our wonderful journey of discovering AR for literacy learning and teaching.

We are very grateful for the opportunities to work with a team of dedicated teachers who were willing to take on new learning opportunities and push boundaries for literacy learning and teaching. We were continuously inspired by how they stimulated our thinking and discussion with practical and pragmatic attitudes for literacy pedagogy. More importantly, we were amazed and excited by the young students who were stimulated and excited by using new technologies to reimagine, repurpose and claim ownership for literacy learning.