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Transformative Language Use in and Beyond the Classroom with the Voice Story App

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Abstract

This paper describes the process of creating an app for languages informed by two key theoretical frameworks; the Framework-For-Action (FFA) (Hughes, Guion, Bruce, Horton, & Prescott, 2011) and the technological, pedagogical and content knowledge (TPACK) framework (Koehler & Mishra, 2009). Feedback from students throughout development informed the pedagogical and functional considerations which in turn supported the full development of the app. The app facilitates practical language use and contributes to language learner autonomy and self-access in and beyond the classroom.

Key words: Voice Story, App, technology, language learning, language using

Self-access learning resources support learners of languages to move beyond classroom-bounded language learning to anytime, anywhere language learning. Such resources promote learner autonomy and expand the contexts for learning. In an attempt to increase learners' meaningful use of the languages they are learning, both in and beyond the classroom, an app was conceived. A key aim of the app was to move learners beyond what they are learning in class towards applying the language that has been learned in class by using it meaningfully. This paper describes the rationale and research approach adopted to design, develop, and trial an app for using languages. It outlines the guiding theoretical frameworks that informed the creation of the app and the phases of development including field trials and feedback from students. Finally, it explores the potential of the Voice Story app as a technological tool to enhance learners' language use. The app was developed to be an open-ended resource for use by teachers, self-access professionals and students and aims to contribute to language learner autonomy and meaningful oral language use.

Rationale and Theoretical Frameworks

Technology is already widely used in many schools, often claimed to enhance the learning experience for students by increasing engagement and interest. Many forms of

technology, however, have not be created by educators with a pedagogical underpinning so require careful critique. It is also important that benefits for learning as well as engagement and interest are understood. It is with this purpose that two frameworks; the Framework-For-Action (FFA) (Hughes et al., 2011) and the technological, pedagogical and content knowledge (TPACK) framework (Koehler & Mishra, 2009), were used to inform the development of the Voice Story app for languages and that a strong focus was on the goal to increase learners' language use. These two frameworks were selected because they each represent well-researched bases of knowledge involving the integration of technology for a pedagogical and content specific purpose.

Framework-For-Action

Many forms of technology merely replace a paper-based tool with technology and do not add any transformative pedagogy to the teaching-learning practice. When schools use technology, it should not be "simple adoption" offering a technology replacement but should enhance the "transformative pedagogical potential" of teaching and learning (Hughes et al., 2011, p. 53). The Framework-For-Action (FFA) (Hughes et al., 2011) identifies the importance of technology offering "transformative resources" rather than mere "replication" or "replacement" of a paper-based or analogue tool. In line with this there should be an emphasis on the "amplification" and "transformation" of learning that can be provided with each form of technology considered (Hughes et al., 2011; Lammons, Momata, Mynard, Noguchi, & Watkins, 2015). Accordingly, the development of the Voice Story app will be critiqued for what it offers as a "transformative" technology resource beyond what could be provided in analogue, paper-based form.

TPACK

The technological, pedagogical and content knowledge (TPACK) framework (Koehler & Mishra, 2009) for teacher knowledge for technology integration is an important framework to consider alongside the development of new technologies for educational contexts. The framework identifies the interaction between technology, pedagogy and content knowledge, each important to the successful integration of technology for teaching and learning (Koehler & Mishra, 2009). Teaching well with technology requires considering each component of the TPACK framework; technology, pedagogy and content knowledge. Voice Story will be critiqued for the TPACK considerations that were embedded into the app development.

Method

Context

In Melbourne, Australia, the context for this study, twenty-two different languages are taught across primary and secondary schools within the core curriculum area known as 'Languages'. Despite languages being taught however, there is constant criticism that learners are not able to use the languages they are learning. There is an ongoing need to seek strategies and tools that encourage learners to use the languages they are learning meaningfully. It was for this reason that an app was developed for the purpose of encouraging learners to use the language they have learned in the meaningful context of stories.

Participants

Throughout the development of the Voice Story app there was a series of field trials, including observations of students' use of the app and feedback from students, that were carried out at three schools in Melbourne, Australia with a total of 157 students.

School A is a state government coeducational primary school with students from a diverse range of language backgrounds. Italian is taught in the 'Languages' program at the school which is a new 'second' or 'further language' for most students. Participants in School A included 12 students from Prep A (Prep is the first year of primary school in Victoria, Australia and precedes Year 1), 14 students from Prep B, 10 students from Year 1, 14 students from Year 2, eight students from Year 3/4 (a class with combined year levels), and 17 students from Year 5/6. Trials of the app were carried out in students' first languages which included eleven languages; Arabic, Chinese Mandarin, Delacu, English, German, Hindi, Italian, Korean, Shona, Somali, Spanish, as well as in Italian, the additional language taught at the school. The school has class sets of iPads and laptops.

School B is an Independent girls' school that offers education at kindergarten, primary and secondary levels. The Japanese second language program in Years 3 and 4 of primary school were used for the trials of the app. Participants included 17 students from Year 3A, 18 students from Year 3B, 16 students from Year 4A and 17 students from Year 4B. The Japanese program has a class set of iPads.

School C is a Catholic girls' secondary school that offers French, Italian and Japanese as school 'second language' subjects. Participants from the school trialled the app in one or more of these three languages. Nine students were from Year 7 and five students were from Year 9. All students at this school have laptops and each of the participating students in the app trials also have their own mobile phones.

Research approach

An ongoing, systematic cycle of action research was used to develop the Voice Story app. Action research was deemed appropriate as it is a situationally responsive method to provide authenticity and voice to research that impacts on practice (Cohen, Manion, & Morrison, 2011). Action research in this study involved cycles of planning, acting by implementing plans, observing, gathering feedback, reflecting, and then repeating the cycle.

The aim of the project was to develop a fully functioning app to serve the purpose of increasing learners independent use of the language/s that they are learning. The cycles of action research carried out with students in the context of schools and informed by observations and feedback were critical elements of the app development. The theoretical underpinnings of the FFA and TPACK frameworks were used to inform the development of the app throughout the project. Each of the phases of development are described and then the considerations from the theoretical frameworks are detailed.

Phases of development

Starting point - the analogue task

The concept for the Voice Story app was developed from an originally created analogue 'Storytelling' task. Storytelling was developed as a tool for learners to use the language/s they are learning by creating their own meaningful stories. It consists of sets of pictures that represent language that students have learned in class and the language that students are currently using. It also includes blank cards that can be used for any other language that is not already represented with a picture. The cards can be left blank or have pictures drawn on them to provide for personalised stories. Students select and sequence the magnetised pictures to a whiteboard to visually represent a story. A picture may represent one word or be a prompt to elicit an extended utterance. Students rehearse their stories as often as they like until they are ready to tell it. Storytelling was found to successfully elicit oral language from students and provide an open-ended platform for them to use any language, at all language levels (Wilks-Smith, 2017a).

Despite the effectiveness of Storytelling as a tool to increase learners use of languages, it requires hours of teacher preparation time. The sets of pictures need to represent language that students already know and use, they need to be added to as new language is learned, as well as include language and content that students personally request to include in their stories. It is the continued evolution of the resource that makes it particularly time consuming. The

idea for the Voice Story app derived from the desire to retain the benefits of the Storytelling task whilst eliminating the heavy teacher preparation requirement of the analogue task.

Phase 1 – the app prototype

Phase 1 of the project involved the translation of the analogue Storytelling task to the Voice Story app prototype (Wilks-Smith & Thong, 2018). Plans were first drawn up on paper to illustrate what the Voice Story app might look like including the special features of the app. The creation of the prototype included design considerations so that it would be intuitive to a wide target audience. It also needed to be suitable for a range of ages and language abilities. One instantly recognisable feature of Voice Story is the use of emojis, which are already familiar and widely used. These emojis provide endless possibilities for stories. In addition to the emojis, the app includes the use of photos that can be added via the camera function or used from the existing camera roll. This greatly personalises users' stories. Emoji images and photos are simply touched and dragged onto the screen to plan a story. The sequence of pictures can be swapped, dragged to a bin if unwanted and a whole story can be cleared. Picture direction can vary for different language users who may prefer horizontal right to left, left to right, or vertical orientations. Stories can be audio recorded and played back which encourages purposeful language rehearsal until the user is happy with their story to save and then share.

When the prototype was a working model, field trials were carried out in School A and School B. The purpose of the trials was to observe students' use of Voice Story on the provided iPad, to identify how students used it, to identify if there were any issues in the functioning of the app, and to obtain feedback from students about it. It was important that Voice Story was developed responsive to the context that it would be used in to provide authenticity and to be shaped by the voices of learners.

During field trials, anecdotal notes were taken of observations of students using the prototype and quotes of comments heard during use of it were noted. The trials also included planned questions asked to each participant after using the prototype app:

What do you like about the app?
What works well?
Is there anything that doesn't work?
Do you have any ideas for improvements? And if so, what?
What do you think students can learn or practice with the app?

Would you like to use it at school?
When do you think it could be useful at school? (in which classes?)
Would you use it outside of school? If so, in what situations?
These questions aimed to find out about the functioning of the app, students' enjoyment of it, and the learning that students believed could be possible with it.

Phase 2 – full development

Phase 2 involved reflecting on the prototype, and on observations of its use together with feedback from students. Data obtained from the students was read, re-read and classified into themes. Items to action, such as functional issues, or recommendations to consider, formed the phase 2 development.

The full development of the app included new features, some improved functioning, and incorporated recommendations by students. Significant work was done on the visual design which included a Voice Story logo, themes and colours. Improvements were made to the functioning of the scrolling of emoji categories and the order of the categories was changed. The functioning of the recording and play-back features were also greatly improved. Each of the buttons that previously had text were replaced with pictures representing the function so that the app would be language agnostic.

When the app was fully developed, field trials were again carried out in School A and School B. The functioning of the app was observed, and feedback was sought from students after use. The same questions were asked of the students as were asked in Phase 1.

Phase 3 – completed app

Phase 3 involved reflecting on the observations and feedback gleaned in Phase 2 and making final modifications to Voice Story. Phase 3 also involved a final round of testing and trials, this time with a small selection of students who participated from School A and students from School C for the first time. The functioning was checked on a wider range of devices; previously only iPads were used, and this time laptops and phones were also included in trials. Informal feedback was provided by participants. Although there were a few further ambitious ideas suggested by some students, it was decided by the developers after the Phase 3 trials that Voice Story had achieved its aims and was ready to be launched for widespread use. It is not suggested that this is the end state of the app and that there will not be further phases of development, but rather that it is time that Voice Story is ready for wider

use and the trials have generated enough interest that schools, language programs and teachers are ready to start using it.

App development relating to the Framework-For-Action

In relation to the Framework-For-Action (FFA) (Hughes et al., 2011), one key question was posed and reflected upon throughout the development of the Voice Story app: *What features of the Voice Story app show transformative pedagogy in the teaching-learning practice beyond what can be achieved with the analogue Storytelling task?*

App development relating to TPACK

In relation to TPACK (Koehler & Mishra, 2009), one key question was posed and reflected upon throughout the phases of development:
What are the pedagogical, content and knowledge beliefs relating to language education that underpin Voice Story?

Discussion

Thematic analysis (Braun & Clarke, 2006) of the observational data of students' use of the app as well as student feedback, identified functional and pedagogical impacts of Voice Story. Each of these categories of data were used to respond to the functional issues that were identified, inform further app development and articulate the pedagogical impact of Voice Story.

Informed by the Framework-For-Action, the key question *What features of the Voice Story app show transformative pedagogy in the teaching-learning practice beyond what can be achieved with the analogue Storytelling task?* was asked and is now discussed.

Framework-For-Action

The Framework-For-Action highlights the importance of technology providing transformational learning that cannot be achieved with a paper-based form. Throughout the creation of the Voice Story app the features that could be considered paper-based replacement were defined, whilst also articulating the features that represented transformative learning. Firstly, the shared features of both the analogue Storytelling task and the Voice Story app are:

- ✓ elicits language from students,
- ✓ open-ended,
- ✓ enables learner choice,

- ✓ all levels,
- ✓ all languages,
- ✓ any topic,
- ✓ learner-centred,
- ✓ language students know,
- ✓ self-selected content,
- ✓ personalise the task with selection of pictures,
- ✓ student ownership over learning,
- ✓ builds confidence,
- ✓ meaningful language use,
- ✓ language in context,
- ✓ promotes increased use of language and rehearsal,
- ✓ provides opportunities for reflection on own language use, and
- ✓ promotes learner autonomy.

Transformative language use

Rather than Voice Story simply reproducing the Storytelling task in a digital format, it offers an extended educational experience with the additional functions and features that it provides and extended *transformative* learning that includes:

- ✓ extended quantity of images,
- ✓ manageable categories of images on app (rather than hundreds of scattered cards),
- ✓ personalisation of stories with "selfies" and photos,
- ✓ rehearse, record and play-back story functions, providing an extended purpose to repeat and rehearse language,
- ✓ save and share story functions;
    - provides evidence of oral language skills and a record of language development over time,
    - provides opportunities for the learner to reflect on their learning, build on from their learning and celebrate their development,
    - supports teachers to monitor learners' development, with recordings providing diagnostic information to inform future teaching and can be used as assessment data.
- ✓ removes resource preparation time for teachers,
- ✓ a paperless system,

- ✓ language use in and beyond the classroom,
- ✓ self-access for language rehearsal anytime, anywhere.

In relation to TPACK, the key question *What are the pedagogical, content and knowledge beliefs relating to language education that underpin Voice Story?* was posed throughout app development and is now discussed.

TPACK

TPACK was used as a framework underpinning the theoretical and pedagogical position from which Voice Story was developed and to articulate the pedagogical findings from field trials. Teacher knowledge for technology integration using TPACK is articulated in terms of second language education.

One important aspect of teacher knowledge regarding content for second language teaching and learning is that merely transmitting new content to students does not equate to students being able to apply the knowledge or content practically, use the language in appropriate situations and contexts and communicate meaningfully in their own personally important ways using the new language. Much more is required beyond the transmission of content. Learning needs to be presented and importantly, used, by students in a wide variety of ways for it to be fully understood and be able to be used effectively. It is with this teacher pedagogical knowledge that Voice Story was developed as a tool for learners to rehearse their language, in context and meaningfully.

Many apps for languages fail to understand the pedagogy of teaching languages. App developers without a background in education often see teaching as the transmission of knowledge or the telling of content with the assumption that learning will take place. There is often no consideration of the interaction with the learner or of the active role that the learner must play to enable new learning to occur. These limitations of current language apps are reflected by the many apps for languages that tell new words using a traditional rote learning method that often introduce isolated words or phrases out of context and in which learners are passive in their "learning" of the new language. Very rarely will learners be able to apply the language they have learned meaningfully and in context through such an approach.

Central to the pedagogical beliefs underpinning the creation of the Voice Story app is the desire to avoid language drills with a focus instead on original language creation by users (Vaala, Ly, & Levine, 2015), this supports learners to apply their existing knowledge with the creation of new language (Wartella, 2015). This was evident in the field trials with many

students creating funny sentences and stories that would not have been modelled in class before but have been created using the language learned in class. Students derived enjoyment by making funny stories, such as about "a puppy playing tennis" or "a pig going to a restaurant and eating a cow". It is important that language is not in isolation but is situated in context (Lave & Wenger, 1990) such as in the context of stories, and importantly are the stories that students want to tell.

The trials of Voice Story identified that it was an effective tool for students to produce language meaningfully in their own personally important ways by using language and content that is of interest and important to them. Many students loved involving themselves in the stories by including a "selfie" or their own photos, therefore personalising the stories beyond a set selection of pre-determined pictures. The personalisation of the stories is an important educational consideration that all learning be connected and relevant to learners' lives (Weinstein, 2006). The open-ended telling of stories allows students to say what they want to say, can say and are empowered to use language that is meaningful to them. It was also pedagogically important that students apply the language they have learned at school by producing language meaningfully.

Voice Story was shown to be an open-ended task that showcases students' optimal oral language output abilities. Students are free to be creative, include their interests and demonstrate the language they know. It is particularly important that students are given the opportunity to show their language abilities beyond the constraints of one pre-determined story or any other language task with a narrow focus regarding language level or topic. Voice Story provides an unlimited number of possibilities of language that can be used in any combination to tell any story. Stories reflected students' knowledge of their second language, particularly evident in the observations of students from School B who were learning Japanese as a second language. Many students were observed choosing emojis according to what they could say in Japanese, explicitly stating, "I can say …". Others changed the content of their stories during creation to use the language they knew. One example was a student who included a dinosaur in their story and when they couldn't say it in Japanese, changed it to "dog".

Observational data showed that Voice Story stimulated language use when planning stories. Many students verbally told the story while creating it with images and others were heard whispering parts of a story while planning. These observations identified the impact of visual storytelling for language planning. Traditionally when learners rehearse language, repetitive drills are used that are boring and remove language from a meaningful context.

Voice Story was shown to elicit lots of language rehearsal by students, much of which they were unaware of, whilst they were planning their stories or re-telling them until they were happy with their story ready to share it. In this way, Voice Story provides a meaningful, purposeful way to rehearse language.

There were also examples of students using visuals and language to aid recall of content. One student used Voice Story in his home language, German, and did lots of self-questioning and recalling while creating his story. He asked himself, "What food do I eat in Germany?", then remarked in English "It's cold in Germany", "That's my grandpa in Germany", and "I got bathed in Germany", then told the story in German. This learner used Voice Story to recall his experiences in Germany in German, and planned and commented on the story in English, his second language.

Students also produced language together, which provided opportunities to share ideas, determine what they could say in the second language, discuss the language together as they planned together, as well as produce language together when they shared their stories. One student explicitly stated that "If you do it together, you can discuss it, and use Japanese even more". Students were reflective about the educational benefits of Voice Story for their second language learning, with one student saying, "It got us to think about the language", and another commenting that "It's helpful for thinking about your Japanese".

Voice Story also provided the opportunity for many students to use their home languages. One student questioned, "Can it do it in my language?" This showed that some students with minority languages were aware that many apps are only available in a limited selection of 'other' languages. One student stated, "I haven't done an activity in Delacu before!" and another student shared "I have only ever spoken Shona in my house". Voice Story represented the first time for each of these students to use their home languages at school and have their language skills recognised by the teacher and their peers. Voice Story is a resource to bring learners' languages into the classroom and celebrate the language skills they have. Teachers don't need to speak other languages to bring those languages into the classroom (Wilks-Smith, 2017b).

It was important that student voices were heard throughout the development of Voice Story because they are the target users of the app. Student feedback informed the phases of development, provided new insights and confirmed that the purpose of the app, to expand students' language use, was achieved. Technology use needs to correlate with teachers' pedagogical beliefs for them to consider using them (Ertmer, 2005) and the observations and

feedback from students in this project helps inform teacher choice about the potential of Voice Story.

Conclusion

This paper described the process of developing an app for using languages. Alongside the development were key considerations informed by the Framework-For-Action (FFA) and TPACK theoretical frameworks, which supported the pedagogical underpinning of the app as a learning resource. Observations and student feedback were gathered during field trials in three schools that identified a wide range of functional and pedagogical considerations that informed the development process. The FFA enabled the transformational qualities of the app to be articulated in accordance with the framework and the potential of Voice Story as a pedagogical tool for languages was discussed in relation to the FFA and TPACK frameworks. Self-access professionals would benefit from considering the pedagogical features of these frameworks when adopting new resources.

The educational potential of the Voice Story app was positioned as a platform for language use in and beyond the classroom, therefore providing for learner autonomy and self-access learning. Self-access students would benefit from the app by expanding their opportunities to meaningfully use the language/s they are learning. Particular pedagogical features include its use as a tool for self-directed language use with learners actively producing meaningful language in the context of stories, it is open-ended and provides for personalisation of language, and can be used with all languages, at all levels. It can be used as a language tool anytime, anywhere, expanding language rehearsal time and reaching beyond the allocated language learning time within a school timetable, supporting greater learner autonomy and self-access to using languages.

Notes on the contributors

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educator and researcher. Her work focuses on the design of serious games to augment teaching and learning experiences.

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References

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101. https://doi.org/10.1191/1478088706qp063oa.

Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education, 7th Edition*. USA & Canada: Routledge.

Ertmer, P. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration. *Educational Technology, Research and Development, 53*(4), 25-39. https://doi.org/10.1007/BF02504683.

Hughes, J., Guion, J., Bruce, K., Horton, L., & Prescott, A. (2011). A framework for action: intervening to increase adoption of transformative web 2.0 learning resources. *Educational Technology, 51*(2), 53-61. http://techedges.org/wp-content/uploads/2015/11/Hughes_etal_2011_Pre-Press.pdf

Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education, 9*(1), 60-70. https://www.learntechlib.org/primary/p/29544/

Lammons, E., Momata, Y., Mynard, J., Noguchi, J., & Watkins, S. (2015). Developing and piloting an app for managing self-directed language learning: An action research approach. In F. Helm, L. Bradley, M. Guarda, & S. Thouesney (Eds.), *Critical CALL-Proceedings of the 2015 EUROCALL Conference, Padova, Italy* (pp. 342 - 347). Dublin: Research-publishing.net http://dx.doi.org/10.14705/rpnet 2015.000356.

Lave, J., & Wenger, E. (1990). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.

Vaala, S., Ly, A., & Levine, M. (2015). Getting a read on the app stores: A market scan and analysis of children's literacy apps. New York, NY: *Joan Ganz Cooney Center at Sesame Workshop*. Retrieved from http://www.joanganzcooneycentre.org/wp-content/uploads/2015/12/jgcc_gettingaread.pdf

Wartella, E. (2015). Educational apps: What we do and do not know. *Psychological Science in the Public Interest, 16*(1), 1-2. https://doi.org/10.1177%2F1529100615578662.

Weinstein, G. (2006). Learners' lives as curriculum: An integrative project-based model for language learning. In G. H.. Beckett & P. C. Miller (Eds.), *Project-based second and foreign language education* (pp. 159-165). Greenwich, CT: Information Age Publishing.

Wilks-Smith, N. (2017a). The impact of Intentional Teaching Gestures (ITG) on second language output: A summary of research findings. In C. E. Office (Ed.), *Leading languages professional learning program*. Melbourne, Australia: Catholic Education Office.

Wilks-Smith, N. (2017b). The place of learners' languages in literacy programs: Bringing learners' home languages in through the school gate. *Babel, 52*(1), 27-34. ISSN: 0005-3503. Retrieved from https://search.informit.com.au/documentSummary;dn=048730924656779;res=IELAPA

Wilks-Smith, N., & Thong, L. P. (2018). *From storytelling to the Voice Story App: A research translation project.* Paper presented at the IAFOR Asian Conference on Language Learning, Kobe, Japan. April 27-29, 2018. Retrieved from http://papers.iafor.org/wp-content/uploads/papers/acll2018/ACLL2018_40021.pdf