Sustaining motivation for Japanese *kanji* learning: Can digital games help?

Dallas Nesbitt

Auckland University of Technology
dallas.nesbitt@aut.ac.nz

Amanda Müller

Flinders University
amanda.muller@flinders.edu.au

Educational digital games are often presented at Technology in Language Education conferences. The games are entertaining and are backed by research detailing how games can improve the learning experience through active critical learning, learner interaction, competition, challenge, and high learner motivation. The authors, inspired by such presentations, were interested in creating digital games to mitigate problems of demotivation in a beginner Japanese kanji (non-alphabetic script) class at Auckland University of Technology but found there was no body of research on digital games for learning non-alphabetic scripts. This paper contributes to filling this gap by describing the creation of three digital games for kanji learning. Difficulties were experienced during the development of the games and these are described with reference to the divide, discussed in gaming literature, between the type of digital games being showcased at conferences and the reality for teachers wishing to emulate the practice by developing their own digital games. Questionnaire responses and the game-related journal entries of three cohorts of learners were analysed, and teacher reflections on the action research project were used to answer the questions "Should we be leaving this field to the experts?" and "Other than high-end multi-level curriculum-centred digital games, are there different gaming scenarios worth exploring?"

Keywords: Digital games, *kanji*, Japanese, Japanese script, demotivation

1. Introduction

Technology in Language Education conferences and workshops have been a good

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place to gain exposure to the practical use of high-end digital games in the classroom. Educational game design concepts, with their easy to use and understand, aesthetically pleasing graphics (Prensky, 2001), are appealing, and convinced the authors to use digital games in an action research project to mitigate problems of demotivation when learners were faced with highly challenging and monotonous learning tasks in the Japanese *kanji* (non-alphabetic script) classroom.

Simply making tasks less challenging is not a feasible solution for teachers of orthographic scripts. For a learner new to Japanese *kanji*, the three Cs – the *concept* of a non-alphabetic script, the multi-faceted *characters* each presenting structural, phonological, semantic and visual information, and the Japanese language *context* – each present a set of unique challenges and must be mastered concurrently. Learners need to become familiar in a very short time with as many characters as it takes to facilitate competent reading at a level that will allow for learning from context to take place; it is this highly-challenging task that can lead to demotivation. When questioned about specific behaviours such as non-attendance and lack of interest in viewing test results, learners at Auckland University of Technology typically said "I've just lost all motivation." The studies of Capa, Audiffren and Ragot (2008) on motivation confirm that "... tasks that are difficult will result in an intention to try hard, and tasks that are impossible will result in an intention not to try" (p. 144). Although learning *kanji* is not impossible, the task can soon become overwhelming and appear to be impossible for learners unused to the repetitiveness of long-term rote learning practices. The teachers observed that not all learners in the *kanji* courses showed signs of demotivation but it was difficult to gauge which learners would lose interest in learning and when this would take place.

The first section of the article examines the problems under investigation in this study – demotivation and the challenges faced by learners of Japanese *kanji*. This is followed by a discussion of the suitability of digital games as a solution to the problem presented by these challenges, and the best way forward due to the paucity of literature on games for learning non-alphabetical scripts. Next, the authors discuss the game development, and the constraints met during the process. The three games are then introduced and the study is presented. As this action research project was complicated by technological development issues and unforeseen results that impacted on the effectiveness of the solutions we had proposed, two questions were raised during the final reflective process: "Should we be leaving this field to the experts?" and "Other than high-end multi-level curriculum-centred digital games, are there different gaming scenarios worth exploring?" The authors have responded to these questions in the discussion section.

2. Challenges faced by learners

Japanese *kanji* are logographic characters that represent meaningful units and thus are particularly challenging for learners from an alphabet background. A *kanji* character is structurally complex: it can be formed from up to 16 pen strokes. The so-called "stroke order" or the way each small component of a character is written follows a set pattern that determines the proportions of the character (Zhang, 2014). A character is also phonologically complex: it can have both Chinese origin *on* readings and native Japanese *kun* readings depending on the *kanji* it is combined with, and, due to historical changes, it can have more than one key meaning (Komori, 2006). These complexities make *kanji* learning a difficult task, particularly within the time-constraints of the average university semester. Learners

may also experience cognitive processing difficulties if they have not had prior experience of logographic scripts (Haththotuwa-Gamage, 2006; Mori, 2014; Mori, Sato, & Shimizu, 2007), and item overload, defined in cognitive load theory as "the learning of complex cognitive tasks, in which learners are often overwhelmed by the number of interactive information elements that need to be processed simultaneously before meaningful learning can commence" (Paas, van Gog, & Sweller, 2010, p. 116).

Not only is learning *kanji* challenging, but it can also be monotonous because of the generally long process of acquiring familiarity with these numerous readings, meanings and orthographically similar structural components – the "form" and "content" of each character. A learner without any background in Japanese or any long-term practice in memorisation of large amounts of educational material will begin tertiary study and be confronted with a very challenging and monotonous memorising task. The beginner-level *kanji* courses cover a sufficient number of the 2,136 government prescribed *kanji* characters and their multiple readings to enable accurate reading and writing of Japanese at the increasingly high levels encountered throughout university.

The potential monotony of the *kanji*-learning task can be exacerbated by the way *kanji* is taught. Traditional pedagogy for first language (L1) learners in Japan is based on individual effort through repeated writing and frequent testing (Carson, 1992, p. 49; Machida, 2013). This pedagogy persists in the modern Australasian classroom and is monotonous when continued over the number of years it takes to gain fluency in writing Japanese. It is this monotony combined with the difficulty of practice that can lead to demotivation (Toyoda, 1998, p. 155).

A comprehensive overview of the causes of demotivation in the foreign language classroom is provided by Sakai and Kikuchi (2009, p. 61). The authors list the six most common causes of demotivation:

1. Teachers – attitudes, competency, teaching styles.
2. Class Characteristics – course content and pace, focus on difficult vocabulary or grammar, monotonous and boring lessons, focus on exams and the memorisation of language.
3. Experiences of Failure – low test scores, lack of acceptance by others, feeling unable to memorise vocabulary and idioms.
4. Class Environment – attitudes of classmates.
5. Class Materials.
6. Lack of Interest.

Their study shows that, of these six causes, the highest demotivators are "course content" under Class Characteristics and "low test scores" under Experiences of Failure.

These six causes of demotivation are the results of research completed on learning English as a foreign language (EFL) but the results are clearly echoed in literature on learning Japanese. Learners have admitted to "becoming discouraged and not wanting to continue studying" because *kanji*, the Japanese language, and grammar take a significant amount of time and memorisation (Matsumoto, 2007, p. 205). Grainger (2005, p. 329) asserts that Japanese, a language with a complex orthographic script, has high attrition rates at secondary school and tertiary level because it is difficult. As evident in Sakai and Kikuchi's list of common demotivators, teacher attitude is also a key factor. Teachers who feel that *kanji* is difficult tend to have negative feelings towards *kanji* which could influence learners' attitudes and motivation (Shimizu & Green, 2002, p. 235). In addition, Hamada and Grafström (2014, p. 15) compare Sakai and Kikuchi's list for EFL with their own research

on demotivators in Japanese language learning, and conclude: "Regarding learning content, *kanj*i and politeness are absolute causes of demotivation because of their difficulty, which Japanese students learning English would hardly experience".

The authors have also observed learners expressing frustration when they perceive the time they have put into rote learning does not achieve the desired results. Demotivation has been widely researched in situations similar to the *kanji* classroom where rote learning is prevalent. Typically, demotivation is triggered by the monotony of "a heavy focus on rote memorization of vocabulary and lack of practical application" (Falout, Elwood, & Hood, 2009, p. 405), tedious teaching methods, or over-challenging tasks (Pekrun, Goetz, Titz, & Perry, 2002). We are unable to base our research solely on rote learning of *kanji*, as many factors contribute to demotivation. These can be as wide as the whole school environment (Dörnyei & Ushioda, 2013), or can be particular aspects of education such as the curriculum content and materials, low test scores, teaching style, inadequate school facilities, and the learner enrolling in the class with no intrinsic motivation to help overcome affective issues and sustain learning (Sakai & Kikuchi, 2009). The authors had mainly anecdotal evidence to suggest that the monotony of *kanji* learning was the leading cause of demotivation in the *kanji* classroom as there is a paucity of studies specifically on *kanji*-learning and demotivation. One strongly worded treatise on learning *kanji* stresses that the *kanji*-learning process is indeed demotivating and both the teacher and the script itself are the prime "de-motivators".

> It is asserted that most teachers of Japanese as a second language do not spend enough time on kanji teaching, with the students typically forced to try to learn much of it on their own. Difficulties encountered in learning kanji include the following: kanji complexity that led to problems with memory, combination, pronunciation, and making proper shapes; negative feelings such as a lack of confidence, poor self-evaluation, helplessness, and worries; and difficulties with the teacher. Students were often given little explanation or guidance and were confronted with a mass of unfamiliar lines and rules to memorize. (Usuki, 2000, p. 1)

The authors were eager to see if using digital games could help mitigate instances of demotivation in *kanji* classrooms. Bahji, Lefdaoui and El Alami (2011, p. 4) support the idea that, if learning could be made enjoyable through game play, then learners could overcome problems such as demotivation and the desire to give up their studies.

3. Digital games as a solution

The proposed aim of our action research project was to engage and motivate learners demotivated by any of a number of *kanji*-related factors. Whitton (2012) is a strong proponent for how games motivate learners through rewards, challenges, contextual feedback and mystery and how they help in decreasing nervousness about speaking other languages by providing "safe spaces in which learners can play, explore, experiment and have fun" (p. 249). There is wide agreement on the motivational benefits of digital gaming (Clark & Mayer, 2011; Müller & Mathews, 2013; Padilla-Zea, Gutiérrez, López-Arcos, Abad-Arranz, & Paderewski, 2014) and there is also evidence that games can improve learning. Moseley & Whitton (2013, p. 252) list techniques that encourage learning through problem solving or enquiry, and learning through cycles of repetitive practice, failure, and reflection. Collaborative techniques such as real-time team work, mentoring, and supported social-skills development

are included. Many games scaffold players into arenas of greater difficulty with timed feed-back, and game structures include goals, challenges, rules, rewards, and gains (of artifacts), as well as mysteries designed to stimulate curiosity. Reinhardt and Sykes (2014) add authen-ticity, intercultural learning opportunities and access to diverse written and oral texts to these aspects of learning. See Gee (2003) for a summary of how game playing teaches skills and encourages learning on many fronts. There is also evidence that digital-based educa-tional games are of benefit to learners, since learning through immediate experience and play is how the young of all species naturally learn and is more memorable than learning out of context (Aldrich, 2009, pp. 1–2; Gee, 2003, p. 2; Van Eck, 2006, p. 18)

Very few studies detail drawbacks of educational digital games. Papert (1998) and Van Eck (2006) suggest games lose their value if we make them unnecessarily academic by intro-ducing boring learning concepts when games are designed to encourage "flow" or complete engagement in something we enjoy. A second drawback arises from the many interactive experiences that contribute to our enjoyment of games such as the tasks, the challenge, the rules, the competition and the story goals. Huang and Johnson (2008) and Huang (2011) suggest these can overload a learner's cognitive processing capacity and detract from the amount of curriculum content the learner will be able to recall.

Educational digital games appear to have elements that would encourage both motiva-tion and learning. Unfortunately, the plethora of research literature on digital gaming is not matched by a body of writing on games for learning non-alphabetic script. We were able to find two articles. The first (Syson, Estaur, & See, 2012) showcased a collaborative multi-modal learning game for Filipino university students in which Part A, of a two-part team, competes against other teams to guess the word meaning and reading of random *kanji* characters using hints provided by Part B of the team. The collaborating Part B of the team, are able to draw a hint, upload a digital photo or record audio sounds to help the first team guess the meaning of the character. The aim was for learners to create and share mnemonic aids that might be remembered and used by the other learners to recall *kanji* items in the future. The second article (Olson, Kauffman, Fowler, & Khosmood, 2015) is a role-playing game to teach the Japanese scripts, *ḥiragana* and *katakana*. The players use abilities gained from their *kana* (term for *ḥiragana* and *katakana* scripts) knowledge to battle with enemies. Both studies were on games developed by Japanese language educators for learning Japanese script. The second game was the type we initially envisaged creating for our *kanji*-learning project, but the Olson et al. study did not extend beyond the simple scripts, *ḥiragana* and *katakana*.

An area of immediate concern for us was whether or not to follow these examples and create a digital game ourselves. Whitton (Whitton, 2012; Moseley & Whitton, 2013) suggests many barriers prevent teachers from introducing games into educational pro-grammes. The cost of developing or purchasing a game is high and there are associated costs such as extra hardware, and the cost of time for teacher training, upskilling or cre-ating an in-house digital game. Whitton suggests game development is beyond the skill level of most teachers and Van Eck (2006) reinforces this: "Professional game development takes one to two years and involves teams of programmers and artists" (p. 20). He points out that games developed in-house must be comparable in quality and must function as well as commercial games.

Although creating games that meet these criteria may be a challenge, offering an alterna-tive motivational tool such as reading for enjoyment, as Whitton suggests, is not feasible. In the context of L2 learning where both the Japanese language and *kanji* are studied   **27**

concurrently, encountering unfamiliar grammatical structures *and* unknown *kanji* in sentences can be frustrating and can contribute to demotivation; whereas games have visual clues that are universally understood, and therefore the item to be practised is isolated from its wider context.

One of the authors had successfully developed two digital games for education and was able to provide guidance on the processes involved in the development (Müller & Price, 2012). However, that development project had taken place in a different university and a different country and there was not the same level of institutional support at the institution where our current project was to take place; for this reason, we considered the use of commercial games available online. Digital games appeared to be readily available but games such as *Ninja Kanji*, *Kanji Pal*, *Kanji Repeater*, *Kanjilicious*, *Kanji Crush* and *Phrase Bot* were all simple item-matching games or flashcard sets. Only two Japanese role-playing games (JRPG) were listed. *Koe* (2015), an as yet incomplete, Japanese language game that has been under development since early 2014, and *Slime Forest Adventure* (Learn Japanese PG, 2015), a role-playing game for learning *kanji*. An informal review and pilot of *Slime Forest Adventure* was conducted in two *kanji* classes at Auckland University of Technology. It was not received well by teachers because the game tested knowledge of approximately 700 *kanji* outside of the university curriculum and they also felt it took learners too great a proportion of the class time to come to an understanding of the game. Learners showed little enthusiasm, as the graphics were unsophisticated, there was no sound, and the level of *kanji* introduced became too difficult at an early stage in the game. This game was not pursued further but the experience forced us to consider more deeply what level of game we might be able to produce and what role we wanted the game to play in the classroom.

The experiment with *Slime Forest Adventure* suggested that high-end multi-level games would not suit the instructional situation because of the time commitment needed for learners to become familiar with game reality. We agreed that if digital games were to promote motivation they would ideally target the perceived causes of demotivation. In order to make *kanji*-learning less challenging, learners could gain extra exposure to difficult *kanji*-specific tasks, such as correct stroke order, through the more enjoyable games medium. Learners have little opportunity to apply the *kanji* they have learned as reading Japanese requires a higher level of *kanji* knowledge than beginning learners have achieved. We hypothesised that digital games could provide repeated exposure to *kanji* combinations within a realistic virtual world while testing recall of those items.

As indicated earlier, a major factor in demotivation is heavy focus on rote memorisation. In Japanese, *kanji* learned previously, in the previous course or in the year before, appear in new vocabulary compounds along with newly learned *kanji*, placing extra stress on learners who failed to completely memorise the earlier characters. Including a tedious activity, such as memorisation, in games, runs contrary to the gaming concept; however, we felt that it could be feasible for games to provide greater exposure to *kanji*-specific areas where a breakdown in rote memorisation has occurred, such as where previously learned *kanji* are poorly memorised due to time constraints and the large number of *kanji* introduced.

In response to our testing of the game *Slime Forest Adventure* and the considerations outlined above, we decided to create an in-house suite of three simple games, each one targeting a particular *kanji*-specific problem. The next sections describe the games, the development process and the study.

4. The games

Three computer games were created to provide secondary, complementary methods of *kanji* familiarisation alongside repeated writing activities. As we have explained, the motivational medium, digital gaming, was chosen because rote learning strategies, applied to gain mastery of a high number of structurally complex *kanji* characters, can be demotivating if used over a long period of time or in cultural contexts where memorisation has not been employed as the basis of learning theory from early years in education. At a wider pedagogical level, these digital games were one of a number of activities to scaffold learners from individual effort in traditional learning through to participatory learning practices.

4.1 Kanji Character Writing game

The first of these games, *Kanji* Character Writing, a 30-second timed-response game, focuses on choosing and clicking individual written strokes to build a *kanji* character. The strokes must be added in the correct order. The correct *kanji* is then shown on screen and the correct/incorrect score is automatically adjusted (Figure 1).

Figure 1: Screen shots of the Kanji Character Writing game

The focus on stroke order serves an important educational purpose because, in our experience, strokes learned correctly in the early stages support the production of consistent proportions and easier recognition later among individual handwritten variations of that *kanji*. Knowledge of correct stroke order can also improve the speed of writing by shortening the distance the moving brush or pen takes to complete the character. Familiarity with correct stroke order improves speed of recall through chunking, since the components that make up a *kanji* are building blocks where one of a set of prototype characters are integrated into the elements of other *kanji* characters. Formal course evaluations at Auckland University of Technology show that learners perceive practising stroke order, alongside repeated writing of *kanji* characters, to be a monotonous and burdensome task, but they also believe that it is a necessary part of the process of learning *kanji*. Traditionally, only one method of practice exists: repeated writing of stroke order correctly in a box grid following visual guidelines.

In the *Kanji* Character Writing game, when the learner selects the wrong stroke, the game scores that attempt as incorrect, and the stroke is not used in the *kanji* character being built. This immediate feedback is not possible if the learner handwrites the *kanji*, as he/she can unconsciously vary the stroke order and produce something close to, but not exactly, the correct form. Since the learner does not receive corrections during their practice of **29**

kanji, they may form bad habits when writing. The persistent use of wrong stroke order or proportion, in the long run, prevents improvements in the readability of their handwriting. Thus, in the game, when learners have their stroke choice negated, denying them the ability to proceed, it prompts them to follow the correct procedures. It means that they have to notice the word at the most basic level and build familiarity with the smaller elements, or components, that support fluency.

In the game, learners are able to test their recall of the stroke order and learn from their errors. In designing this, we aimed to create an experiential learning activity where learners actively construct their knowledge, self-correct when faced with failed attempts, and form their own metacognitive writing strategies in order to master the game. Such a process encourages a deeper mastery (for discussion, see d'Arcais Giovanni, 1994; Tollini, 1994). Contrast this to being given a sheet that either numbers the stroke sequence or shows the strokes being progressively written, and which the learner must then copy in order to memorise the stroke order. This approach to teaching requires the learner, often unsuccessfully, to self-correct and it does not require the construction of metacognitive strategies for writing novel *kanji* characters. A further unexpected benefit of this game approach (that tests knowledge through actual construction of characters) is that it is immediately understood by learners with any of a range of developmental disabilities, such as dyslexia, who struggle with the traditional method of emulation through copying (Sugasawara & Yamamoto, 2009).

4.2 Kanji Character Selection game

The aim of the second game, *Kanji* Character Selection is to correct the poor recall of previously learned *kanji*, a significant area of difficulty for learners. The speed of introduction of new items and a lack of sustained application often results in only partial automatisation of *kanji* characters or compounds and their meanings.

The game screen shows a grid with 16 *kanji* characters and a visual stimulus with a short explanation of the English meaning of the target *kanji* word. Learners are instructed to click *kanji* (from the word list of the prerequisite course completed in the previous semester) to make a *kanji* word that matches the English meaning. Learners are not given any indication of the number of *kanji* characters required to write the target word. Correct/incorrect scores are displayed on the same screen (Figure 2).

Figure 2: Screen shots of the *Kanji* Character Selection game

The process of learning which of the many phonemically and structurally similar *kanji*

items will correctly form a two or three-*kanji* word is a momentous task. In our experience, learners often learn kanji vocabulary without gaining any strong visual familiarity or ease of recall. This is because opportunities for rehearsal and application of kanji knowledge through wide general reading is limited due to the high number of *kanji* required to read even simple texts and the time it takes to learn each multi-faceted *kanji* item.

A further advantage of this approach is that the time it takes to choose an answer is much shorter than the time it takes to write it on paper (such as when *kanji* character combinations are memorised by the method of repeated writing). The quick generation of words promotes exploration and practice, and the immediate feedback can help learners gain an awareness of their skill level and even confidence when they score highly in a game in a relatively short time. We anticipated that the ease of generating words and the speed of the feedback would act as motivators to practice *kanji*.

4.3 Kanji Listening and Reading game

The third game, *Kan*ji Listening and Reading, is an animated game played at six ability levels which seeks to expose learners to *kanji* when used in the context of a sign or sentence within a natural Japanese scene. This game aims to promote fluency through natural encounters with the variant readings each *kanji* can have. For example, the different signboards in different parts of the game use one *kanji* character, 八, with many different readings: the date of a bargain sale is shown as 八月 (*hachi-gatsu*, meaning August, the eighth month); the opening of a new supermarket as 八日 (*yoo-ka*, meaning the eighth); and the price of a double hotel room as 八千円 (*hassen-en*, meaning eight thousand yen). The reading of 八 differs depending on the other characters in each compound word.

The game also provides learning opportunities for learners with a background in *kanji* but who have a limited knowledge of the Japanese *on* and *kun* readings. Notably, the *kanji* characters are given as they naturally appear among the two other syllabic Japanese alphabets. The game offers some repeated exposures of *kanji* compounds within the game itself, among the various levels of the game. The game targets, in the first instance, the difficulties a beginning learner will inevitably have with the existence of one, two, or indeed many different readings a *kanji* can have depending on the word it appears in.

Figure 3: Screen shots of the *Kanji* Listening and Reading game

This game may have a cultural benefit as well. A study by Schwartz (2006) indicated that learners felt well-designed game landscapes were real and enjoyed the "visit" to a different

culture they provided. The game uses a wide range of authentic images of Tokyo city. On the other hand, Poole (2000) states that the enjoyment of digital games can be heightened when the player recognises familiar scenery. Working on the assumption that learners are familiar with university campus scenes, we have introduced campus scenes but made them culturally interesting with Japanese realia and obvious cultural differences such as the baseball game as a club activity.

The game avatars – one Japanese and one Auckland University of Technology student – move by bus, tandem bicycle, or on foot through urban scenes in Tokyo featuring commercial signboards, the text of which was created by the game developers. The avatars direct attention to messages on the signboards and the learners then choose, from multi-choice options after the bus has moved on, the correct *hiragana* reading of *kanji* highlighted on each sign (Figure 3). This game was designed to offer an opportunity to apply learned compounds to everyday situations. At a beginner level, the *kanji* for numbers, dates, and times are ironically the most complex in terms of variant readings and grammatical difficulty (different types of item require different counting systems). Dates, times, and prices are required for effective everyday communication to the extent that numbers appear in the most-frequently-used-500-words list of most languages. In the classroom, there is neither the opportunity to convince learners of the number of situations in which one needs numerical fluency nor to provide sufficient exposure for attaining fluency. The game was designed to provide this exposure.

5. Development of the game

As educators, we were satisfied with the pedagogical goals of the games we had created. The difficulty lay with developing simple games that were not merely a "support for the practice of factual information" (Kiili, 2005). We kept in mind Prensky's (2001) six key structural elements of games. If the games contained: (1) rules; (2) goals and objectives; (3) outcomes and feedback; (4) conflict, competition, challenge and opposition; (5) interaction; and (6) representation, then they could provide both motivation and the learning the teachers had hoped to gain from high-end digital games. The games provide learning through problem solving but lack the mysteries, the variety of challenges, and the conflict often distinguishing high-end games. The games were designed with specific game elements such as immediate feedback, competition through scoring, and the adrenalin boosting completion of timed puzzles. The *Kanji* Listening and Reading game progresses through different levels with the timed puzzle becoming more challenging. The teachers felt Prensky's fifth element "interaction" would take place as a natural result of the gaming situation. Learners would tend to play the games together on the computers in self-directed learning spaces at the university, and during the study the authors observed that this was indeed the case. Excitement and discussion were generated, particularly in the *Kanji* Character Selection game as two or three learners attempted to build a picture together from fragmented memories of previously learned, but poorly remembered *kanji*, within the time limit in the game.

Reservations had been expressed in the literature about teachers developing digital games because of high development and training costs (Whitton, 2012). Although the authors secured development funding in this case and one had some background experience that went some way towards addressing these reservations, a number of unforeseen problems negatively influenced both the project and the study. As a result of back-end technology issues, a longer development time was required but the funding was limited.

As a consequence, the planned games were compromised and some of the competitive aspects were not included. In addition, language and cultural misunderstandings caused constraints in the game development and delayed progress. Three groups worked on the development of the digital games in separate locations: the off-site developers (Malaysian with very basic Japanese familiarity); the teachers (non-native ability in Japanese, and English); and a Japanese national assistant (Japanese and some English). The greatest problem was the inability of the developers to type or enter Japanese language content and this added to the pressures on the Japanese speakers completing the project in addition to their teaching. A third problem arose when the games were near completion. The university was unwilling to cover the cost of the host server or long-term maintenance and annual usage costs. The authors felt that these technological development constraints distracted attention away from the problem, reflection, and solution nexus of the action research project; however, as the issues did not have a major effect on the *kanji* learners themselves, they decided to continue the project.

6. The study

This practitioner action-research project was based on Elliot's (1991) definition: a holistic integration of the core areas of teaching and learning including curriculum and teacher development, and research to bring about effective reflection and change in the classroom. We followed McNiff and Whitehead's (2011) practices that stress the validity of explanations by the practitioner, the absence of a hierarchical distinction between researcher and practitioner, and validation by others acting as critical learning partners. At the end of each research cycle, a staff member outside of this project critically reviews the researcher's reflection on the progress of the research project. The project was undertaken by one researcher/*kanji* teacher, one researcher/teacher of a different curriculum area, and two teachers of the *kanji* course at the university. The two teachers of the *kanji* course were involved as critical learning partners throughout the project. Their involvement was deeper than that suggested by McNiff and Whitehead as, alongside reviewing the researchers' reflections, they observed the commercial game trial and the game prototype trials and provided feedback from a *kanji* teacher's point of view.

The problem identified as central to the research project was not new. Teachers of *kanji* had observed what was perceived to be "demotivation" in a number of individual learners every year as they struggled to sustain their interest and engagement in very challenging situations. Efforts to improve the situation through such strategies as interviewing learners, providing rewards, and setting up "agreements" to aid learners in achieving goals, had not led to significant change. The process of formulating a clear research question was challenging because of the context. We were unable to observe or survey learners who were experiencing demotivation as those we had identified as "demotivated" tended to leave the course without explanation, attend intermittently, or not engage with the teacher or peers. Previously motivated learners could also become demotivated with few warning signs. Research had suggested it was unlikely there was a single reason for demotivation or a particular time, such as at the beginning or end of a course, when it might occur. We felt there could equally be reasons other than demotivation for the behaviours, such as leaving the course, described above.

At this point we decided against formulating a research question related explicitly to our problem and accepted the "developmental nature" of action research where "nothing stands

still" (McNiff & Whitehead, 2011). We decided, instead, on a general aim: *to integrate learning material into the programme that will engage and motivate the learners as well as improve their learning.* We focused on Dörnyei and Ushioda's (2013) revelation that demotivated learners still retain some positive motivational components even if they, themselves, state that they have "lost all motivation". Engaging activities such as digital games might assist in reviving motivation and could further increase the motivation of other learners in the classes who may, at some stage, experience similar affective issues themselves. We wanted to design games with a strong "learning" component to satisfy the needs of both learners and their teachers working with a demanding curriculum.

The three digital games were created and added to an online "package" of *kanji* learning tools based around a *Model of Kanji Learning* that one author (Nesbitt, 2013) had created to describe the steps required for mastering *kanji* and to link each step with appropriate learning tools. The learners created their own learning plan and had two one-hour self-directed learning sessions in a computer lab each week to practice *kanji* using the online tools. The sessions were in addition to three one-hour teacher-led classroom lessons and the teacher was not present in the self-directed learning sessions. There was no obligation to use all the online learning tools provided. The games were introduced in a standard classroom session but not used again in the classroom after a first introduction.

Our research aim was *to integrate learning material into the programme that will engage and motivate the learners as well as improve their learning.* Five game-related questions were included in a course evaluation questionnaire, completed by all learners in the *kanji* course.

To measure "engagement":

1. Have you played the digital games?
2. Have you checked how high your score was compared to your classmates?
   To measure perceived "improvement in learning":
3. Do you feel playing the kanji games will help you get higher marks?
   To measure "motivation":
4. How did you feel about having three digital games on the website?
5. Is there anything you would like to change about the kanji learning digital games or the work and activities you share with your classmates and your teacher?

Space was given for comment after each question. A detailed response was not expected as there was no compulsion or pressure to play the games and the first of the two proposed research cycles was to pilot the games as a motivational tool. The second cycle would provide data on whether digital games were motivating for a wide range of learners.

Learners' reflective-learning journals were consulted for further detail on whether or not the games were perceived to be improving learning and whether learners felt motivated to engage with the games on a regular basis. Neither the questionnaires nor the material from the learning journals were seen in their original form by the researchers. All data were anonymous.

6.1 The participants

Three cycles of the study took place over three semesters. Two cycles were originally planned but a third was conducted because the first two cycles yielded no conclusive results.

The participants were three separate cohorts, one in each research cycle, from a second-level beginner *kanji* course at Auckland University of Technology. First-level beginners study

the *ḥiragana* and *katakana* scripts and 200 *kanji* characters. Second-level beginners master a further 150 *kanji* characters and complete an intensive study of *katakana* loan word use in Japanese. Each cohort completes three hours of classroom study and two further hours of self-directed learning per week. All learners enrolled in the course wrote learner journals and completed the questionnaire. Participation in the research project, however, was voluntary. Sixteen participants from a class of 17, agreed to be evaluated in the first cycle; nine participants from a class of 12, agreed to be evaluated in the second cycle; and 13 participants from a class of 15, agreed to be evaluated in the final semester of the project. The *kanji* course learners were from a variety of first language (L1) backgrounds. The range was consistent over the three cycles with approximately 60% New Zealanders, 20% Chinese or Taiwanese, and 20% Korean. One learner in each of the final two cycles was from a different L1 background. In both these cases, the L1 was an alphabetic background. Prior learning of *kanji* and the range of test and examination results was not significantly different over the three research cycles. Due to ethical considerations all collected data were anonymous and neither age, gender, nor race were identified.

6.2 Data collection and analysis

Data from the questionnaire and learning journals were collected at the end of each cycle. The researchers analysed the anonymous data, breaking it down into an initial 25 categories following a General Inductive Approach (Thomas, 2006). Successive readings narrowed those general categories down to three main themes linked to the key words in the action research aim: *engagement*, *motivation*, and *learning improvement*. The authors then completed a reflective report on the process and outcomes of the research cycle. The two *kanji* teachers gave critical feedback on the reflective report and provided a second reflective report on elements of the first research cycle that they had been involved in. The reflective reports were used in the planning process for the second and third cycles and a final reflection was completed at the conclusion of the project. The final reflection looked at the outcomes of the research, the limitations, and how things could have been done differently, as well as considerations for the *kanji* courses in the near future.

The findings are discussed in the following section.

6.3 The results

6.3.1 Cohort 1. The first cohort provided an equal number of responses across the three themes, with the majority *engaging* with the games, enjoying them (*motivation*) and reporting that they understood the pedagogical value (*learning improvement*). Twelve of the sixteen participants played the games and all of the themes – *engagement*, *motivation*, and *learning improvement* – were evident in the responses of those participants. Learner 5 stated, "*Each game focuses on different practice purposes. I think it is good. If you practise kanji with it [the games] you will memorise kanji quicker and they will stay in the long-term memory*". Learner 8 felt that "*Doing any kind of practice is beneficial. It puts into practice what we have learned in a fun way*".

Participants indicated that demotivation was occurring and that the games helped to counter it. Learner 1 commented "*It is good to have games to break up the constant rote learning nature of learning kanji*", and Learner 3 remarked, "*I have fun when I learn*". Learner 2, referring to the digital games, stated, "*It's good to have games available there. It makes* **35**

learning kanji fun" whereas, interestingly, Learner 7 said, "*The flashcard* game *helped me for the test*" showing some confusion between the flashcards learning tool that was used to practise repeated writing and to which we ascribed the source of demotivation, and the digital games produced to alleviate the demotivation. The apparent confusion was also evident in data from Cohort 3. It is possible that the self-testing aspects of flashcards could be perceived as an enjoyable game.

Five participants did not play the digital games because they were not able to log in or they preferred to use other learning methods. Learner 6 wrote, "*I don't think they are as helpful as flashcards and kanji reading. I want more online tests than games*" Only one participant in this cohort gave an indication of how often the games were used. Learner 4 explained, "*I played the games more at the beginning of semester when I had more time. Usually I would just use flashcards*".

Participants' learning journals contributed few comments on the digital games. One comment was placed under the *engagement* theme but it also appeared to show a wider positive attitude towards the use of technology in the classroom: "*It is an interactive learning process, building on this idea for future students would be good*".

6.3.2 Cohort 2. In contrast to the participants in Cohort 1, the majority of the second cohort who were taught one semester later responded negatively in the *engagement* theme, and therefore naturally provided very few responses over the *motivation* and *learning improvement* themes. Responses included:

I never really interacted with the games. I don't like using the computer to learn.

I like learning to be straight-up. When I play games I lose my attention and focus.

I don't even consider using it [games]. I use only hard copies.

I like to make hard copy study tools.

The best way I learn is by writing kanji out.

Ninety percent of the participants answered negatively the questions that asked whether they had played the games and their response to them: "*Online learning is a waste of time*", "*We need more kanji writing practice in class*", or "*I only looked at them because I had to in class. I personally don't think that being social will help my learning*" and "*No, I don't think video games count as a learning tool*" but the majority appeared to indicate a dislike of the online learning medium, rather than the learning method.

The participants' learning journals expanded on the dislike of online learning. Learner 2 felt that "*Online learning gives me a headache.*" Learner 5 wrote, "*I am not an online learner. I prefer writing things down with discussion and practice.*"

Cohort 2 was the only group of participants who commented on the social aspects of the learning, albeit with some resistance. Learner 9 responded, "*I enjoy working with others but I learn best when I am alone*" and Learner 3 wrote, "*Normally I just play by myself.*"

6.3.3 Cohort 3. Due to the unexpected, wide, cohort-specific variation in response to the games in Cohorts 1 and 2, a third cycle was added to the action research project. The majority of learners in Cohort 3, however, indicated that they did not use the games because they perceived other learning tools (in this case the flashcards and/or reading tool) to be more

effective in helping them attain an examination pass grade in the short time available to them, and they did not feel the games offered the same effective pathway.

Responses from this cohort were concentrated in the *learning improvement* thematic category. Interestingly, the type of responses given here were not evident in data from either of the previous two cohorts.

The learning improvement theme can be summed up by this response from Learner 1: "The only tools I use often on the website are the reading tool and the flashcards as I find the other tools are not as effective in helping me study." Other participant responses were similar:

> I am mostly too busy with other study.

> I haven't used the games as such but the kanji flashcards have helped a lot.

> I already have all the tools I need to learn kanji effectively.

> I can't honestly say they help as I don't find the time to use them.

Again, there was confusion between the digital games and other learning tools. In answer to the question "Have you played the digital games?", Learner 9 replied, "*Yes I use the kanji learning website for flashcards a lot.*"

There was a lack of discussion in the learning journals about the digital games. Only one learner commented on the games: "*The game interface is creative and suitable for young people.*"

7. Discussion

The first two cohorts produced unexpected, strongly contrasting results and data and the additional third cohort produced few similarities to either. In practitioner action research the reflective process is a key part of any changes made as a result of the study; therefore, rather than considering only the contradictory data from the study, the authors employed the reflective reports and results of discussions within the teaching teams to assist in formulation of conclusions and future action plans.

The results of the first cycle were seen as positive. Researchers and teachers reflected that participants appeared to have a clear understanding of the value of the games for their learning and were motivated by the games, using words like "fun" to describe them. Some teachers expressed doubts about the value of the digital game intervention, however, because of the game development difficulties and the almost 30% of learners who failed to engage with the games. Reflective reports at the end of the second research cycle, in which the majority of learners chose not to engage with the games at all, indicated an unwillingness to proceed with digital games, but a decision was made to set up one further research cycle to see if it would match either of the quite polarised results of the first two cohorts. As the results show, participant responses in the third cycle were unexpected and took a different direction. A clear majority of the third cohort found the digital games motivating and expressed an understanding of their pedagogical role in the curriculum but did not continue to engage with the games after initially playing them, choosing instead to use "more effective" learning tools to reach their goals.

Our final reflective discussions with the *kanji* teachers concluded with two questions that all felt were crucial and required a response before we made any further attempts to use **37**

digital gaming in the *kanji* courses. The first question was: "Other than high-end multi-level curriculum-centred digital games, are there different gaming scenarios worth exploring?" The second was: "Should we be leaving this field to the experts?" The authors have proposed a new, two-cycle study as a response to the data gathered in this study and to the further two questions. In answer to the question "Other than high-end multi-level curriculum-centred digital games, are there different gaming scenarios worth exploring?", the first response is to utilise the existing games for a set two-week period during the semester. The intention is to incorporate the games when the number of *kanji*, the structural complexity of the characters, and the number of unfamiliar vocabulary items the *kanji* represent have increased and learners begin to show signs of weakening task motivation. Game play will be facilitated and then closely monitored by the teachers and competitive aspects will be employed in a class competition. This is to alleviate teacher concerns that there had been a fairly minimal introduction to the games and learners needed more guidance. To address the perception of some participants that the games were not very useful, the teachers will highlight how learning will take place, prior to introducing the games.

The second response to the data answers the question, "Should we be leaving this field to the experts?" The game development was beset by difficulties that had an impact on the workload of teaching staff; the teachers wished to avoid the extra burden of game creation but suitable digital games were not available commercially. Research data in this project had indicated there is learner confusion between games and learning tools, and that a number of learners felt the flashcards were the most effective learning tool or "game". This data changed the authors thinking about the type of games that could be employed in the classroom and we felt it might be viable to explore collaboration with a commercial producer of learning tools such as flashcards. The researchers felt this game/learning tool confusion could be turned to advantage if a commercial designer presented game-like learning tools (easy to use, easy to understand, pleasing graphics, competitive aspects). The flashcards and reading tool currently used at the university are digital but were created in-house and have a very basic design with no extra functionality. A commercial product would be designed to motivate learners, in particular the percentage of those who are disengaged or unmotivated. The professional presentation might also be more attractive to those who dislike using the computer to learn. At the same time the tools would provide the quickest and most effective means of reaching learning goals, and fulfilling curriculum demands.

8. Conclusion

The games were created to lessen learner demotivation by increasing practice opportunities for three challenging aspects of Japanese orthography within an enjoyable medium, and to scaffold social learning into a curriculum traditionally reliant on considerable individual effort for success. This initial action research study provided a snapshot of learners' engagement with, motivation for playing, and perception of usefulness of the three digital games for *kanji* learning. There was a wide variation in response to the games, signalling that this type of study needs to be repeated, with both commercially produced digital games and educator-created games to give validity to these findings. High-end digital games for learning Japanese *kanji* are not commonly available and the process of developing the games, in this situation, was beset with obstacles; however, the results of the study suggest games could be an effective motivator. The authors will complete a further study on digital gaming using

targeted introduction of games, and a blurring of the lines between learning and gaming through the integration of game-like aspects in commercially produced learning tools.

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Author biodata

Dallas Nesbitt is a senior lecturer in Japanese at Auckland University of Technology, Auckland, New Zealand, and vice-president of JSANZ (Japanese Studies Aotearoa New Zealand). Her research interests are the teaching and learning of Japanese orthography. She is co-author of the Japanese Language textbook "Contact Japanese".

Dr. Amanda Müller is a lecturer of English for Special Purposes in the School of Nursing and Midwifery at Flinders University, Adelaide, South Australia. She is author of *A Glasgow voice: James Kelman's literary language.* Her research interest is the use of computer games in language teaching.