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The iPad at 10: Literature on Its Use in the Classroom

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Abstract: *This article presents a review of the literature on iPad use in the classroom, focussing specifically on the benefits and the concerns of using iPads as well as recommended strategies for successful iPad integration. Affective benefits, such as an increase in motivation for both students and teachers, as well as improvements in learning, such as the increased retention of vocabulary, have been found (Pegrum Oakley, & Faulkner, 2013). Issues associated with iPad use include classroom management difficulties, technical problems and the challenge of maintaining a pedagogic focus.*

Professional development is the essential ingredient for successful implementation of iPads into the curriculum (e.g. Topper & Lancaster, 2013). A plan for professional development should be personalised and based on the needs of individual teachers (Fenton, 2017), progressive rather than focussed merely on the implementation stage, and designed to help educators integrate technology without compromising pedagogic goals.

While brief and limited in scope, it is hoped that the insights presented here will be useful for educational institutions looking to implement iPad use into their curricula.

The ubiquitous use of technology, by young and old alike, as well as the amount and variety of information readily available at the touch of a button has led to an increasing number of educational institutions incorporating technology into their classrooms. In 2010 we were introduced to the iPad. It is portable, easy to use, and can host a wide range of applications. Because of its functionality and diversity, the iPad is being used in more and more schools. In the eight years since its introduction, many institutions have implemented iPad use in their curricula and numerous researchers (e.g., Ferguson, 2017; Pegrum, Oakley, & Faulker, 2013) have examined the effects this has had on the learning environment.

In Japan the use of the iPad in school is not so common but is slowly gaining in popularity. As schools look to incorporate this technology into classrooms, it is prudent to make use of the learnings of other institutions and to be aware of the latest research in the field.

The purpose of this paper is to present an overview of the main themes that have been covered in

research on iPad use in schools. These themes include the advantages of iPad use, concerns associated with its use, and recommendations for institutional implementation based on the experiences of other institutions as well as supportive empirical evidence.

Benefits of iPad Use

Affect

Improvements in motivation, engagement and enthusiasm when learners use iPads are well-documented in the literature (e.g., Falloon, 2015; Pegrum et al., 2013). For instance, in a review of mobile technology practices in several different schools from kindergarten to high school, Pegrum et al. (2013) found it was a motivating factor not only for learners but educators as well. Benton's (2012) study revealed similarly positive findings. All of the eight teachers from middle to high school that she interviewed saw higher levels of engagement, more effort and increased motivation when using iPads in the classroom.

A longitudinal case study involving 5th and 6th graders revealed that particular aspects of the iPad contributed to their engagement, enjoyment, and

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motivation (Ciampa, 2014). Immediate feedback from games or other applications helped students to track their progress. Game difficulty levels were automatically adjusted based on performance which encouraged the learners to keep trying. Additionally, the learners valued the ability to control the pace of the game, to repeat if necessary, and to personalise their experience. The teacher found that adding an element of competition, against one's own previous performance in one instance, generated a meaningful learning experience as well.

In a more recent study, Maich, Hall, van Rhijn, & Henning (2017) also found that a majority of students felt iPad use was a valuable addition to the classroom, helping them with coursework as well as general technological skills. They felt they learnt more and worked harder when using iPads. The iPads used in the Maich et al. (2017) study provided customised, individualised material, which gave learners the opportunity to interact with the material and not merely receive it. This allowed for greater creativity and engagement, and therefore enjoyment.

Of particular relevance to English as a Foreign Language learning situations was a study done in the Philippines comparing learner attitudes based on iPad use during lessons (Alluad & Ishizuka, 2018). The results of questionnaires given to Grade 5 elementary students in two different schools showed a significant difference in attitude between the two groups, with iPad users rating English lessons much more positively. Interviews were not conducted to understand the role that possibly confounding variables may have played in the difference between the two schools. However, in a portion of the questionnaire delivered only to the students with iPads, an overwhelming majority said that they enjoyed learning English more with an iPad and that the iPad encouraged them to learn new words.

The studies above clearly show a positive influence on affective factors such as learner motivation, effort and engagement when iPads are utilised in classroom settings. Customisable features of the iPad additionally mean that pedagogical materials need not always be one-size-fits-all.

Collaboration

A study on the influence of the iPad on dialogic teaching revealed that learners spent a large proportion of class time working independently rather than collaboratively in pairs or groups (Engin &

Donanci, 2015). For instance, during one observed lesson, half the time was spent explaining and the other half spent on independent work. However, in a primary school in New Zealand where the curriculum was specifically designed to foster collaboration among students, this was not the case (Falloon, 2015). Students gave high ratings to the portability of the iPad because it allowed them to easily collaborate with other students or other groups, both inside and outside of the classroom. This collaboration also meant that students received immediate feedback on work from their peers, in a variety of situations from face-to-face pair work to inter-class interactions within the school, and from relatives and friends after school hours.

Likewise, Kirkpatrick Brown, Searle, Sauder, & Smiley (2017) found an increase in students communicating with each other and working together after they began using iPads in school. This study was specifically concerned with assessing the effect of iPad use on the social inclusion of learners with exceptionalities, and their findings show more collaboration among students regardless of exceptional-ity.

Although some research findings point to the use of iPads leading to solitary, independent work, if implemented with a view towards increasing collaborative opportunities, iPads have proven effective in fostering communication both in and out of the classroom.

Improvements in Learning

Few studies have thus far addressed the issue of whether iPad use results in learning improvements. However, Alyahya and Gall (as cited in Walsh & Farren, 2018) discussed the affordances of iPads to potentially enhance learning outcomes. For instance, iPads can be used anywhere and anytime, there are a number of available applications that can be used for various pedagogical purposes, and iPads provide the means for increasing communication among students and between students and teachers.

Anecdotal teacher and student perceptions of increased learning due to some iPad features have also been reported. A case study done by Ciampa (2014), for example, detailed the improvements made by a Grade 6 student named Lisa who became inspired through the making of a video using the iPad, which led to her increased interest in the iPad and its features. One of the features she discovered was the iPad's ability to read for her. She disliked reading

and was not very good at it but after finding this feature she was reading more and teaching others about the various features of the iPad. This qualitative study provides compelling evidence that learning experiences and knowledge can be enhanced due to use of the iPad.

An extensive survey of nearly 700 middle schoolers revealed similar learner perceptions as those described in the case study above. When questioned, a majority of students using iPads felt they learned better if using an iPad instead of traditional pedagogical tools (Ferguson, 2017). Interestingly, Ferguson analysed this finding even further, breaking it down by native language. A significantly higher percentage of English as a Second Language (ESL) students answered this question more positively than did their native English peers. A second significant finding was that ESL students likewise reported being less distracted with other applications when using their iPads than did native speakers.

Small-scale examples of research which went beyond possibilities or perceptions were two empirical studies conducted in Australian schools, one concerning French vocabulary and the other mental mathematics (Pegrum et al., 2013). The study on mental maths skills consisted of a pre-test, use of relevant applications on the iPad for one academic term, and a post-test in which improvement was found. Another school tested three different groups, one of them a control group, on their retention level of French vocabulary and found that students in the two iPad groups outperformed those in the control group, remembering between 20 and 26 words compared to the control group's 12. While admittedly limited in their generalizability, these studies do point to the learning gains which can be realised through the effective use of iPads.

Skills for the Future

Even in 2008, before the release of the iPad, Abell recognised that integrating technology into the classroom would be of benefit to learners in preparing them for life in the 21st century. Being able to use various technological tools is required for many careers and those who are able to demonstrate these capabilities are at an advantage. In 2014, not long after the introduction of the iPad to the market, Male and Burden stressed the importance of integrating technology into learning environments.

Student perceptions of technology, most especially the easy availability of information, have affected the way that they use technology and affected their perception of traditional classroom subjects. Hoffman (2013) found that the introduction of iPads into the classroom highlighted for students the importance of knowing where to find information. Memorisation and rote learning of facts carried even less weight because they had this information, if allowed to use it, at their fingertips. Students felt that knowing where to find information, of whatever type, was of more practical use than memorising. This led Hoffman to question whether the long-held definition of a good student as one who can recite facts and pass tests without outside help should perhaps instead take into consideration the fact that learners are growing up in a world surrounded by information that is always available.

More recently, Prensky (2017) echoed a similar need for change, not only for technological integration but also with regard to the fundamental goals of education. He spoke of a shifting educational paradigm in which the focus is not on a sequence of academic courses, but real-world projects that learners complete as a team, the aim of which is to improve the world around them. In the process of completing these tasks, they acquire valuable skills related to thinking, acting and accomplishing a goal. Rather than trying to prepare students to one day be able to possibly effect change in their world, they engage in it while they are still students (Prensky, 2017). The adoption and regular integrated use of iPads in the classroom is one way in which students have an opportunity to start taking control of their learning. It is a small step towards a transformation of our education system which can help to ensure that learners truly benefit and are prepared for the future that awaits (Prensky, 2017).

The principled integration of iPads in the classroom has proven beneficial in many respects, from learner engagement to 21st century skillsets. The use of technology in the classroom affords opportunities for bridging the classroom with the outside world, through collaboration, research and real-world projects. Empirical evidence has also demonstrated improvements in learning for both language and mathematics. Moreover, iPads have been effective in motivating learners to become active, enthusiastic participants who find more enjoyment in learning.

Concerns about iPad Use

Distraction and Classroom Management

One of the most oft-cited concerns about iPad use in educational settings is the ease with which learners become distracted. Students participating in Hoffman's (2013) action research study, for instance, were frequently distracted from classroom tasks by the various social applications or games on their iPads. She therefore recommended that the purpose of the devices be made clear to students, along with the possible removal of any applications not appropriate for an educational setting.

Educators from 10 different school districts who had been using iPads in their classes for at least nine months commented on a noticeable increase in students being distracted by games or other applications or websites (Fenton, 2017). This frustration led the teachers to request more training and information on how to deal with these types of situations. The shift in classroom dynamics due to the introduction of technology calls for different classroom management strategies than those used in teacher-centred paper-and-pencil lessons.

However, not all research reveals this tendency for students to become distracted. Ferguson (2017), for example, found that 72% of middle school students did not easily become distracted, but this could have been influenced by the even higher proportion of students who felt their teachers had made effective use of the iPad during lessons. Using an iPad because it was available as opposed to the efficient, strategic and well-planned use of it as a means of accomplishing pedagogic goals appears to have been the crucial difference in the level of distraction that learners experienced.

Haptics and Paperless Curricula

We gather many types of information through our sense of touch. It is one of the fundamental ways that infants learn about the world around them. In a study on finger-painting, very young children using a tablet rather than paint, paper, and fingers showed a wider variety of touch types, both longer and faster touches as well as more complex sequences of touches (Crescenzi, Jewitt & Price, 2014). However, in spite of these clear benefits, the children using tablets also used fewer fingers, showed less variety in the pressure they applied and missed out on the textural quality of the paint.

While this study was conducted with very small children who had not yet fully developed their sense of touch, similar tactile preferences have been expressed by older students as well, as illustrated below.

A paperless curriculum, while ecologically friendly, does have its drawbacks. When questioned about differences they perceived in the use of technological versus paper pedagogical materials, a majority of students commented that they missed reading paper books and writing things down (Ferguson, 2017; Hoffman, 2013). Technological problems were part of the reason for this bias, but students also felt they learnt more when taking notes with a pen as opposed to a keyboard (Hoffman, 2013). Additionally, students in Ferguson's (2017) study were very negative about their paperless curriculum, especially with regard to specific subjects like Mathematics. Clearly the touch and feel of pen on paper is still important, even to young learners who are so familiar and adept at using technology.

Pedagogical Challenges

Integrating the use of an iPad into lessons requires extensive time and consideration in order to ensure that technology is being used in the best way possible and that pedagogical goals are not being compromised. Primary school teachers who participated in a case study commented on this challenge (Maich et al., 2017), pointing out the added necessity of training students how to use an application or tool. Their concern was with regard to the time that these instructions took away from the actual task students were to do.

In planning lessons as well, there are important and often time-consuming decisions to be made as to which application best fits with the aims of the lesson (Hutchison, Beschorner, & Schmidt-Crawford, 2012; Maich et al., 2017). The results of this painstaking work can be immensely positive, with students actively engaged in tasks and producing quality work, but the time and energy investment involved in planning can be quite substantial.

Moving beyond the first introductory lessons in which technology is used, the pedagogical challenges continue. As teachers and students alike become familiar with the technology and its various applications, it is no longer necessary to allot significant class time for instructions on how to use the technology. At that point, strategies are needed for truly incorporating the technology into the curricu-

lum and sustaining its use for the long term (Fenton, 2017). Student-centred lessons in which learners are using technology on a 1:1 basis require a considerable shift from traditional teaching methodologies, and this shift can be quite a challenge. Somewhat surprising was the finding that older teachers were more adept at this type of integration than their younger peers, despite the ease and familiarity with which younger generations are able to use technology (Crichton, Pegler, & White, 2012). Years of teaching experience proved more valuable than technical skills.

Technical Issues

While the vast majority of middle-schoolers responded positively to using iPads in school, the main complaints were about technical issues such as crashing (Ferguson, 2017) which consumed class time and caused difficulties in submitting work. Engin and Donanci (2015) also found that technical problems were a frequent occurrence during lessons, with a considerable amount of class time spent in troubleshooting. Difficulties downloading applications, insufficiently charged iPads, and Internet connectivity were the most commonly cited issues by teachers, who complained of the class time lost in dealing with these issues rather than working to accomplish the pedagogical goals of their lesson.

Recommendation for Implementation: Professional Development

It has been noted by several researchers that the most critical component in ensuring the successful integration of technology into the curriculum of an educational institution is the preparation, support and engagement of the teacher (Keane, Lang, & Pilgrim, 2012; Topper & Lancaster, 2013). The professional development of educators using technology has also been analysed by various researchers, with common recurring themes that are discussed below.

Based on a Well-Structured Plan

A detailed, progressive plan for professional development is necessary as the support needs of a teacher are considerably different at the time of implementation than in the years that follow (Fenton, 2017). Data from Fenton's study revealed that during the first year of integration, teachers wanted training on iPad features, applications and learning management systems. Time needs to be set aside for attending formal training, working informally with

colleagues to share ideas, researching applications and exploring their possible pedagogical uses (Pegrum et al., 2013). Setting up communities of practice to enable the sharing of ideas between colleagues was also recommended by Walsh and Farrow (2018), based on journals that primary school teachers kept over the course of one school year as well as follow-up interviews.

Issues that teachers requested for professional development sessions later in the implementation process included topics such as course design and assessment (Fenton, 2017). In the beginning, teachers are more focussed on the day-to-day use of technology in the classroom and the integration of it into their lessons. As this becomes less of a pressing need, the focus broadens to consider aspects of the curriculum as a whole. The teachers in Fenton's (2017) study emphasised the importance of ensuring that training and development concerns are not limited to the initial implementation but extend to the years that follow.

Personalised and Based on Need

While it is sometimes necessary and most certainly easier to deliver a one-size-fits-all training session for everyone, a more effective professional development session addresses individual concerns and needs in small groups (Fenton, 2017). Teachers typically have little time and this more focussed method provides teachers with what they need in an efficient manner. In addition, individualised attention given, for instance, during a lesson in which a particular type of activity is planned, is particularly effective as well (Pegrum et al., 2013). Providing teachers with adequate support and resources helps to ensure they will be able to effectively integrate iPad use into their classrooms.

Pedagogically-based

Initial concerns at the thought of a classroom full of students, each one using their own iPad, will likely centre around the technical and logistical aspects of the integration. However, this would most certainly be replaced quickly by pedagogical concerns (Pegrum et al., 2013). The teachers in Pegrum et al.'s study remarked upon the need for help in integrating the iPads into their lessons without compromising the intended goals. Several of the schools had already implemented a framework in which the teaching pedagogy was the driving force in choosing which applications to use and how to use them.

Other schools were in the process of moving in this new direction based on their experiences.

Conclusion

Integrating the use of iPads into learning environments is still a somewhat new endeavour, but in the past eight years, quite a wealth of information has been gathered regarding advantages, disadvantages and best practices.

Research has shown that, to ensure the successful integration of technology such as iPads into the curriculum, proper training and subsequent support of educators are the most effective steps that can be taken (e.g., Topper & Lancaster, 2013). Practical experience in an integration process has revealed this need for training as well. One of the most significant and recurrent topics that emerges from interviews and journal entries of teachers is the need for pedagogically sound, well-planned, need-based and ongoing professional development (e.g., Pegrum et al., 2013). This training needs to be tailored to the teaching context, the phase of integration and the varying technical ability of the educators involved. Professional development, ongoing support and relevant resources help to ensure that teachers are well-prepared and confident in their use of the iPad within the curriculum, which helps to ensure that students truly benefit from this integration.

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