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Pre-service Teachers' Reflections: The Influence of School 1:1 Laptop Programs on their Developing Teaching Practice.

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Abstract: Throughout Australia, many government and non-government schools have implemented a one-laptop-per-student (1:1) policy. Whilst there was initial interest in the implementation of these programs, little has been done to track the uptake of digital learning technologies afforded by access to the laptops. This study examined pre-service teachers' reflections on their experiences with 1:1 laptop programs in their secondary schooling. The lens for this reflection was their consideration of their aspirational teaching practice. Qualitative data were collected from two successive cohorts (2014 and 2015) of the first year of a Bachelor of Education course. The objectives of the research presented in this paper were to: capture recollections of the students' experience of 1:1 laptop programs; categorise these recollections into positive and negative experiences; and investigate the impact of 1:1 laptop programs on students' perceptions of teaching with ICTs and their personal learning at university.

Introduction

One-to-one laptop initiatives in schools have been expanding significantly over the last decade. This is due to a number of factors: less expensive hardware, improved Internet connectivity, and promotion by governments and education authorities. Inspired by the *Digital Education Revolution Policy* document released in 2007 (Rudd, Smith, & Conroy, 2007, p. 1) many secondary schools throughout Australia opted to participate in the revolution with the intention of equipping every student in Years 9 to 12 access to "world class information and communications technology". Some schools made the decision to implement a 1:1 laptop policy across Years 8 to 12, and many independent schools placed the onus of the provision of these laptops squarely on the shoulders of parents, insisting that students bring their laptops to every class. Student academic achievement in these schools is becoming more transparent and public due to the public access to school data on the *MySchool* website, and has increased the competition between schools for market share (Blackley & Walker, 2015). As a result, school leaders are strongly encouraging the utilisation of contemporary digital resources to enhance student learning, engagement, and achievement; one-to-one laptop programs appear to integrate digital technologies in a highly visible fashion (Inan & Lowther, 2010).

There is a body of research that investigated the initial uptake by *teachers* of digital technologies in secondary schools (e.g., Handal, Campbell, Cavanagh, Petocz, & Kelly, 2013; Hsu, Wu, & Hwang, 2007; Kopcha, 2012; Mumtaz, 2006; Sang, Valcke, Van Braak, & Tondeur, 2009), and a growing body of research specifically designed to investigate the use of laptops (e.g., Inan & Lowther, 2010; Penuel, 2006; Rosen & Beck-Hill, 2012; Weston &

Bain, 2010). It seems clear that student laptop use, at the direction of teachers, has mostly involved note taking, assessment writing, homework, organisation, drill practices, communication, accessing various eTextbooks, and engaging in research using the Internet (Blackley & Walker, 2015; Keengwe, Schnellert, & Mills, 2012; Penuel, 2006). In his research synthesis, Penuel (2006) identified three characteristics common to global 1:1 laptop initiatives: (1) students have access to laptops that are loaded with contemporary productivity software (e.g., word processing, presentation, and spread sheeting programs), (2) students have wireless access to the Internet, and (3) students use the laptops for academic tasks such as word processing assignments, taking eTests, and designing and delivering presentations.

Whilst research has been conducted on *teacher* uptake of 1:1 laptop programs and, to a lesser degree, some measure of student outcomes whilst at secondary school, little investigation has been conducted to examine the *ongoing* impact of the school experience on students entering pre-service teacher education. This is a key consideration as teacher beliefs based on past experiences is reported as a major challenge to effective technology integration (Mouza, 2008).

Teacher education programs can influence pre-service teacher's integration of technology (Agyei & Voogt, 2011); however, research continues to report that technology remains significantly under-used in their teaching (Dawson, 2008). This gap between learning in higher education and implementing in practice requires further investigation. Tondeur et al. (2011) conducted a review of studies reporting on pre-service teacher technology integration preparation. A key theme that emerged was the relationship between pre-service teachers' attitudes and the extent to which they integrated technology. A key factor for pre-service teachers to integrate technology is reported to be their positive attitude towards technology; conversely, a negative attitude results in poor motivation to integrate technology into their teaching and learning practices (Cullen & Greene, 2011). The reason for these attitudes and beliefs requires exploration.

The findings presented in this paper contribute to this body of research as they focused upon 1:1 laptop programs in secondary school education from a *student perspective*; they reflected upon their secondary school experience in their first year of higher education. It was envisaged that the data collected would be flavoured by the participants' involvement in their pre-service teacher education programs; perhaps influencing the reflective lens of each participant as they begin to develop their professional identity.

Significance of the Study

Given the expenditure of time and money to successfully launch and maintain 1:1 laptop initiatives, investigation needs to be carried out to determine if the commitment has been *worthwhile*. The judgment of this should not be limited to apparent improvements in student outcomes at school, but also the influence *beyond* that time and space. It is envisaged that the results of this research will be of interest to the Heads of Learning Areas and the principals of schools in which 1:1 laptop programs are an entrenched expectation of teacher practice, and those considering such programs, as it will be the first time that data has been collected and analysed in regards to the use of the laptops in these schools. Furthermore, the data may be of interest to lecturers of first-year units in regards to the experience many students bring to their pre-service teacher education programs.

Methodology

A mixed methods approach was taken in this research as typically investigating reflections and personal insights can be effectively undertaken by using a survey-interview combination. In this case, the survey was anonymous and accessed online, while the interviews were semi-structured and conducted with small focus groups.

The research questions were:

1. What was the nature of laptop use of students in 1:1 laptop program schools?
2. How has the 1:1 laptop program impacted students' perceptions of their future teaching with ICTs?

Participants

First year Bachelor of Education students in a common first year unit (undertaken by primary, early childhood, and secondary education students) were invited to participate in the anonymous, online survey, and also a series of semi-structured focus group interviews. Due to the nature of the research, only students who had undergone a minimum of one year in a 1:1 laptop program in their secondary schooling were eligible to participate. The data set presented in this paper was sourced from two iterations of surveys and interviews: 2014 (n = 23) and 2015 (n = 10). In all 29 female students and three male students volunteered for the survey and seven for the interview; from a population each year of 600 students although the number of eligible (ie a minimum of one year in a 1:1 laptop program) students was unknown as they were only identified by consenting to participate. The ages ranged from 18 to 31, with 20% of participants having left school less than one year ago, 37% one to two years ago, 27% between two and five years ago, and 16% more than five years ago. Typically (60% of participants) indicated that they used the laptops most in Year 12, and no students indicated using the laptops in Year 8.

Data Collection Methods

Data were collected using two methods: an anonymous, online survey and four semi-structured focus group interviews. The Qualtrics survey of 50 statements used two 5-point Likert scale arrangements from *Very often* to *Never*, and *Strongly disagree* to *Strongly agree* to obtain students' responses, and five semi-structured focus group interviews that were 45 – 60 minutes in length; audio-recorded; transcribed verbatim; and cross-checked by the researchers. To ensure consistency of approach, the same researcher conducted the interviews.

The anonymous, online survey comprised both demographic and reflective components. The demographics targeted aged, gender, and number of years since leaving secondary schooling. The reflective components used the stem "At my secondary school, I used my laptop to …" and were aligned to four different categories of potential laptop use: *productivity activities, education-specific activities, communication activities,* and *creation activities.* The productivity activities listed were: word processing, creating graphs and charts, compiling spreadsheets, creating and presenting slide shows, drawing diagrams, and creating desktop publications. Education-specific activities referred to use of the laptop to undertake fundamental "school" tasks such as: accessing their eTextbooks, accessing video and YouTube clips, accessing assessment results and feedback, and completing drill-and-practice activities. Email access, online discussions, and access to the school intranet were the key communication activities, while creation activities comprised blogs, movie-marker, Vokis,

photo-shop, and website construction. These categories and statements were similar to those used by Handal et al. (2013) in their study, and Blackley and Walker's (2015) study involving teachers' use of laptops, and were adapted to reflect the capabilities of the Apple Mac environment within the context of a secondary school 1:1 laptop program.

The interview questions were created by the researchers to collect extended opinion or attitudinal data, as the participants were encouraged to reflect on their past experience and also to project themselves into their profession. The eight key questions were:

1. Would you please describe the 1:1 laptop program at the school you attended?
2. Would you please describe a typical scenario of you using the laptop in or out of class in your learning?
3. What do think were the *benefits* of using a laptop for your learning?
4. What were some of the issues in using a laptop for your learning?
5. Do you believe that the 1:1 laptop program was "Value for money"? Why/why not?
6. Can you describe any of your *current* student-practices that resemble how you used the laptop in your secondary school?
7. What advice or recommendations would you make to teachers in a secondary school that was considering implementing a 1:1 laptop program?
8. Have your experiences with the 1:1 laptop program influenced your ideas on teaching? How?/Why not?

Data Analyses

Data analyses were conducted on the survey responses and interview transcripts. The survey responses were grouped in two positive responses (*strongly agree* and *agree*; *very often* and *often*), a mid-way response (*sometimes* or *neutral*), and two negative responses (*strongly disagree* and *disagree*; *seldom* and *never*). A thematic analysis of the data was carried out by examining single-fields and a selection of multiple-fields (cross-tabulations). This was done to gain insights into trends and relationships. The interview recordings were transcribed verbatim by one researcher, and cross-checked by the other researcher. Both researchers coded the transcripts, and then collaborated to reach consensus on the final coding. The transcripts were then analysed independently, and further collaboration resulted in a consensus on the major emergent themes.

Findings and Discussion

The findings are organised according to the type of laptop use (that is, productivity, education-specific, communication or creation), and participant reflections of their experience that were drawn from the sections of the survey, and supported by quotes from the interviews. This is followed by the themes identified from the interview transcriptions. Although the sample size was limited (n = 33 for the survey and n = 7 for the interviews) the findings do provide an initial measure from which other larger studies may evolve.

Productivity Activities Usage

The productivity activities that participants rated as using most often were *word processing* and *creation of presentations using PowerPoint*: both scoring 70% *very often* or *often*. Interestingly 100% of the interviewees confided that although the laptop was "handy for typing up assignments" there was a prevailing practice of doubling up of work: "We

would still handwrite our work and then transfer it onto the laptop in Word" (Participant 2d1). The use of PowerPoint presentations was predictable given its high profile in Windows environments in schools and accessibility to a compatible Mac version: "We did a lot of PowerPoints at school for assignments" (Participant 2d2). The two lowest rated productivity activities were *draw diagrams* (scoring 63% *seldom* or *never*): "Trying to draw diagrams on the laptop was too hard so you'd always need your file with paper." (Participant 2d2) and *create desktop publications* (scoring 63% *seldom* or *never*).

Education-Specific Activities

> The highest rated activity in this category was *gain information from websites* scoring 80% *very often* or *often.*
> (Participant 2d2) *Actually the only thing we really used it for in class was research on the Internet.*
> (Participant 2a2) *It was useful to be able to do searches on the Internet anytime.*
> (Participant 2c1) *We would use it a lot for research. For example in Art, we would start a new topic, like the Renaissance, and the teacher would tell us to research it.*

Two other reasonably high-scoring activities were *do my homework* (77% *very often* or *often*) and *complete assessment tasks* (scoring 60% *very often* or *often*). Of interest is the score of 63% *seldom* or *never* that was reported for *access my eTextbooks* which is a contrary finding to Blackley and Walker's (2015) study on teachers' reported uses of laptops.

Communication Activities

The two highest-scoring activities for communication were *access emails* (77% *very often* or *often*) and *access the school intranet* (67% *very often* or *often*). Both of these activities are typical of administration directives in secondary schools, and as such, may not reveal an actual *student* preference for these modes of communication.

Creation Activities

The three creation activities listed in the survey (*create videos/movies; create animations; create pod/vodcasts*) scored highly negative: respectively, 53% *seldom* or *never*; 63% *seldom* or *never*; and 73% *seldom* or *never.* This is not surprising given that the participants reported that they used their laptop most in Year 12, when perhaps the emphasis of their studies is more focused on meeting the demands of certification and tertiary entrance.

Additional Laptop Use

Additional free-text entry responses from participants to *Please list any other uses for the laptop that you experienced* revealed that as students they seized the opportunity for

social networking and gaming. Listed were: Facebook, iPhotos, messaging friends, skype, games, and kaleidos. These responses were also supported in the interviews:

(Participant 2c2) *Lots of games and we would bring in a USB and plug it in and install the game in class and then play it.*

(Participant 2c) *We used Facebook in class a lot. We would play games on them too.*

(Participant 2b1) *I spent a lot of time playing a Tetrus game.*

So in response to research question 1 (What was the nature of laptop use of students in 1:1 laptop program schools?) the majority of participants in this study clearly indicated a limited range of *productivity activities* (word processing and presentations), *education-specific activities* (researching using the Internet, and *communication activities* (student email and school intranet). These findings mirror Blackley and Walker's (2015) study investigating teachers' self-reported use of the laptops, and to a great extend also mirror their use of ICTs in their initial teacher education program, for example. *I do my assignments at Uni on my laptop, which is the same as at school.*(Participant 2a2), and *Word and Power Point are the big ones I use now*. (Participant 2c1).

Participant Reflections on the School 1:1 Laptop Program

This group of statements in the survey used the stem "The 1:1 laptop program at my secondary school…" and Table 1 summarises the participants' responses that scored higher than 50% for *Strongly agree* or *agree.*

Statement	Scoring SA or A
advanced my productivity ICT skills	78%
advanced my creativity ICT skills	70%
made it easier for me to achieve to the best of my ability	63%
is something I would recommend to other schools	63%
provided me with a platform to take responsibility for my learning	63%
assisted me to be organised	59%
supported my preferred learning style	56%
allowed me to choose the time and place for engagement with the curriculum	52%

Table 1: Summary of participant reflections on the personal impact of the 1:1 laptop program (n = 33)

When the statement, *is something I would recommend to other schools*, was cross-tabulated with the number of years in which participants were involved in a 1:1 laptop program, the results indicate that the longer the participants were involved in the laptop program, the less likely they would be to recommend such a program to another school. Of the students who had participated in up to one year in a 1:1 laptop program, 30% of them reported that the would recommend such a program to other schools; whilst the students who participated 4 to 5 years in a 1:1 laptop program scored 30% as a *neutral* or *disagree* for recommending to another school.

Interview Findings

Three key issues were identified from the interview data: school policy versus teachers' beliefs, student misuse of the technology, and teacher *and* student preference for pen-and-paper use. The following quotes provide an indication of why these were issues.

School Policy versus Teachers' Beliefs

(Participant 2d2) *[the teachers] would tell us we wouldn't be using it in their lessons but we still have to bring them to class because they said it was school policy.*
(Participant 2d1) *we would have the laptop open and pens and paper out. We would have the laptop at the top of the desk open because we wouldn't be using it, but we had to have it open, so that would be the best place to get it out of the way so we could write.*

There was a consistent policy amongst the 1:1 laptop school leadership teams in regards to making the use of the laptops highly visible; hence the directive to teachers to insist that students have them in every class. However, in many instances, it was reported that the class teacher had not planned to use the laptops in the lesson, so whilst the students had them, they were set aside so that traditional pen-and-paper and/or teacher-directed instruction could be used.

Student Misuse of the Technology

(Participant 2c2) *There wasn't any block on the Internet so we would be on Facebook and MySpace all the time. We didn't do much work that year. We would take photos of teachers and edit these and show them around.*
(Participant 2c1)*You weren't meant to be able to get onto Facebook and Gmail but we found a way around that. The teacher was up the front and we were watching a movie on the projector and kids would be gaming on their laptops instead of word processing notes. Someone would take turns in taking the notes and then send the others those notes.*
(Participant 2d1) *It is also really easy to have your finger on the escape key and get out of something you shouldn't be in when the teacher comes close … only some teachers walked around while we were working.*

Whilst, on the surface, these practices of the students may appear to be "mis-use" in that what they were contrary to what they were expected to do, perhaps it illustrates the "opportunistic-use" of their devices and functionality that are second-nature to them. It also illustrates the importance of teacher awareness, monitoring student access, and the need for effective digital pedagogical practices.

Teacher and Student Preference for Pen and Paper

(Participant 2c1) *In English the teacher made us hand write everything. Most of our work was still pen and paper, I preferred that.*
(Participant 2d2) *I typed up all the notes but when exam time came, I would make all my notes on pen and paper and then I would type them up. Then I would print them off and highlight that. That's how I would study.*
(Participant 2d1) *Even with history, all our notes were on pen and paper.*
(Participant 2a2) *We only used the laptop is some lessons. In maths we didn't really use it at all. We still did a lot of hand written work. We would still hand write our work and then transfer it onto the laptop in Word. In class tests, we always hand wrote those.*

Whilst it is understandable why the laptop was not used in mathematics classes (e.g., difficulty in formatting equations), it is ironic that these students who have grown up with

PCs and laptops, and word processing experience would prefer to take notes by hand. Is this because the dominant classroom expectation and desire of the teacher is to do so, or is it that there is some intrinsic belief that hand-writing will foster learning, or at least recollection?

> When responding to the interview question *Do you believe that the 1:1 laptop program was "Value for money"?* participants were in agreement that it was not, citing the lack of use as the primary reason.
>
> Participant 2a1*: No we didn't use it enough. It would be worth it if they would have used it more. I got by fine without using it more.*
>
> Participant 2c1: *It was ok but I think the teachers could have used it more and been more onto us. They could have really made the learning more fun with it.*
>
> There were few recounts of positive laptop usage, and the most comprehensive was:
>
> (Participant 2a2) *In English, we would watch a movie then straight away we would need to get on our laptops and research more information about it. Then we would go straight onto a Word document and write about it. You could also take notes on it while the movie was playing. That was really good using it for research.*

The sentiments conveyed by the participants align with previous research on pre-service teachers' 1:1 laptop integration within their practicums in that it involved directing students to utilise the laptops for note-taking, assessment writing, communication, and Internet searching (Mouza & Karchmer-Klein, 2013). These findings appear to demonstrate the phenomenon of past learning experiences impacting future teaching practices. In response to the second research question (How has the 1:1 laptop program impacted students' perceptions of their future teaching with ICTs?) four key actions for themselves as future teachers were clearly evident (1) laptop use needs to be monitored well by the class teacher; (2) integrate them effectively into learning activities; (3) do not block so many websites ("if you are going to give kids the technology then don't take it away because you don't trust them"); and (4) know how to use the technology.

The first action described by the pre-service teachers involved in this study relates to concerns about teachers monitoring the misuse of the technology by students. Interestingly research reports conflicting results in the relationship between technology integration and classroom management. Sabanci, Ozyildirim, and Imsir (2014) suggest that technology usage in English language lessons assisted in easing classroom management issues. Lim, Pek, and Chai (2005) alternatively report on classroom management issues that occurred in technology-mediated lessons; however, they suggest these could be alleviated through more structured and specific procedures and rules. Furthermore, there are now programs and apps that support the classroom teacher to manage technology use in the classroom, for example, being able monitor all student screens simultaneously during a lesson.

The second action relates to teachers being able to effectively integrate technology into their teaching practices. This negative experience reported by pre-service teachers may have stemmed from various reasons, including their teachers not having the knowledge to integrate technology effectively (Blackley & Walker, 2015), and/or relating towards their attitudes and perceptions of the usefulness of the technologies in their teaching practices (Teo, 2008).

The third action described by the pre-service teachers is to not block so many websites. This can be difficult to influence as it is often the choice of the software purchased by a whole school or system that determines which sites will be blocked. These website blocking programs may not always be effective in blocking inappropriate websites and may in fact block appropriate websites. Furthermore, the appropriate use of technology in schools is heavily regulated as is the case in Australia. Examples include the *National Digital*

Learning Resources Network: Standards for Digital Resources (Education Services Australia, 2012); *Australian Professional Standards for Teachers* (AITSL, 2014) and *Safe Schools Toolkit* (Department of Education and Training, 2014). It could be assumed that the participating pre-service teachers in this study were not aware of these policies and regulations as well as the blocking programs that are designed to support them.

The final action from pre-service teachers is for teachers to know how to use technology themselves. Interestingly teachers and pre-service teachers may be able to effectively use and navigate social media websites but be unable to effectively use technology for teaching and learning. This may be a consequence of teachers and pre-service teachers using technology more in their personal lives than their professional lives (Yeung et al., 2012).

The pre-service teachers reflected on how they would use the affordances of 1:1 laptop programs in their future teaching. The participants suggested: allocating set times in the school day to use the laptops, using videos to demonstrate real life applications of concepts, prioritising handwriting over laptop use, not building the lesson around the laptop, infrequent use as they can be a distraction, and student-directed individual use.

> (Participant 2c2) *I would be more creative if I was going to use IT in my lessons. I want to make it fun and interactive. But I won't use them all the time. I won't make them available all the time, I will only have set times that they are available.*
>
> (Participant 2c1) *I am hoping to teach Human Biology so I would get my students to watch videos and look at diagrams. I think the visual support would be really good for students. I would only use the computers individually for research. I don't really know any creative options to be able to use the laptops so I can't use them like that.*

These reflections demonstrate the necessity of more explicit attention to integrating technology within student learning experiences (Hughes, 2013). Furthermore this research highlights the importance of pre-service teachers being given opportunities to analyse and critically reflect on integrating technology into student learning experiences in a meaningful way (Mouza & Karchmer-Klein, 2013) as well as not allowing their negative past schooling experiences to impact their teaching practice (Cullen & Greene, 2011).

Conclusion

A whole school 1:1 laptop policy with the requirement that every student has a laptop does not ensure good digital pedagogy – that is, the use of ICTs for teaching and learning – the worst case scenario is a sea of open laptops alongside very traditional classroom practices. Practices reported by the pre-service teachers in this study and the teachers in Blackley and Walker's (2015) previous study, indicate that laptop use is primarily *substitution* (Puentedura, 2010) – the technology is used as a tool substitute with no functional change. An example of this is, as indicated by the participants in their interviews, using the laptop to word process text that would otherwise have been type-written or hand-written. Puentedura's (2010) SAMR model describes four levels of technology use in learning activities: *substitution*, *augmentation*, *modification*, and *re-definition*. Substitution is the simplest use of technology in the classroom, followed by *augmentation* that concedes a functional improvement to the direct substitution of a tool. An example of this would be the use of PowerPoint to present slides as a functional change to using overhead transparencies and a projector. We believe that as long as schools and initial teacher education programs continue to promote and model predominantly *substitution* and *augmentation* use of

technologies, then authentic digital pedagogies and transformation will not occur.

Skills and technology innovations relating to managing students' technology use in the classroom could form part of initial teacher education courses to address pre-service teachers' classroom management concerns. In order to prepare pre-service teachers to effectively and authentically integrate technology into student learning, Tondeur et al. (2011) suggest the following strategies be incorporated into initial teacher education programs: pre-service teachers have opportunities to observe practising teachers effectively integrating technology into lessons; technology be integrated into all pre-service teacher education curriculum units; explicit instruction in planning to integrate technology is provided; explicit linking between theory and practice in utilising technology is a component of curriculum units; the opportunity to practise integrating technology into lessons is included in professional studies units; and time to collaborate with peers and share experiences in integrating technology is provided. It is essential that pre-service teachers are informed on policies and regulations that relate to the safe, ethical and responsible use of technology in their teaching and learning practices. If pre-service teachers do identify blocked sites that would be effective in supporting student learning and integrating technology into lessons, then they need information on how to report these discrepancies. Alternatively, with the wealth of information available, consideration should be given to how knowledgeable they are in their searching for digital information. Pre-service teacher programs could include instruction on Internet search skills, language, and digital information curation.

In order to transform the use of technologies in 1:1 laptop schools, or even Tablet or iPad equipped schools, we posit that the focus should be upon digital pedagogies rather than the tools. By this we mean planning learning experiences to make the best use of the affordances of the technologies so that the students develop and demonstrate 21st Century Learning Skills. Blackley and Sheffield (2015) distilled four main consistent components from the differing lists and descriptions of these skills: Critical thinking, communication, collaboration and creativity. Despite being recognised as aspirational skills for our students for many years, the technologies available to teachers and students highlight the new importance that they have (Silva, 2009). Student artefacts that demonstrate their learning could potentially move away from the constraints of individually produced print text, and the whole learning journey can be supported by peer collaboration and reflection enabled by tools such as Google Docs (©2016, Google) and Trello boards (©2016, Trello, Inc.). Other tools can enhance multi-modal demonstrations of learning while at the same time providing opportunities for collaboration and creativity; easy to access and intuitive to use examples of these include: Vokis (©2016, Oddcast Inc.), GoAnimate (©2016, GoAnimate), and JINGs (©1995-2016, TechSmith Corporation).

The use of digital pens could eliminate the issues raised by the participants in this study in regards to mathematics and drawings or diagrams in any subject area. In fact, the use of these devices, that use real ink and write on paper, has the potential of make 1:1 laptop programs redundant. Students and teachers who prefer manual writing are catered for; the potential distractions of having a laptop, as indicated by the students, can be eliminated; and what has been written – every word, sketch or scribble – is converted to a digital file, and then be easily edited, archived, and shared as required.

This research aimed to contribute to the discussion on how 1:1 laptops are being used in the classroom and how this impacts pre-service teachers' experience and beliefs about technology and learning. The results of this small scale study suggest that their experiences impacts on their beliefs and use of technology in their learning and teaching practices. This is of concern when these experiences were token or negative uses of technology. It is recommended that further investigation is conducted into the use of technology in learning and teaching in schools and in pre-service teacher education programs.

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