

Pre-service Teacher ICT Tool-kit

The Role of the Setting

Kathy Jordan and Jennifer Elsden-Clifton
School of Education, RMIT University, Bundorra, Australia

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Abstract: For some time, Teacher Education policy and research has consistently argued that graduates are ill-prepared to use ICT in their practice (TEMAG, 2015). In Australia, an increasing regulatory environment means that Teacher Education providers need to meet national accreditation demands as well as design programs that address professional standards for graduates where an effective ICT use is a requirement. In an effort to have greater understanding of how to design Teacher Education programs that meet these challenges, this small scale study investigated where 69 pre-service teachers learned how to use a number of ICT resources commonly used in primary and secondary schools. Findings suggest that they learned how to use many resources (particularly general-type resources) in their everyday life prior to undertaking their teaching qualification and that they learned how to use a lesser number in university coursework or practicum in schools. A number of implications for Teacher Education conclude this paper.

1 INTRODUCTION

Teacher Education has an important role in supporting the next generation of future educators to have the knowledge and skills to integrate ICT in their teaching practice. It is through these experiences that pre-service teachers can shape their knowledge and beliefs about teaching and learning with ICT, and ultimately impact on what happens in their future practice (Bakir, 2015; Haydn, 2015, Tondeur, et al. 2012). However, it has proved more difficult than people thought (Haydn, 2015). A number of factors are often identified in the literature that act as obstacles, or enablers, and help explain why pre-service teachers feel inadequately prepared (Haydn, 2015; Tondeur, et al. 2012). Mirzajani et al., (2015) categorise obstacles into three types: Resource-related obstacles, Institutional obstacles and Attitudinal obstacles. Resource-related obstacles include lack of access to ICT hardware and software, lack of training and support to use ICT, lack of knowledge and skills and lack of leadership. Institutional obstacles include lack of financial commitment, lack of time, and lack of incentives and commitment. Attitudinal obstacles include resistance to change, negative attitudes and self-efficacy.

Research also suggests that teacher educators play a significant role in supporting pre-service teachers develop the required skill-set (Albion &

Redmond, 2008). This can involve routinely using ICT, so that pre-service teachers can see it being modelled. Haydn (2015) suggests that the competence of teacher educator staff is one of the most defining factors in whether teachers in their first year of practice use ICT or not. Research has shown however that not all teacher educators have the capability to provide this support (Albion & Redmond, 2008), with many courses being taught by enthusiastic individuals, rather than mainstream practitioners. Sometimes it is insinuated that the lack of teacher educator uptake is because they are 'digital immigrants' (Prensky, 2001). According to the view made popular by Prensky (2001) and others, the so called 'digital immigrants', have come later to using ICT, and find using these tools foreign. This is contrasted with the 'digital natives', those who have grown up with technology, and are accustomed to using these technologies throughout their day to day lives. While this view has been debated and many of its claims rejected (Bennett et al., 2008; Selwyn, 2009), it still has considerable traction.

Research clearly shows that educating the next generation of educators is a complex undertaking (Haydn 2015). However the role that pre-service teachers play in their education and professional learning has perhaps been underplayed. Research has shown that pre-service teachers have access to

an increasing number of technologies. A recent study by Delaney et al. (2014) of some 220 science pre-service teachers in their first semester of study at two Australian Universities, found that many were familiar with the listed 50 types of technologies. However, knowing about, or having access to technologies, does not necessarily mean that pre-service teachers are able to transfer this knowledge to classroom settings, as this study proposed. Nevertheless, it does raise the broader question of to what extent providers and teacher educators should be responsible for developing the skill-set of the next generation of educators and to what extent pre-service teachers should assume responsibility.

In the next section we explore further how Teacher Education providers have faced this challenge in the past. We then move on to describing the Australian context, which forms the backdrop to this specific study, and the changing regulatory environment, which is impacting on Teacher Education. The findings of this study are discussed in relation to how pre-service teachers ICT toolkit may be considered in the design of Teacher Education program.

2 APPROACHES TO TEACHING ICT

Teacher Education programs in Australia, involve both theoretical knowledge and practical teaching and learning strategies. Often these two components are separated, with university coursework concerned with theoretical pursuits and practicum, or professional experience in schools, concerned with the more practical aspects of teaching (TEMAG, 2016). Both components are seen in the literature as important in developing pre-service teacher capacity to integrate ICT. Yet it is university coursework that has been given most attention in the literature.

In the past, it was often assumed that pre-service teachers only needed to have technical-know how to be able to integrate ICT into their practice. Teacher Education providers often met this challenge, by designing skills-based courses that focused on teaching pre-service teacher how to operate and use technologies. Bakir (2015) cites a survey of 1439 United States institutions which revealed that 85% of programs offered an educational technology course that focused on basic technical skills. Skills-based courses have been criticised for their limitations in teaching pre-service teachers to apply ICT in practice (Bakir, 2015; Steketee, 2005). It is

now taken as a given, that because of the speed of introduction of new technologies, that it is impossible to keep up to date with new technologies. In response, Mishra and Koehler (2006) argue for another way of thinking about technology knowledge. They suggest that while it does involve having the technical know-how to operate particular technologies, it also involves recognition that technologies are not neutral and that their designs and capacities can both enable and constrain particular practice. Mishra and Koehler argue that teachers need a deeper understanding of technology knowledge that continues to evolve and develop. They suggest that pre-service teachers need a complex knowledge set, one that enables them to interconnect their knowledge of technology, pedagogy and content.

How Teacher Education providers should structure and design their programs to achieve this skill-set is also highly contested (Bakir, 2015; Kay, 2007; Tondeur, et al, 2012). Steketee's (2005) review, while conducted some time ago, suggests that Teacher Education providers have used four main approaches. The first approach is the 'ICT skills development approach', in which a specific unit or course is used to upskill pre-service teachers to use ICT. While acknowledging that having skills is important, Steketee comments that this approach does not mean that pre-service teachers can apply these skills in practice. The second approach, the 'ICT pedagogy approach' aims to do just this, by using a specific unit or course to teach pre-service teachers how to incorporate ICT. While she suggests that this is a strength of this approach, she identifies transference into classroom practice again as an issue. The third approach, the 'Subject-specific approach', moves away from the discrete course approach, to embed ICT into specific subjects or disciplines. She suggests that this approach does enable pre-service teachers to develop practical knowledge of integrating ICT, but suggests that being able to use in practice, such as on practicum is again hindered. The fourth approach, the 'Practice driven approach' is intended to do just this. Commenting favourably on the authenticity of this approach, she suggests it is weakened by the need to have shared commitment to use ICT by university teachers, pre-service teachers, and mentor teachers in schools.

Tondeur, et al. (2012) suggest that, "Teacher education programmes have struggled with selecting and implementing the most effective strategies" (p. 135). This has become more complex given the current context of Teacher Education in Australia.

As such where does this leave providers who seek to develop programs that prepare effective future educators?

3 CONTEXT OF THE STUDY

Recently in Australia, the Report of the Teacher Education Ministerial Advisory Group (TEMAG) *Action Now: Classroom Ready Teachers*, the latest in a long line of government reports and inquiries into Teacher Education in Australia, was released. This group was established in 2014 to provide advice on the quality of teacher training in Australia and identify recommendations to better prepare teachers with the practical skills needed for the classroom. The report identified a number of directions, proposals and recommendations around the importance of the practicum (practical experience in schools), forming partnerships between Teacher Education providers and schools and the need to integrate theory and practice.

The teaching practicum is generally acknowledged as important for the development of practical skills in teaching and as a foundation of quality Teacher Education (Ure, Gough & Newton, 2009). Practicum is also identified as an important way for pre-service teachers to develop skills in using ICT, as it is through these experiences they can build their knowledge and learn how to integrate ICT and future potential practice (Bakir, 2015). Grove (2008, n.p) comments that,

The student teaching field experience is a critical component in the preparation of student teachers as a means of establishing ICT practices they will use in future settings. The experience provides a hands-on opportunity for student teachers to put what they know into action as they transfer, apply and refine the theory they have learned into lessons for their students. It is in this critical period that they construct their understanding of teacher practice.

The TEMAG report suggested ways that ICT could be used in Teacher Education programs. For example, it suggested that online technology could be used to enable pre-service teachers to become more familiar with teaching techniques and ideas from experienced teachers; that they could then discuss them, and reflect on them in relation to their own practice. The report paid attention to practicum, stating that ICT, “could be used to better prepare pre-service teachers to get most benefit from their professional experience and assist in integrating

theory and practice,” (2015, p. 49). It commented that ICT could be used to complement face-to-face practicum by enabling pre-service teachers to explore teaching scenarios without being physically present in schools.

The TEMAG report and resulting discussion papers, are having significant impact on Teacher Education in Australia, so too is national accreditation (Henderson et al., 2013). In 2011, the Australian Government introduced a national approach to accreditation for Teacher Education regulated by the Australian Institute for Teaching and School Leadership (AITSL). Teacher Education providers are required to meet a number of program standards as well as a set of national professional standards for graduates. These standards stipulate what teachers should know and be able to do. In relation to ICT, graduate teachers need to meet three standards, these being: to use ICT to expand curriculum opportunities, to know a range of ICT resources, and to support safe, responsible and ethical use of ICT (AITSL, 2011).

This direction towards greater accountability is not confined to Australia, as recent endeavours in the United States such as the development of ISTE Standards attest. Yet as Lemon and Garvis (2016, p. 2) suggest,

There is however emerging evidence that identifies gaps between teaching standards, policy and curriculum documentation and the reality of teachers’ (both in- and pre-service) own skills, knowledge and motivation (p. 2).

This paper responds to specific calls to ensure that upon graduation, graduates are confident and competent users in ICT. To date though Teacher Education providers (through their provision of coursework and practicum) are perceived as responsible for developing these standards and the role that pre-service teacher prior knowledge gained through work, study and personal and social lives has not been fully considered. Given that pre-service teachers do not come to their Teacher Education programs as blank slates, what is the impact on program designers? Armed with this knowledge, what influence could this have on our program designs?

This paper then is essentially concerned with where do pre-service teachers develop their ICT tool-kit? To what extent do they bring this knowledge with them to their Teacher Education programs, and to what extent do they learn this knowledge via the coursework and the practicum components of these programs? This paper was guided by the following research questions:

- 1 Where do pre-service teachers learn how to use listed ICT resources? Do they learn how to use these listed resources in one setting more so than others? If so, which setting was more often used? Which setting was least often used?
- 2 Is there a relationship between the setting and type of resource?
- 3 As a result of these findings, what are some implications for Teacher Education programs and in particular practice based courses?

4 METHODOLOGY

This paper draws on findings from a self-assessed survey completed by 69 pre-service teachers enrolled in primary or secondary Teacher Education programs at RMIT University, Victoria Australia. This survey had various sections, with one section asking pre-service teachers to indicate whether they knew what each of the listed ICT resources was and what it did (using a yes / no scale), and another section asking them to report their level of skill in using these resources (using a four-point scale: not at all, a little, some, a lot). The results of these two aspects of the survey have been reported previously (Jordan & Compton, 2015). A third section of the survey, and the focus of this paper, asked the pre-service teachers to indicate where they had learned to use these ICT resources. The pre-service teachers were presented with five options and asked to choose one: Coursework, Practicum, Prior Study, Prior Work, or Personal / Social Life.

The survey instrument used for this study was adapted from a larger instrument, used by practising teachers as a professional learning tool to benchmark their ICT confidence and skill (DEECD, 2014). It is a commonly used instrument and has been used for a number of years in various iterations. It includes a list of ICT resources, that can be categorised as both General-type resources (those that could be used in everyday lives, such as Twitter), as well as Education-type resources (those more particular to the classroom such as Interactive Whiteboards). This list was reviewed, with those not considered particularly relevant to pre-service teachers removed, resulting in some 32 items being included in the adapted instrument. It is to be noted, however, that while we considered that these resources may be relevant to pre-service teachers, we did not assume that they would know them all. The survey instrument was administered online using Qualtrics software via a link sent by email.

5 FINDINGS

In the web-based survey, the pre-service teachers indicated the setting where they learned how to use the listed ICT resources, choosing from five options (Coursework, Practicum, Prior work, Prior Study, Personal / Social Life). Survey results were then presented as percentage data as shown in Table 1. In the following discussion, we begin by reporting on the setting or location of their learning. We then turn to report on the specific resources learned in these locations. Finally, in the third section we report on the relationship between setting and the type of resource (General-type resource or Education-type resource).

Site of Learning

As seen in the table, pre-service teachers largely learned how to use listed ICT resources in their Personal / Social Life. They indicated higher percentages in this setting in relation to some 22 of the 32 resources, but this varied by resource.

Participants indicated higher percentages in learning to use resources during Coursework on five occasions. When it came to learning how to use resources on Practicum, participants recorded higher percentages in relation to three resources. Participants did not record a higher percentage in relation to any of the resources in their Prior Work. They indicated a higher percentage in a Prior Study setting on one occasion.

Coursework and Personal / Social Life were selected as the site for learning each of the listed resources. However, this was not the case with the other three settings, with Practicum not being selected on seven occasions, Prior Study on nine occasions, and Prior Work on three. Thus, the order of the setting where students learned to use different ICT resources was Personal / Social Lives, then Coursework, followed by Practicum, Prior Work and then Prior Study.

ICT Resources

As stated in the previous section, a higher percentage of participants learned how to use the listed resources in their Personal / Social Lives compared to the other settings or spaces. The following section focuses on reporting which ICT resources were learned in this setting, as well as the other settings.

The participants reported learning how to use some 22 of the 32 listed resources in their Personal /

Social Lives. This ranged from 31% who learned how to use Smart Pens in this setting, to 94% who learned how to use Gaming Consoles as well as Social Networking Website. 80% or more of the participants learned how to use nine resources in this setting rather than other settings. These were: Gaming Consoles (94%), Social Networking Website (94%), Digital Cameras (93%), Intelligent Maps (90%), GPS (90%), VoIP (88%), iPod, itouch or other MP3 player (87%), Tablet (82%) and eBook Reader (80%). Around 60 to 70% of participants indicated they learned how to use four main resources in this setting. These were: Voice Recognition Software (66%), Netbooks (67%), Social Bookmarking (67%) and Blogs (71%). Around 40 to 50% reported learning eight resources. These being: Robotics Equipment (42%), Wireless Internet Access (45%), Digital Learning Resources (49%), Mobile Phones (53%), and Video Conferencing (55%), with Video Sharing, Discussion Forums and Microblogging all recorded by some 58% of pre-service teachers.

A higher percentage of participants reported they had learned how to use five resources in their Coursework, rather than other settings. These were: The DEECD Website (77%), NING (69%), Online Conferences (63%), Wikis (57%), and Online Surveys (35%), and Digital Learning Portfolio (26%).

Participants reported higher percentage rates in learning three resources during Practicum. These were: Edustar (64%), and FUSE (50%) (both being websites designed by the government to support teachers), and Interactive WhiteBoards (IWB) (47%).

A higher percentage of participants reported learning how to use one resource in their Prior Study and this was in relation to Learner Response Devices (30%).

Relationship between Location of Learning and Type of Resource

In this third section we analyse and report on the relationship between the setting of learning Coursework, Practicum, Prior Study, Prior Work, or Personal / Social Life and the type of resource, whether General-type resource or Education-type resource.

Predictably, participants learned how to use General-type resources, that is, those that are accessible in every-day Personal / Social lives, such as GPS, and Social Networking, Digital Learning Resources. They reported less learning of Education-type resources, those more applicable to specific education settings. These were, Wireless Internet

Access for Learning and Teaching, Netbooks (mini tablets funded by the Department of Education) and Mobile Phones for Educational Use.

In Coursework, participants reported learning how to use Education-type resources such as department of education and government websites and Digital Learning Portfolio. They also reported learning how to use General-type resources including Online Conferences, Wikis and Online Surveys.

In Practicum, participants reported learning about three Education-type resources, Edustar, FUSE and IWBs. In Prior Study they reported learning about one resource, Learner Response Devices, a General-type resource.

As a general trend, participants were more likely to report learning to use resource in one of the listed locations, rather than across the five locations. This is shown in patterns in their rating of resources, particularly the differences between the highest rated location and the second highest. There was at least a 70% difference between the highest rated resource and second highest resource in relation to some 9 resources. For example, Social Networking Website was learned by some 94% of participants in their Personal / Social Life, with only 3% indicating they learned in either Coursework or Prior Work. Gaming Consoles, was learned by 94% of participants in their Personal / Social Life and only 4% in Prior Study. A final example is iPod, iTouch or other MP3 player, which 87% indicated they had learned in their Personal / Social Life compared to 3% who indicated they had learned how to use this resource in each of the other four locations. However, there were some exceptions to this pattern. For example, 35% of the participants indicated they learned how to use Online Surveys in Coursework and 33% indicated they did so in Personal / Social Life. Another example is Robotics Equipment with 42% of participants reporting they learned how to use in their Personal / Social Life, along with 33% who reported learning in Prior Study.

There were a few occasions when the participants did indicate that they learned how to use a resource in multiple locations. For example, Learner Response Devices, was reported being learned by 20% of participants in three locations (Personal / Social Life, Coursework and Prior Work), Smart Pens was reported being learned by 31% in Personal / Social Life, 23% in Prior Study and 19% both in Coursework and Practicum. Digital Learning Portfolio was learned by 26% of participants both in Coursework and Practicum and 21% in Personal / Social Life.

This general trend of learning to use a resource

in one location (rather than multiple locations) can also be shown by patterns of non-selection of a location. This was the case in relation to some 14 of the listed resources. For example, Practicum, as a setting was not selected on seven occasions, in relation to Discussion Forums, Intelligent Maps, Social Networking Website, VOIP, Robotics Equipment, Gaming Consoles and Digital Cameras. Prior Work, as a setting was not selected on three occasions, in relation to FUSE, Blogs, and Microblogging. Prior Study was not selected on eight occasions, in relation to Edustar, Ning, Intelligent Maps, Social Bookmarking, Social Networking Websites, VOIP, Gaming Consoles, and GPS. This pattern is also shown by very low rates of selection of a setting (2%, 3% or 4%) in relation to some 22 resources.

6 DISCUSSION

Teacher Education providers are often criticised for not preparing practice-ready graduates. In Australia, Teacher Education providers are facing increasing pressure, as evidenced by the recent TEMAG report (2015) and its recommendations around achieving greater consistency across providers and the better integration of in class experience and learning at university. As well, national accreditation requirements are now having considerable impact on the design, and delivery of programs (AITSL, 2011).

For some time, this pressure on Teacher Education providers has also included the expectation to prepare future educators with an ICT toolkit. In Australia, the development of national professional standards, which stipulate what graduates should know and be able to do, has turned this expectation into a requirement for all providers. Yet in the past, Teacher Education providers have been found wanting when it comes to preparing pre-service teachers to use ICT in their teaching practice. In particular, the often-used approach of a stand-alone educational technology course has been the source of contention (Kay, 2007; Tondeur et al. 2012), so too the skill level of teaching staff. Thus as Henderson et al. (2013) suggest, providers are likely to be challenged to meet the demands of the current regulatory environment.

Against this background of increasing pressure, greater accountability and criticism of past efforts, a considerable body of research has shown that achieving this ICT expectation is complex. Research has shown for example that a range of factors act as barriers or enablers (Ertmer, 1999; Ertmer,

Ottenbreit-Leftwich, & York, 2006–2007) to pre-service teacher appropriation of ICT. There is also increasing recognition in research that technical know-how, while necessary, does not accurately define the complex knowledge set required (Mishra & Koehler 2006).

This study suggests that rather than learning how to use particular resources in their Teacher Education programs, pre-service teachers primarily learned to use them in their Personal / Social Lives. For the most part these resources were General-type resources. Pre-service teachers were also likely to learn how to use a given resource in one location, rather than across multiple locations. As such, the results of this small-scale study could have bearing on how Teacher Education programs are designed and delivered. For example, it suggests that Teacher Education could focus more on how to incorporate prior knowledge of resources to the school context, and what knowledge (pedagogy, content and technology) pre-service teachers then require.

Responsibility for pre-service teacher capacity to meet these requirements continues to rest with providers. There has been little consideration that pre-service teachers can bring knowledge and skills with them to their Teacher Education Program. This is not to suggest that pre-service teachers are digital natives, as this view has been successfully challenged and rendered a myth by a number of researchers (see for example, Selwyn, 2009; Bennett, Maton, and Kervin, 2008). Rather it is to suggest that we appropriate the tools that we have available to us, and for many pre-service teachers in Australia ICT tools are readily accessible. As a result of the rapid development of technologies including social technologies and mobile technologies, and their increasing availability and relatively low cost, it is likely that many pre-service teachers have learned how to use a range of resources in their own lives prior to their enrolment in a Teacher Education program. Nor has there been much consideration that pre-service teachers should have some accountability for their own development of knowledge and skills.

This study reveals a number of tensions. On the one hand Teacher Education providers are expected to prepare graduates who have the knowledge and skills to teach in schools, including having an ICT skill-set. Reports such as TEMAG (2015), advise providers to make more use of school settings, so as to facilitate more practical skills. Yet, very few of the pre-service teachers in this study, reported that they learned how to use ICT resources during Practicum in schools. Thus Practicum may not have

provided these particular pre-service teachers with many ICT learning experiences. As such this study could reinforce what we already know about practising teacher use of ICT, that as with pre-service teachers, it is not simple. As well it suggests a mismatch between the rhetoric around ICT expectations and practice reported in research.

This study highlights that pre-service teachers can learn how to use ICT resources in a range of locations, not just in a Teacher Education program. This is not to suggest that having this knowledge is all that is required to integrate into practice. Rather to the contrary research has shown that a complex set of knowledge is required, that Mishra and Koehler (2006) argue involves the complex interplay of three sets of knowledge technology, pedagogy and content.

This study shows that General-type resources are most known by these participants, whereas Education-type resources were not. Therefore, this raises the question of where will pre-service teachers learn how to use them? Recommendations for Teacher Education in reports such as TEMAG (2015) highlight the need for greater connections with schools. Underpinning these recommendations is the view that schools are sites of practice and that practice is valued. Conversely then, one could argue that university settings, perceived as theoretically orientated are not as valued. This study suggests that the perceived benefits when in a Practicum setting may not be readily achieved. Indeed, it could be argued that this study challenges the implicit assumption in reports that greater connection with schools will lead to greater practice.

This study raises further questions about how ICT can be embedded into both components of Teacher Education programs. Given that it is assumed that knowledge and skills are taught in both these locations it is interesting that these settings were not utilised to any great extent as the source of pre-service teacher knowledge. Teacher Education providers perhaps need to move away from seeing themselves as the provider of all knowledge regarding how to use ICT in teaching practice, and have a greater acknowledgement that this knowledge and skill can be learned in a range of settings. We recommend further investigation into how Teacher Education providers can best design programs to take advantage of the multiple locations in which this knowledge can be learned.

7 LIMITATIONS

It is important to note that this study has a number of

limitations. First it is only a small scale study involving a small number of participants. Therefore, a study with more participants could be of value. The selection of participants was also based on volunteers and those who had undertaken at least one practicum which would enable them to comment on their learning in this location. However secondary pre-service teachers only had a four week practicum block and primary pre-service teachers had twice this amount, two blocks of four weeks each time. Thus there was a difference in the amount of practicum experience that could have influenced results. As well, the amount of time spent on Practicum was not equitable with that spent on Coursework. Furthermore, these participants were drawn from two different programs, but data did not differentiate by program.

Another limitation in this study is the trustworthiness of self-report data, as participants may have over-stated, or indeed under-stated, where they learned how to use these resources. There are also a number of possible limitations to the survey question which asked, 'Where I developed this skill' which could have been interpreted as referring to 'first learned' or 'most learned' which may have skewed results. In addition, as participants could only select one of the five listed locations, they could therefore not rank locations.

8 CONCLUSIONS

This paper contributes to the ongoing debate around how Teacher Education providers can educate the future educators. Having knowledge of where participants learn how to use ICT resources is an important consideration in the framing of Teacher Education programs, particularly in regards to targeting professional standards around ICT.

This small scale study has a number of implications for Teacher Education providers. First, given that pre-service teachers gain considerable knowledge of General-type resources in their Personal / Social Lives, Teacher Educator providers could concentrate more on embedding Education-type resources into Coursework. This embedding could be across the lifespan of a program, so as to enable progression in learning and consistency in approach, a strategy advocated in research by Bakir (2015) and Tondeur et al. (2012). Second, while research has suggested that the Practicum can be a site for learning how to use ICT resources, this study revealed limited use of this setting. As such further opportunities to explore the use of this setting

could be undertaken.

This study provides evidence that pre-service teachers can learn how to use ICT resources from a range of locations and that they can learn how to use resources prior to their commencement of their program. Indeed it suggests that considerable benefit to learning can be lost if due acknowledgement of the importance of pre-service teacher personal and social lives are not taken into consideration when

planning and designing Teacher Education programs.

This study while small and exploratory is important for future Teacher Education programs in Australia as understanding where pre-service teachers learn how to use ICT resources is a consideration in program design and also can be beneficial in complying with national professional standards and accreditation requirements.

Table 1: Where pre-service teachers learned to use the resource as percentages.

	Coursework %	Practicum %	Prior Study %	Prior Work %	Personal / Social Life %
Digital Learning Resources (websites, interactives, movies, images)	21	10	10	10	49
The DEECD website (Department of Education website)	77	7	2	9	5
FUSE (Department of Education repository for teachers)	25	50	13	0	13
EduSTAR (Department of Education suite of ICT applications pre-loaded onto teacher notebooks)	29	64	0	4	4
Discussion Forums, Chat and RSS Feeds	29	0	4	8	58
Blogs	24	2	3	0	71
Wikis	57	2	4	7	30
Microblogging e.g. Twitter	39	3	0	0	58
Ning	69	6	0	6	19
Intelligent maps e.g. Google Maps	6	0	0	3	90
Online Surveys and Polls e.g. Survey Monkey	35	4	10	18	33
Social Bookmarking e.g. delicious, Pinterest, slymbaloo	26	5	0	2	67
Social Networking Website e.g. Facebook	3	0	0	3	94
Video Sharing e.g. Teacher Tube	25	10	2	4	58
Online Conferences e.g. Blackboard Collaborate, Google hangout	63	3	16	8	11
Video Conferencing	15	5	5	20	55
Voice Over Internet Protocol (VoIP) e.g. Skype	4	0	0	9	88
Wireless Internet Access for Learning and Teaching	15	24	7	9	45
Interactive Whiteboard (IWB)	26	47	10	12	5
Robotics Equipment e.g. Lego robotics	17	0	33	8	42
Gaming Consoles	2	0	0	4	94
Digital Cameras - still/video	2	0	2	3	93
GPS (Global Positioning Software)	2	2	0	6	90
Netbooks (mini tablets funded by the Department of Education)	6	22	2	3	67
Mobile Phones for Educational Use	28	11	2	6	53
iPod, iTunes or other MP3 players	3	3	3	3	87
Tablet e.g. iPad	8	7	2	2	82
eBook Reader e.g. Amazon Kindle	2	10	2	6	80
Learner Response Devices e.g. Quiz Dom	20	10	30	20	20
Smart Pens or Digital Pens	19	19	23	8	31
Digital Learning Portfolio	26	26	11	16	21
Voice Recognition Software	9	3	13	9	66

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