Teacher Education in an Online World: Future Directions

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Abstract
We contend in this paper that attention to understanding the challenges of teaching and learning in an increasingly online world is needed. In particular, the imperatives of technological change and globalisation are linked to what student teachers ought to learn as well as how they learn. We suggest that future teachers will require skills not currently emphasised in many teacher education programs, and that some skills which have been traditionally considered as important will become less central. More sophisticated understandings of the implications of ICTs for reforms in curriculum, pedagogy and assessment are required. Teacher education programs must move beyond a focus on students’ ICT skills, and beyond integrating ICTs into the existing curriculum to an understanding of the transformative power of ICTs in education. Recent trends and online initiatives are presented to portray emerging online environments which hold implications for teacher education. We provide suggestions for teacher skills in terms of Educator Proficiencies and Effective Teaching and Learning Practice which we believe can provide the stimulus for preparing teachers for teaching in an online world.

Introduction
Our experience of preservice teacher education through the 1970’s in Australia included the teacher tools of chalk, blackboard, pen and paper; assignments were handwritten, information was obtained from printed and written texts and communication was usually confined to face-to-face meetings. Learning in an online world: School education action plan for the information economy (EdNA Schools Advisory Group, 2000) provided a vision for schools which recognised the ways in which factors such as globalization and online computers were likely to affect young people. That strategic document highlighted the importance of people as well as infrastructure, content and services, supporting policies, and enabling regulation. The people dimension refers to the understanding that for improved learning outcomes for students to be achieved, action is required to ensure that “educational leaders, teachers and administrative staff have the skills and commitment to use learning technologies effectively” (EdNA Schools Advisory Group, 2000, p.3). What are those skills required? Raising the Standards (DEST, 2002a) which “discusses the significant issues relevant to the development of a teacher ICT Competency Framework, makes recommendations and proposes a specific structure for the framework and the nature of ICT standards that could be developed from it.” (DEST, 2002a, p.3).

DEST (2002a) recognises the “impetus for this project stems from the report Learning in an online world: School education action plan for the information economy” (p.3) and makes specific reference to people. This paper aims to add to this important dialogue for identifying implications and new skills for future teachers in these new times, characterised by increasingly online technological capabilities for information and communication.

ICTs in Preservice Teacher Education
It is becoming increasingly clear not only that, as highlighted by the Australian Council of Deans of Education report New Learning a Charter for Australian Education (ACDE, 2001) in their Proposition 5, that “Technology Will Become Central to All Learning”. ACDE continue to argue that the “Technologies of digitization have the potential to transform learning relationships” (ACDE, 2001, p. 3). The transformative stage involving ICT use in schools can be conceptualised as three overlapping stages (see Table 1 below). These stages are described by Dwyer, Ringstaff and Sandholtz (1991), and Kraver (1997). That conceptualization tends to mirror the developments of teacher education programs in ICTs. However, some doubts have emerged in recent times relating to the claims of the transformational potential of ICTs. For example, Cuban (2001) in Oversold and Undersold Computers in the Classroom questions those claims and indicates that most changes he has observed have been, at best, incremental changes and classrooms still operate in much the same way as they did before ICTs. Similarly, Fluck (2001) in his observations of the English context, noted that the critical elements to achieve success in the transformation to a curriculum which would not exist without ICTs, included the revision
of the national Curriculum to include ICT in every subject area, as well as definitions of the ICT skills requirements of pre-service and in-service teachers” (Fluck, 2001, p. 149).

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<th>Stages of ICT Implementation</th>
<th>Example of Implementation</th>
<th>Conceptualisation</th>
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| 1. Skill Acquisition         | Students learn basic computer components and functions and gain skills in applications such as word processing, spreadsheets and databases. | (Dwyer et al, 1991)  
1. Entry  
2. Adoption (Kraver, 1997)  
Wave 1: Early Adoption – “End of the beginning” |
| 2. Enhancing Teaching and Learning | Students learn how to integrate ICTs within the existing curriculum. | (Dwyer et al, 1991)  
3. Adaptation  
4. Appropriation (Kraver, 1997)  
Wave 2: ICT Integrated Curriculum – “Buildup” |
| 3. Transformative            | Students are prepared for the ways in which schooling is changed by ICTs. | (Dwyer et al, 1991)  
5. Invention (Kraver, 1997)  
Wave 3: Research based learning technologies are released and transform education – “Final Push” |

Stage 1 reflected a tendency to focus on the acquisition of ICT skills, while Stage 2 moved from that inadequate orientation from teaching about computers to teaching with computers. Thus, the task was for student teachers to study how ICTs could be used to enhance teaching and learning within the existing curriculum. Examples of this orientation internationally include Preparing Tomorrow’s Teachers to Use Technology (US Department of Education, 1999) in the USA, Interactive Education: Information and Communication Technology (ICT) Strategy for Schools (Ministry of Education, New Zealand, 1998) in New Zealand, and Hong Kong’s Information Technology Learning Targets (Information Technology Learning Targets Working Group, 1999).

Stage 3 relates to the transformative power of ICTs. In identifying this stage, we have drawn on the conceptualisation of the dimensions of ICT use whereby ICTs hold the potential to be an “integral component of the reforms which will alter the organisation and structure of schooling itself” (DETYA, 2000). Drawing on this dimension, we question the assumptions which tend to suggest that it is sufficient to focus on learning about and learning with computers, and suggest that much of this work in teacher education has not gone far enough. The DEST (2002a) report agrees, noting of ICTs that "to date, this potential has not been realised in any significant way, particularly the potential to transform how, what, where and why students learn what they do. While there are only limited examples of the transformative power in the educational sector, experience from industry and other sectors clearly demonstrates that new times need new approaches, and that the nature and application of ICT enable that transformation.” (DEST, 2002a, p.3)

Similarly, the DEST report Making Better Connections (DEST, 2002b) which reviewed preservice teacher education programs in Australia, reported that “while pre-service teachers receive considerable exposure to, and experience with, ICTs in their training, they receive limited experience in actual classroom use” (p. 2). The implications of this observation are that examples of ICT integration are still uncommon, and that current teaching practice has not developed sufficiently to keep up with technological change. This may be an indication of the tension arising from the conflict between a traditional hierarchical education system and globalisation. By examining some examples of initiatives in online learning and teaching approaches, the following section highlights the need for the identification of educator proficiencies for teaching and learning in an increasingly online world.

**Initiatives in Online Learning**

An extrapolation of current initiatives into the near future suggests that online learning in schools will become increasingly important. The two examples discussed in this paper that illustrate this are Virtual schools and ICT Initiatives in Australia.
a. Virtual Schools
There are a number of virtual schools of various forms in the U.S., Canada, Australia, Israel and the United Kingdom, in addition to examples such as the Islamic Virtual School, the Virtual School for the Gifted, and the International House Net Languages School. These schools are characterised by a physical separation between teacher and learner, and the use of online computers. While there is no indication that virtual schools will replace their bricks-and-mortar counterparts, they do provide an additional option for students, and their numbers are growing.

b. ICT Initiatives in Australia – Learning in an Online World
In Australia, the overview of ICT initiatives by Finger and Trinidad (2002) has highlighted the growing number of initiatives related to exploring the potential for connectivity. Among the online initiatives in Australia (see Table 2 below), the Schools Online Curriculum Initiative aims to develop and make available online curriculum content for teachers in Australia and New Zealand. In justifying the development of online curriculum content, the Learning Federation (2003) states that

"...while there is currently a great deal of educational material available online...[t]here is an acute shortage of such resources which are written specifically for Australian and New Zealand teachers and students. Research shows that good quality, properly sequenced online curriculum materials engage and motivate students." (The Learning Federation, 2003)

The implication for teacher education is that future teachers will be required to select from the array of learning objects available online to design curriculum programs which take advantage of those online resources to meet the needs and interests of their students. This raises questions about current preservice teacher education programs in terms of whether or not they are effectively preparing future teachers for learning in an online world.

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<th>Initiatives and Projects</th>
<th>Summary</th>
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<td>* Progress Report: Learning in an online world</td>
<td>The Commonwealth Government promotes and supports national collaboration across school systems to achieve the goals set down in <em>Learning in an Online World</em> (EdNA Schools Advisory Group, 2000).</td>
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<td>* The Le@rning Federation – Schools Online Curriculum Initiative</td>
<td>A component of Backing Australia’s Ability: An Action Plan for the Future, the Le@rning Federation aims to generate online curriculum content for system delivery to schools.</td>
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<tr>
<td>* National ICT Research Database</td>
<td>This will provide a searchable, online database available through EdNA Online.</td>
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Starting a Roadmap for Educator Proficiencies and Effective Teaching and Learning Practice

We argue that the kinds of challenges evident in the examples of virtual schools, and online initiatives, such as those in Australia, require new teacher competencies for the potential benefits afforded by ICTs to be realised. In order to conceptualise these new skills, we have drawn on lists of skill sets developed in the USA and Australia. These include the National Educational Technology Standards (NETS) for Teachers (ISTE, 2003), the enGauge 21st-century skills list (NCREL, 2003), which in turn was derived from a number of nationally recognised skill sets in the U.S.A., and the teacher learning technology competencies developed by the Australian Council for Computer Education (ACCE, 2000). We have also drawn on the conceptual map of ICT skills provided by Russell, Finger and Russell (2000). The recommendations provided in Raising the Standards (DEST, 2002a) are considered with particular reference drawn to using a comprehensive view of competence which includes “technical and higher order cognitive knowledge, skills, understandings and attitudes related to professional knowledge, professional practice and professional attributes” (DEST, 2002a, p. 3).

Table 3 focuses on two of the essential conditions for effective technology use; that is, the notions of educator proficiency and effective teaching and learning practice, defined by NCREL (2003) as:

1. Educator Proficiency (with Effective Teaching and Learning Practices) refers to educators who are proficient in implementing, assessing and supporting a variety of effective practices for teaching and learning. Proficiency requires the cultivation of digital-age skills and processes, planning and design, implementing technology-supported learning, assessment literacy, professional practice and productivity, and able to guide students as they deal with social, ethical and legal issues related to life in a technological world; and
2. Effective Teaching and Learning Practice requires the vision to be translated into practice through learning environments characterized by powerful, research-based strategies that effectively use technologies.

Although these two considerations do not comprehensively cover all dimensions proposed in the NCREL framework, our focus in Table 3 represents a starting point for developing a roadmap based upon identifying implications of ICTs for preservice teacher education. In each case, a future skill is identified, together with corresponding implications for teacher education. In our view, knowledge of these skills is necessary to enable effective changes in what students learn, how students learn, and to facilitate reforms to the organisation and structure of schooling.

For Educator Proficiency, we identify some of the skills and implications for behaviour management, multimodal screen-based literacy, assessment, authenticity determination and context knowledge as essential areas where teacher education programs must provide appropriate programs for ICT use. In the area of Effective Teaching and Learning Practice, we identify hypertext pedagogy, interpreting cues in mediated communication, socialisation and the teaching of values, the incorporation of ICT into discrete subject areas, and the design and implementation of new curricula.

Table 3: Implications of ICT and Connectivity for Teacher Education

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<th>Educator Proficiency</th>
<th>Implications for Teacher Education</th>
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<td>Multi-modal Screen-based Literacy</td>
<td>Increased need for this skill in most traditional and virtual schools. Includes</td>
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<td>• Reading, authoring and correcting screen-based material;</td>
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<td></td>
<td>• Advising students on appropriate use of elements such as graphics and sound;</td>
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<td></td>
<td>• Teaching web-authoring and multimedia production;</td>
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<td></td>
<td>• Evaluation of online materials.</td>
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| Assessment | Multimedia and online environments enable  
|            | • Creation of digital/electronic portfolios;  
|            | • Online testing;  
|            | • Online surveys, data collection, storage and analysis. |
| Authenticity determination | Students will submit materials electronically. Verification will be difficult. Issues include  
|                           | • Cybercheating and plagiarism;  
|                           | • Intellectual property. |
| Context knowledge | Students will need to know social practices, beliefs and values that embed ICT in students’ lives. |
| Behaviour Management | Reduced need in virtual schools where there is no face-to-face contact. New environments require  
|                      | • Establishment of protocols for online communications;  
|                      | • Development of acceptable use policies; e.g. for Internet use;  
|                      | Confidentiality, copyright, intellectual property. |
| Effective Teaching and Learning Practice | Implications for Teacher Education |
| Hypertext Pedagogy | Teachers will need to be able to:  
|                   | • Create hyperlinks;  
|                   | • Teach and learn in an online world;  
|                   | • Teach students how to avoid the “lost-in-space” syndrome;  
|                   | • Achieve deep learning using the Internet;  
|                   | • Incorporate web-delivered, web enhanced and web-supported modes of delivery;  
|                   | • Incorporate “Learning objects” in teaching. |
| Interpreting Cues in Mediated Communication | In the absence of face-to-face cues such as facial expressions and body language, teachers will need to develop skills in reading nuances in email and other materials sent by students; e.g., emoticons. |
| Socialisation and the Teaching of Values | • Where traditional school-based socialisation is reduced by agencies such as virtual schools, teachers will need to be able to offer alternative programs;  
|                                       | • Explicit provision must be made for the teaching of values. |
| Incorporating ICT into Discrete Subject Areas | It will not be sufficient for teachers to be able to use a computer, or understand common applications such as a word processor, spreadsheet or database.  
|                                             | • All teachers will need to be able to use online computers for learning in specific subject areas, in rich tasks which involve a transdisciplinary approach, and in integrated themes across subjects involving an interdisciplinary approach;  
|                                             | • Expectations will be that delivery of programs should be enhanced through online, multimedia resources. |
| Designing and Implementing New Curricula | It will not be sufficient to utilize ICTs to enhance existing curricula, as online environments will require the design and implementation of new curricula; that is, ICTs will require changes in what students learn as well as changes in how students learn. All teachers will need to:  
|                                              | • Design and implement new curricula to ensure that educational programs are relevant to the changing technological environments in which students are immersed;  
|                                              | • Demonstrate connectedness to the ‘real’ world which will require mechanisms for curriculum development which can shape and respond dynamically to technological changes. |

To understand these implications for teacher education, we refer to the arguments of the New London Group (1996). The spread of ICTs in schools should not be seen as an important but isolated example of change affecting traditional educational structures. It is, rather, a sign of the global, social and technological changes that have contributed to the ‘new times’ that we live in. We live in a time of global economy and globalised society, where daily life is mediated by complex and changing multimedia and technologies. We contend that teacher education in the twenty-first century should ensure that newly qualified teachers are able not only to cope with
the inevitable challenges that will arise, but also to capitalise upon the potential of the ICTs to create new learning and teaching environments.

Conclusion
In this paper, we have argued that there is the need for an urgent reconceptualisation of student teachers’ skills and learning experiences in teacher education courses. We suggest that future teachers will require skills not currently emphasised in many teacher education programs, and that some skills which have been traditionally considered as important will become less central. More sophisticated understandings of the implications of ICTs for reforms in curriculum, pedagogy and assessment are required. Teacher education programs must move beyond being limited to focusing on students’ ICT skills and beyond the integration of ICTs into existing curriculum to an improved approach to preparing future teachers to effectively creating and working in online teaching and learning environments. In order for this to occur, we believe that new ICT competencies, utilizing a comprehensive view of competencies, will be required.

Acknowledgement
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References


