Reviewing the literature in IT pedagogy: the classification dilemma

Abstract

Over the years research in Education has shifted from a functional use of Information Technology (IT) to a more applied approach focusing on educational technology to improve teaching and learning outcomes. Research today which investigates the intersecting fields of IT and pedagogy can prove challenging right from the outset when attempting to categorise the breadth of literature. By gaining an understanding of the way in which the research field itself has developed the researcher soon begins to appreciate the controversies surrounding IT Pedagogy. Furthermore, the need for a navigational tool for reviewing the literature is essential, because much of the terminology in IT and pedagogy is inconsistent, adding a critical layer of complexity. The purpose of this paper is to provide an approach to solving the dilemma of classifying studies in three intersecting fields: IT, ICT and educational technology. A systematic review of over 726 journals from the IT domain was undertaken, in order to understand the historical line of development of terms used in IT, ICT and technology. We found that IT refers to hardware and software, as well as a subject discipline in secondary and tertiary courses in Australia. ICT is often used interchangeably with IT, both terms are used to describe the integration of computer applications within other disciplines in the curriculum, such as English, Maths, and Science and encroach into the emerging area of educational technology. Pedagogy is another term with a myriad of meanings starting from the very general concept about teaching and learning, and shifting to more complicated definitions involving social process, culture, self-esteem and identity of learners. There were over 21 journal articles and textbooks on pedagogy and over 30 books and journals articles on ICT/online/web or e-pedagogy. This paper has been adapted from the literature review chapter of a doctoral dissertation investigating IT teacher pedagogy in schools, TAFE/VET sector and Higher Education. Because the nomenclature poses such a challenge, this paper presents a roadmap or set of guidelines for future researchers navigating the vast and overwhelming literature of IT and pedagogy.

Introduction

Undertaking research in the discipline of IT poses a challenge because IT is an umbrella term for a range of different but related ideas and concepts. Within the literature there is great confusion in the way in which concepts, ideas and language is used because there is no common language across the discipline (Voogt & Knezek, 2008a, p. xxx). Not only is IT a term that is commonly used to refer to hardware and software, but it is also a broad subject discipline in secondary schools and tertiary courses in Australia that covers quite an extensive range from network administration, computer science, software development or computer programming to website design and technical support (computer maintenance). IT is also offered as a separate subject or stream within other discipline areas such as Engineering (computer systems engineering and electronics), and the Creative Arts (multimedia, scripting, animation and authoring tool). There is much debate about which disciplines comprise the ICT spectrum with the teaching of ICT completed through several different faculties and schools, including engineering, science, and business or economics. In this climate, it is difficult to reach agreement on a single set of disciplines (Koppi & Naghdy, 2009, p. 5).

Furthermore, the term ICT - interaction between devices, system and people - is also used to describe the incorporation or integration of computer software applications and technologies within other such as English, Maths, Science and History. Not only is ICT often used interchangeably with IT, but as technology is involved there is also a cross-over with an emerging area of study, the discipline of educational technology. These diverse, yet similar elements add a layer of complexity when reviewing and classifying the literature, because any investigation in IT actually involves three separate fields of study- IT, ICT and educational technology - and the relevant key terms associated with each field.

Therefore, one of the key challenges to overcome in an investigation into IT and pedagogy is the inconsistent way in which key terms are used in the literature and the different contexts in which they are used. This paper attempts to simplify the confusion of classifying the range of different but related ideas and concepts in IT, ICT and Educational Technology by providing a roadmap or set of guidelines. For future researchers navigating the vast and overwhelming

literature in these areas, this approach may offer a solution towards the classification dilemma in which they find themselves.

1.1 Information Technology and Information Communication Technology

Terms such as IT, Information Communication Technology (ICT), Computers and Educational Technology are used extensively throughout the literature. One of the difficulties reviewing this subject area was the inconsistent and varied use of the key terms. The wide ranging use of the term, *IT*, and the resultant confusion with *ICT* in the literature, is compounded by the adoption of words such as *computer* and *technology,* to describe similar ideas and concepts, as well as the use of other nomenclature to describe teaching departments and courses. Underwood (2004, p. 136) argues there is a weakness in IT investigations because of a failure "to use the language and theoretical perspectives common across the discipline."

In Australia, the terms, IT and ICT, are understood to express different concepts. IT, as it applies in the TAFE sector, is taught as a separate discipline with very basic instruction occurring at Certificate I, II and III, gradually acquiring greater complexity at Certificate IV and Diploma levels. In secondary schools, IT refers to VCE subjects in Yrs. 11 and 12. In addition, when IT is used in the context of curriculum in TAFE, schools and universities, it usually refers to the discipline or subjects with content that consists of the application of computer software and hardware. However, this is not always the case as IT can also refer to the use of educational technologies or computer hardware and software. By contrast, ICT usually refers to the way in which computers are used within other subject such as Science, Humanities, Maths or Physical Education, for example.

Webb & Cox (2004) explain that ICT is used to describe a discrete subject, as well as one that integrates technology in the curriculum. Consequently, when authors such as Phelps (2002) write about ICT, their interpretation of the term is not clear because insufficient details are provided; as a result, it is not possible to work out the meaning from the context. A number of academics (Gibson, 2001; Hammond, 2004; Schoeny, 2002) use IT and ICT interchangeably, while others (Kirschner & Davis, 2003; Loveless, 2003) refer to ICT to describe the integration of

technology within the curriculum. Part of the reason for this indiscriminate use of terms may lie in the fact that ICT is a recent addition to the educational lexicon here and abroad. Hammond (2004, p. 29) points out that in England, IT was renamed ICT in the UK national curriculum in 1999, and ICT is used by some Australian university departments (Swinburne University of Technology and Griffith University) instead of IT. Therefore, the boundaries between ICT and IT are not often clearly delineated, leading to inconsistent usage.

A search of e-Journals using the key terms, IT, ICT, computer or technology in their titles, resulted in more than 700 likely sources, which is a substantial number of publications.

Table 1 : Journal Search of Key Terms in Titles

Key Terms Journal Search	Hits	Examples
Information Technology Journals	129	• Journal of Information Technology • Journal of Information Technology Education • Information Technology in Teacher Education
Computer	533	• CIT, Journal of Computing and IT • Computer and Information Science • Australian Educational Computing
Information Communication Technology	7	• Journal of Information and Communication Technology • International Journal of Information and Communication Technology Education • African Journal of Information and Communication Technology
Education Technology	57	• Journal of Technology Education • Australian Journal of Educational Technology • British Journal of Educational Technology

Therefore, while there is broad use of the key terms as evidenced in the range of e-Journals, the challenge was in appropriately classifying the literature to find common themes because of the confusion between terms IT and ICT. This makes research in the area problematic and clarification of the various terms, their context and the particular way in which they are used in Australia and UK compared to America and Europe. Further research regarding the specific approaches adopted by American and European scholars classifying terms is needed.

1.2 Commonly used terms

While Kennedy, Krause, Gray, Judd, Bennett & Maton, (2006) have shed light on the term, digital natives, and highlighted the characteristics of the Net Generation suggesting educators alter their teaching practices to better suit these savvy users of technology. It is clear that In IT the list of commonly used terms is rich and extensive with a number of related terms such as *computer*, *technology* and *web* used interchangeably, and with scant attention to the clarification of terminology making research in policy and evidenced-based practice problematic. The most frequently used terms were *computer* (Shields & Behrman, 2000, p. 4; Subrahmanyam, Kraut, Greenfield, & Gross, 2000, p. 124), *computer technology* (Becker, 2000, p. 44; Chen, 2000, p. 168) and *computer-based technologies* (Roschelle, Pea, Hoadley, Gordin, & Means, 2000, p. 76).

These terms were used in a generic way to describe hardware, software or teaching and were often substituted for the terms, IT or ICT. For example, Wartella & Jennings (2000, p. 31) used the word *computer* to refer to "greatly enriched learning", whereas Resnick (2000, p. 173) used it to mean "material for making things". For Jonassen et al. (1999, p. 12), *educational technology* was interpreted as "rich and flexible media for representing what students know and what they are learning" while Chen (2000) and Becker (2000) see it as the inequitable distribution of software and hardware resources. At times terms were used inconsistently within the same article. For instance, Dede (2000, p. 178) referred to *technology* as hardware, and then in another part of the same article he described it as a *learning tool*.

In a Canadian review of the literature on ICT and technological tools in education from 1995 to 2008, researchers that found an increasing number of articles substituted tool(s) for more specific terminology (Arntzen, Krug, & Wen, 2008). "...given the need to understand ICT within the constantly changing social and cultural contexts of local and global societies, it is misleading when digital hardware, software and infrastructure are reduced to being called a tool" (Arntzen et al., 2008, p. 6).

A number of IT related terms expressed the same or similar ideas. Selinger (cited in Leask, 2001, p. 83) used a variety of terms such as *computer aided learning*, *computer based learning* and *integrated learning systems* interchangeably. Tomei (2005, p. xv), however, used *computer assisted instruction*, *computer based training*, and *computer managed instruction* to indicate the absence of teacher instruction or *teacherless classrooms*. The TAFE or VET related term is *self-paced learning*. *Technology* was also a common term used (Moyle & Owen, 2009, p. 7; Norton & Wiburg, 2003, p. xi; Schrader, 2008, p. 457). Moreover, Broadbent (2002, p. 9) stated that *online* refers to *virtual learning environments* and *e-Learning*, while Tomei (2005, p. xix) referred to them as *learning management environments*, *distance education* or *flexible delivery*. For Albion (2002, p. 1) *online* meant "a supplemental website supporting a class to a complete course offered to students around the globe who never meet."

The selection and use of IT, ICT or other related terms by some authors may have also reflected a particular pedagogy. The two basic theoretical approaches in IT or ICT education are outlined by Resnick (2000, p. 174) below:

> Transmitting information from teacher to learner or a process in which learners actively build an understanding of the world based on their experiences and interactions.

Resnick (2000) referred to didactic and constructivist models, respectively, and differences in pedagogical approaches were evident in the following example in the literature about the use of *internet*. Preston (cited in Leask, 2001, p. 200) described the *internet* as a *telecommunications centred learning environment*, Montgomery (2000) as *online content*, Selinger (cited in Leask, 2001, p. 93) as *virtual space* and Robertson et al. (2004) as *learning spaces*. Indeed, many authors were imaginative in their use of language and matching the terms used in IT with a particular learning theory is worthy of investigation, but remains outside the scope of this study. Therefore, in order to avoid this confusion and develop a clear understanding of the terminology, the researcher needs to examine the context and the assumptions underlying the particular interpretation of each author.

1.3 IT refers to a range of subjects

The discipline of IT is also an umbrella term for a range of subjects with several areas of specialization which include networking, website development and programming languages that are offered in different faculties. When a number of courses in metropolitan Melbourne university and TAFE institutes were compared, there as a cross-over or similarity between the subjects delivered by the departments of Informational Technology, Multimedia and Engineering (Appendix 1: Cross-over between IT, Multimedia and Engineering). For example, a number of the subjects offered by the IT department in some educational institutions (Institutes 1, 3, 5, 6 and 7) on web related technologies were also offered by the Multimedia or Engineering departments. The common subjects were web pages, website scripting, HTML and animations. The TAFE Information Technology department in Institute 7 offered similar courses to the Department of Visual Art, Design and Multimedia, while Institute 5 offered comparable web based courses as the departments of Business, Design and Science Engineering and Technology. Moreover, in Institute 1, the advanced diploma in Engineering included competencies such as animation, authoring and creating 3D digital images, and Institute 5 offered web pages and multimedia programming within the Computer Science and Computer Systems Engineering streams.

In addition, Institutes 1 and 4 had one department that offered both IT and Multimedia courses such as School of Art, Design and ICT and Information Technology and Multimedia, respectively. Conversely, the name of the department in Institute 7 in this study is named ICT, yet the subjects listed in the handbook are advertised using the term, IT. There were also *computer* and/or *Information Technology* courses offered within other departments. For example, in Institute 1, the Engineering department offered a Diploma of Technology (Computing) and the Multimedia department in Institute 6 offered a Diploma of Information Technology (Multimedia Integration). Although not directly discussed, consideration also needs to be given to the fact that library studies or information management is a stream included within IT courses by some universities. The varied use of nomenclature across the educational institutions made reviewing the literature complex and complicated, especially when attempting to delineate what is or is not IT, and how the range of terms hinders research and practice in this area.

1.4 **Defining Pedagogy**

Generally, pedagogy is a term that is more commonly used in Europe (Alexander, 2004; Hall, Murphy, & Soler, 2008; Leach & Moon, 1999; Mortimore, 1999) to refer to teaching and learning, and there are a variety of meanings. It is only in the last few years that it has been used more frequently here in Australia and England, and its meaning varies according to whether the focus is on the teacher, students or on both:

> Views of pedagogy will be in a constant process of renewal, taking evidence and ideas from all available sources, riven inevitably with controversy but always forward looking. (Leach & Moon, 1999, p. 275)

Alexander (cited in Hall et al., 2008, p. 5) sees that the problem with pedagogy lies in its concern with the teacher only, to the exclusion of the learner:

> [Pedagogy] is used more frequently.., but still does not enjoy widespread currency in England. The spectrum of available definitions ranges from the societally broad to the procedurally narrow. (Alexander, 2004, p. 9)

In Europe, pedagogy is recognised as an integral part of the educational discourse (Hall et al., 2008) and here in Australia, it is beginning to be reflected in the literature. It appears in select educational circles, but is slowly beginning to enter the wider educational domain.

According to Watkins & Mortimore (1999, p. 3), pedagogy can simply be defined as "any conscious activity by one person designed to enhance learning in another" and as a relationship between "teacher, the classroom or other context, the view of learning and learning about learning" (1999, p. 8). For Leach & Moon (2008) pedagogy is very broad and the context or setting is crucial as they argue that pedagogy has many facets and includes social process, culture of practice and builds the self esteem and identity of learners.

> In creating and sustaining pedagogic settings teachers crucially determine both the nature and quality of learning. Pedagogy is more than the accumulation of techniques and strategies, more than arranging classroom, formulating questions and developing explanations. It is informed by a view of mind, of

> learning and learners and the kinds of knowledge and outcomes that are valued. (Leach & Moon, 2008, p. 6)

Others interpret pedagogy as a series of characteristics or competencies (Somekh & Davies, 1991), while some approach it from the perspective of student learning (Robertson et al., 2004; Roschelle et al., 2000; Shields & Behrman, 2000). However, the definition of pedagogy put forward by Alexander (2000, 2008b; Hall et al., 2008), that it is both the act of teaching, as well as the thinking behind it, is preferred because it encompasses both domains:

> Teaching is a practical and observable act. Pedagogy encompasses that act *together with* the purposes, values, ideas, assumptions, theories and beliefs that inform, shape and seek to justify it. (Alexander, 2008a, p. 75)

This description is more detailed than Mortimore's (1999) general definition, which was not as expansive as that of Leach & Moon (2008).

1.5 The notion of Pedagogy in IT and ICT

The debate in the literature is about the tension between the role of technology and pedagogy and the disciplines of IT, ICT and educational technology. Gardner (1999) argues, in his theory on multiple intelligences, that technology has the potential to deliver more individually appropriate outcomes for both teachers and students. "technology … should allow a quantum leap in the delivery of individualised services for both students and teachers" (Gardner, 1999, p. 179). There has been tension between the technical skills required and the need to use educational technology in pedagogically meaningful ways for some time now.

Preference is sometimes given to technology over pedagogy and vice-versa and according to Fein & Logan (Aragon, 2003, p. 48), it is the learner who should have priority, not technology. Technology is used in disciplines such as Science, Humanities and Accounting to enhance curriculum, whereas in IT, it is subject content as well as a taught skill. The following authors, (Crawford, 1999; Robertson et al., 2004; Webb, 2002), discuss the impact of technology on pedagogy and practice. The debate concerns the " ... the distinction between teaching *about*

technology (vocational) and teaching *with* technology (pedagogic)" (Watson, 2001, p. 254). For some, Reeves (1998) argues technology is a tool and an education resource:

> Technology is best used as a cognitive tool to learn *with* rather than a surrogate teacher. Pedagogy and content matter most; technology and media are only vehicles, albeit powerful ones. (Kearney, 2002, p. 2)

Watson (2001) maintains that the *human* issues of how we integrate ICTs into learning requires teachers to be trained in the appropriate use of ICT in pedagogically meaningful ways and to understand the complex and dynamic processes of change in classroom practices. However, as Minaidi & Hlapanis (2005, p. 246) point out there is a need to be mindful of some pedagogical obstacles such as age, professional experience, perceptions, stereotyping and rapid evolution of technology.

1.6 An IT Pedagogy?

There was limited reference to an IT or ICT specific pedagogy in the literature. Webb & Cox (2004, p. 241), while undertaking a review of the pedagogy related to ICT in the UK, reached a similar conclusion and little has changed in the intervening years. They also put forward a framework for pedagogical practices relating to ICT use (Webb & Cox, 2004, p. 239) which Webb (cited in McDougall, Murnane, Jones, & Reynolds, 2010, p. 97; Webb, 2011, pp. 3, 12) has adapted. It needs to be noted that the name of the model changed from ICT use to IT and the behaviours changed from IT to ICT, which is further evidence of the way in which these terms are used interchangeably in both the UK and Australian contexts. Therefore, the material must be scrutinized very closely because of the range of meanings for IT, ICT and Educational Technology outlined previously in sections 1.1-1.3 to ensure that the subject matter has been classified and defined in relevant to the researcher's purposes.

In general, whenever pedagogy was mentioned in an IT context, it is closely tied to the use of educational technologies so its use was rather misleading. It seems that once the connection to technology was established, most if not all of the strategies and techniques were directly related to technology. A good example is the educational publication, *The Journal of*

Information Technology for Teacher Education, which changed its name to *Technology, Pedagogy and Education*. It relates more to the integration of educational technology in universities and schools than to the discipline of IT. Inglis et al. (2002, p. 45) sum up the situation as follows:

> In the education and training literature, one sometimes finds information technology being used in an educational context referred to as *educational technology*. The terminology is also misleading. The word 'technology' in the term *educational technology* does not refer to hardware or software but rather to a set of principles used in designing materials.

In another example, Somekh & Davies (1991) have drawn up a checklist for students and teachers on ways in which learning and teaching change when educational technologies are incorporated: "The development of a pedagogy for IT is the process whereby we learn to interrelate creatively with computers in educational events" (Somekh & Davies, 1991, p. 154). The researchers may refer to IT in the extract, but the context is ICT and/or educational technologies, not the discipline of IT. This lack of consistency illustrates how the use of terms makes research and practice in this area problematic. It could also be said that whenever there is a connection to any type of technology, the focus can shift to the technology, and not IT as a subject discipline. This can be misleading and places an onus on the researcher to read more carefully, by checking that the terms have been classified in ways that are appropriate to their context; especially when examining evidenced-based practice in schools, university and TAFE/VET sector, this reflective approach is very important.

Whilst there was some agreement about an IT pedagogy, there was little consistency in the way the term was used. The majority of the literature on IT and pedagogy seems to focus on a few main themes such as professional development of teachers to improve technical skills (Hammond, 2004, p. 39; Webb, 2002), integration of technology in a lesson (Bacon, Sanderson, Warner, & Walker, 2001; Kearney, 2002; Tomei, 2002; Webb & Cox, 2004), attitudes and perceptions towards technology (Minaidi & Hlapanis, 2005; Montgomery, 2000; Redmond &

Brown, 2004) and teacher-accounts of trialling different educational theories in the classroom (Henderson, Putt, & Coombs, 2002; Maddux, Johnson, & Willis, 2001; Polyzou, 2005).

And many studies of those studies on teaching and learning in IT and ICT have been conducted in schools and universities, and not in the TAFE/VET sector. Generally there is a lack of information on IT teaching in TAFE or VET with the major part of the literature centred on a number of different themes such as VET policy (Bullock, 2010; DEST, 2002, 2005), Training Packages implementation (Chappell, Hawke, Rhodes, & Solomon, 2003; Chappell, Hawke, & Schofield, 2002; Coates, 2003; Leary, 2003) and the profile of the VET workforce (Harris, Simons, & Clayton, 2005; Mitchell & Ward, 2010). When IT gets a mention, it is in relation to educational technology and how it will "reduce the reliance on teachers and trainers to deliver VET courses" (Chappell, 2000, p. 8). Also, there are a few studies of single subject discourses but they are on engineering or manufacturing (Toner, 2005), and not IT.

Apart from a limited number of articles which included Cox & Webb's (McDougall et al., 2010; Voogt & Knezek, 2008a, 2008b; Webb, 2002; Webb & Cox, 2004) research on ICT in the UK and Christie's (cited in Gurung, Chick, & Haynie, 2009) description of computer science, there was little success in locating publications on IT pedagogy. This is in contrast to the number of papers and reports about an online pedagogy (Porter, 2004; Stephenson, 2001), and e-Learning pedagogy (Beetham & Sharpe, 2007; Salmon, 2003) or web-based pedagogy (Cole, 2000). While some authors such as Cole (2000) and Stephenson (2001) did not explain clearly what they meant by *pedagogy*, there was an acknowledgement that it was somehow different. They did not elaborate on the difference other than providing a description of the learning platform used, as if that in itself is *pedagogy*.

> E-learning is different from traditional forms, and demands new pedagogical skills *and* a fluency with technology which will be new to many teachers and trainers (Stephenson, 2001, p. 169).

Salmon (2002, 2003) provides suggestions for teachers as well as learning activities for students, while Postle et al. (2003) argue that the pedagogical framework for online teaching is not clearly articulated. He claims that the tension in designing these types of learning

environments is between technology and pedagogy. McPherson & Nunes (2004, p. 48) were critical of the use of the term *pedagogy* and *pedagogical model* asserting that it is "commonly used but seldom precisely defined". They argue for a clear definition of the learning philosophy, strategy and tactics to achieve pedagogical goals, and suggest that the complexity of integration requires methodologies from Instructional Systems Design (ISD).

> A pedagogical model is a theoretical framework that can be used by practitioners as a framework for understanding educational action using a specific learning theory... *Pedagogy before technology* is a common catchphrase of the reflective practitioners in this field, suggesting that – far from trying to create pedagogy anew - we should be in the business of locating the new technologies within proven practices and models of teaching. (Beetham & Sharpe, 2007, p. 4)

It can be seen, therefore, that pedagogy is used in a number of different ways not only to describe teaching and learning strategies, but also to define the complex educational frameworks involving teaching or learning online. For example, in the literature we read about e-learning and web based pedagogy, as well as a digital or technology-based pedagogy that integrates educational technologies. The bulk of the IT literature focuses on the transformative nature of technology, and its impact on pedagogy, and usually involves participant accounts on the different strategies and techniques used in classrooms.

> One notable development of the last few years is the increasing exploration around the nature of teaching and learning itself, which has been fed, stimulated and challenged by the increasing use of computing in most educational areas. (Salmon, 2003, p. x)

Observe the way in which computing has been used to describe educational technologies and how the classification dilemma demands close reading of context in order to understand the intended meaning of the author.

1.7 Conclusion

Generally, researching the IT literature is complex and complicated because the three domains of IT, ICT and Educational Technology are closely interrelated. The confusion for researchers is that there are a large numbers of IT related terms and little consistency in the way they are used. The purpose of this paper was to provide a road map or guide for researchers as they navigate their way through the vast array of literature in the field of Information Technology.

IT refers to both computer equipment as well as the name of the discipline and some degree of confusion exists between IT, as a discipline, and with ICT, which is the integration of technology into other disciplines such as Science, Maths and English. A further complication arose when the emerging field of Educational Technology Support was included. This resulted in a rich and extensive range of terms and concepts used interchangeably, at times lacking consistency and often posing a real challenge to researchers. The ubiquitous and indiscriminate use of terms IT, ICT and pedagogy, in much of the literature, may discourage and/or impede the researcher in attempts to review and classify studies in terms of consistent themes.

The IT classification dilemma was also evident in the area of pedagogy with publications referring to pedagogies in terms of *ICT*, *e-learning, web-based, digital and online learning*. Although an extensive range of studies on pedagogy in IT and ICT exists, there appears to be a gap in the literature on IT pedagogy, especially in the TAFE/VET context as most studies were conducted in schools and universities, not in a vocational setting. To conclude, the researcher must be aware of potential classification dilemmas or pitfalls when navigating this literature. There is much to be gained from close examination of the specific context, as well as the assumptions underlying particular interpretations of each author, if the goal is comprehensive appreciation and understanding of research in IT pedagogy.

Appendix 1 : Cross-over between IT, Multimedia and Engineering

Educational Institution & Department	Courses/ Subjects
Institute 1	
Art and Design and Animation	Advanced Diploma of Multimedia inc. computer animation, web page design authoring, games design and digital video.
Engineering	Diploma of Technology (Computing) Advanced Diploma of Computer Science inc. Animation Design and Production; Computer Science, Programming (C); Programming Java; Design, Multimedia Applications; Create 3D Digital, Animation, Integrate and Use a Scripting Language in Authoring a Multimedia
Information Technology	Certificate IV in Information Technology (Websites)/Certificate IV in Information Technology (Networking) Diploma of Information Technology (Website Development)/Diploma of Information Technology (Networking) Multimedia and Website Design - Certificate IV in Information Technology (Multimedia)/Certificate IV in Information Technology (Websites) Diploma of Information Technology (Multimedia)/Diploma of Information Technology (Website Development) Certificate IV in Information Technology (Programming) - Multimedia and Web Development;
Institute 2	
School of Art, Design and ICT	Advanced Diploma of Computer Systems Engineering Advanced Diploma in IT – create dynamic pages manage e-business websites Advanced Diploma in Multimedia inc. integrate and use a Scripting Language in Authoring a Multimedia Product and Design and Create a Multimedia Interface. Certificate II in Multimedia (Web design Stream) inc. update web pages, operate computing packages, use an authoring tool to create and interactive sequence, prepare Multimedia for different platforms Certificate III in Multimedia inc. Use advanced features of computer applications, Create web pages with multimedia, Use an authoring tool to create an interactive Sequence Diploma in IT (Multimedia) inc. identify components of Multimedia, Author a multimedia sequence, develop a multimedia script and create web Pages with multimedia Diploma in Information Technology (Website Development) inc. website design and development, Cascading Style Sheets, Create a Simple Mark-up Language Document to Specification , Produce Basic Client Side Script for Dynamic Web Pages
Institute 3	
Cultural and Recreational	Certificate III + IV in Multimedia inc. use an authorising tool to create an interactive sequence. Certificate IV in Multimedia inc. integrating a database with a web site; creating audio into multimedia presentations and creating web pages. Diploma in Multimedia inc. Programming for multimedia and Internet applications, design and creative media and multimedia authoring. Advanced Diploma of Multimedia inc. C++ programming and project management.
Electro-technology and Communications	Advanced Diploma of Computer Networking Certificate IV in Information Technology inc. 3GL programming creating web pages and computer hardware components Certificate IV in Information Technology (Website Administration) inc. building basic sites and creating basic script and other technical elements for a website Diploma of Information Technology (Software Development) inc. web technologies, developing web based applications, project management and scripting languages.
Institute 4	
Information Technology and Multimedia	Certificate IV (dual Qualification) Website Design and Administration Diploma in Website Development Certificate II- IV in Multimedia Adv. Diploma in Multimedia

Institute 5	
Business TAFE	Certificate IV IT inc. create web pages with multimedia (elective) Diploma in IT inc. create web pages with multimedia (core) Certificate II in IT inc. create a simple mark up language document to specification
School of Design TAFE	Advanced Diploma in MM Certificate IV in MM inc. interactive media, animation and web page authoring for the internet.
Science Engineering and Technology	Advanced Diploma of Computer Systems Engineering inc. internet and multimedia programming 1 +2. Advanced Diploma of Computer Science inc– create web pages with multimedia (core)
Institute 6	
Engineering and Technology	Advanced Diploma of Computer Systems Engineering Bachelor of Engineering (Electronics and Computer Systems)/Electronics and Computer Systems/Business
Information Technology and Computing	Advanced Diploma of Computer Science with streams in Multimedia, Instrumentation, and Software Development Information Technology - Certificate IV in Information Technology inc. web page production and communications. Website Development - Diploma of Information Technology (Website Development
Multimedia	Multimedia Design - Certificate IV in Multimedia (Design) Advanced Diploma of Multimedia (Design) Diploma of Information Technology (Multimedia Integration) inc. all aspects of multimedia, web programming and multimedia management. Website Design - Certificate of Dynamic Web Site Design inc. dynamic web sites, create graphics + video, create animation and write for the web.
Institute 7	
Department Of Electro-technology And Computer Systems	Certificate IV In Electro-technology Computer Systems
Department Of Visual Art, Design And Multimedia	Diploma Of Multimedia inc. Author a multimedia product, Design and create a multimedia Interface, Update web pages and design and edit digital video (core) Certificate II In Multimedia inc. Update WebPages, (electives) Certificate II in Multimedia inc. Update Web pages, Use an authoring tool to create an interactive sequence, Use information technology
Information Communication Technology	Certificate III in Information Technology (Software Applications) [Web Pages] Diploma of Information Technology (Website Development) inc. Flash, Dreamweaver and HTML Certificate Iv In Information Technology inc. Web design and multimedia animation Certificate Iv In Information Technology (Network Management) inc. Create web pages with multimedia (electives Diploma Of Information Technology (Software Development) inc. Advanced Internet Technologies (core) Diploma Of Information Technology [Specialising In Multimedia] Diploma Of Information Technology (Website Development)/Diploma Of Information Technology (Internetworking inc Internet Programming and Web Project (core)

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