

Development of a Culturally Appropriate Interactive Multimedia Self-Paced Educational Health Program for Aboriginal Health Workers.

¹Faeka El Sayed, ¹Jeffrey Soar, ²Zoe Wang

¹School of Information System, Faculty of Business, University of Southern Queensland, Toowoomba.

²School of Nursing and Midwifery, Faculty of Health Sciences, Australian Catholic University, Brisbane
W0106566@uconnect.usq.edu.au

Abstract. *Aboriginal and Torres Strait Islander health workers are key providers of primary health services to Aboriginal communities especially in remote and rural areas. A culturally appropriated interactive multimedia self-paced health program as a mechanism to improve the accessibility and the use of scientific data and information for health purposes is proposed as a basic method for better supporting Aboriginal and Torres Strait Islander primary health care workers in their practice locations. This paper explores different approaches for the development of a culturally appropriate interactive multimedia educational health program for Aboriginal and Torres Strait Islander health workers and it also explore cultural matters concerning program development in the light of existing literature.*

Keywords: Aboriginal and Torres Strait Islander health workers, Aboriginal Australian health, Program development, Cultural contextualisation, Self-paced education program, Interactive multimedia

1 Introduction

In the changing environment in which the health care system operates, training of health sector workers must go beyond the nominal acquisition of knowledge, skills and attitudes needed for traditional practice. Training should be adequately and constantly upgrading the health worker's skills in order to keep them up-to-date with changes [1]. An interactive multimedia self-paced program as a mechanism to improve the accessibility and the use of scientific data and information for health purposes is proposed as a basic method for better supporting Indigenous primary health care workers in their practice locations.

This study is motivated to create an up-to-date, culturally appropriate, interactive multimedia, computer-assisted educational health program for Aboriginal and Torres Strait Islander Health Workers, that would give them opportunities to independently control over their learning within an attractive and interesting environment, and improving their quality of healthcare delivery and overall health outcomes [2].

2 Background and Context

Aboriginal and Torres Strait Islander Health Workers are playing a very important role overall in health services and are considered key providers of primary health services to Aboriginal and Torres Strait Islander communities, particularly in remote and rural areas [3]. They are providing the link between their own communities and the health care provider, supporting both of them, helping to build trust, improve communication, and promote better health outcomes [4].

Aboriginal and Torres Strait Islander Health Workers are often overloaded with competing demands. The pressure to know a little about everything is a common theme [5]. Turdgen (2000) described the challenges facing Aboriginal and Torres Strait Islander Health Workers as "*the main problem is the huge expectation put n them. They are expected to understand complicated medical terminology in a foreign language with almost no education, as well as managing clinics and be clinicians, health promoters and education experts. All these responsibilities are rolled up into the one job*".

There has been limited attention given to the maintenance and ongoing enhancement of Aboriginal and Torres Strait Islander Health Workers' skills and knowledge following the completion of formal education [6]. Providing them with high quality education opportunities can be problematic. It can be a challenge to attend refresher courses, face to face education workshops, placement in clinical settings or updating seminars away from their community [7], (Collyer 2006), [6].

Much of the health program training for Aboriginal and Torres Strait Islander Health Workers has been directed from a white middle class perspective [8]. The mainstream cultural material designed for Anglo Australians is not always pedagogically appropriate for the unique needs of Aboriginal Australians [9].

Providing Aboriginal and Torres Strait Islander Health Workers education and skills transfer, professional support, and a continued primary health care program to update their knowledge, would bring greater credibility to their role and would help turn them into a more skilled workforce able to make a more effective contribution (Gruen, Weeramanthri & Bailie 2002) [10].

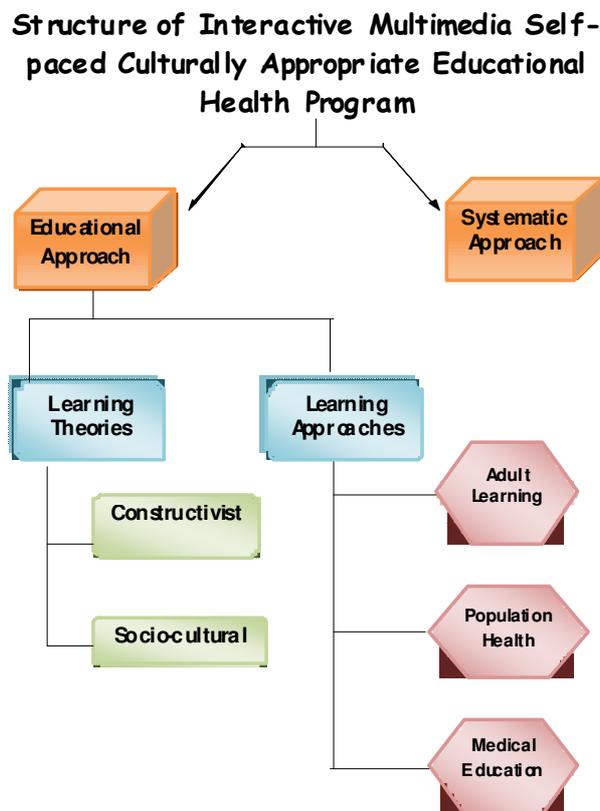
Using Information Technologies is a potential strategy for improving the education of Aboriginal and Torres Strait Islander Health Workers and the quality of care provided within their communities [11]. Bridging the digital divide is understood as a critical opportunity to contribute to bridging the health divide between Aboriginal and non-Aboriginal Australians [12].

Information Technology, like all technologies, comes embedded with the values of the society which produced them [13]. Technology is only useful as an answer to health problems after being modified and adapted by a particular community to meet the conditions and values of that community including its cultural and spiritual values [14].

For new information to be accepted by Aboriginal societies, the process is more important than the content [15]. The cultural inclusivity in the design process needs to affirm the social and cultural dimensions of Aboriginal society in constructed meaning [16]. Cultural inclusivity can be achieved through placing learning tasks in the context of the Aboriginal life or cultural experience, in order to allow learners to access learning resources in a manner that is matching their values, beliefs and styles of learning [17] [9].

3 Interactive Multimedia Program Development Approaches

The construction of educational software should be based on a didactic efficiency and advanced technology [18]. The interactive multimedia model can support structured multi-disciplinary development methodologies: the educational and the systematic approaches [19]; this is represented in **Fig. 1**



(Fig. Interactive Multimedia Self-Pace Educational Health Program Developing Approach)

Designers must expand their perspectives to consider teaching and learning methods, establish principles, and identify the implications of the principles for interactive multimedia [20]. These educational principles have been used as design guidelines, and information technology has been utilized to support and stimulate learners, and provide a variety of mechanisms to help produce the model's materials [19].

Educators and designers of instructional multimedia should adapt to the needs of different learners, subject areas and situations. They should use a variety of multimedia materials and approaches to provide a flexible learning environment meeting the needs of their learners [21]. The recognition of difference in learning preferences of Aboriginal and Torres Strait Island learners and the recognition of the need for change is important when developing appropriate educational programs [17].

This paper discusses the way a culturally appropriate educational health program has been developed and the different approaches adopted.

3.1 Educational Approach

Developing effective materials that facilitate learning requires an understanding and appreciation of the principles underlying how people learn. One of the main and basic foundations of designing instructional Interactive Multimedia programs is the learning theories and approaches; and their impact on model design [21]. If multimedia is used to demonstrate the technical capabilities of a computer and not set in an educational context, the true value of multimedia is lost [22].

Theories of learning have been employed to produce measurably better instructions and to understand the function of multimedia in enhancing the learning experience for users and increase the amount of knowledge they retain [23] [24]. By developing instructional design in accordance with the internal process of learning, a greater degree of confidence in the performance of the lesson may be attained [23].

Constructivist, Socio-Cultural Learning Theories

The Constructivist and Socio-cultural learning theories have been recommended to be used as the base for design of a culturally inclusive program for Aboriginal Australian learners [16].

The constructivist learning theory maintains that knowledge is not received from outside, but that people learn by actively constructing knowledge based on their interpretations of experiences in the world. By weighing new information against their previous understanding, thinking about working through discrepancies, and coming to a new understanding, they take final responsibility for their learning; therefore they need to have some control over their learning process [25] [26] [27] [21] [28] [18].

The constructivists argue that learning outcomes depend on the learning environment, the prior knowledge of the learner, the learner's view of the purpose of the task and the motivation of the learner [25]. Employment of constructivist principles in program design provides a new level of difficulty and challenge for the designers as they should consider the perceptions and previous experience of the learners including culturally shared perceptions, and ensure that the learning environment is as rich and interactive as possible [2] [29]. Interactive multimedia offer a discovery learning approach, which supports constructivist theory: Learners can create their own worlds [30].

The socio-cultural theory stresses the interaction between developing people and the culture in which they live and focuses on how cultural beliefs and attitudes impact how instruction and learning take place [31]. This theory points out that learning is a form of enculturation which occurs in a social context, in which the individual is socialised through gradual participation in tasks, assisted by adults until full competence is attained and the accumulated achievements of particular groups shape the intellectual development of the individual [26] [32] [16].

Learning Approaches

An issue that may be more important than the details of program content is the soundness of the learning approach [33]. Choosing the appropriate learning approaches to be used in the program development will depend on the type of learner targeted and their needs. In the search for learning approach which might be suitable for Aboriginal and Torres Strait Islander Health Workers' continuous professional education there are three approaches that will be adapted.

Adult Learning Approach

Theories of adult learning emphasize the importance of a learner identifying an educational need and planning to meet that need [34]. Three underlying assumptions have been stated in the report of Donald Brundage (1980) about the adults learning principles and their application to program planning:

- The more an adult learner can be involved in the planning related to his/her own learning activities, the more productive those activities will be,
- Program planning by experts or by teachers with no learner involvement tends to lead to subject-centered programs and theoretical problems and
- Program planning carried out largely by learners with teacher assistance tends to lead to problems-centered programs [35].

The national review of Aboriginal and Torres Strait Islander Health Workers training 2000 for improving access to education and training recommended the participation of Aboriginal and Torres Strait Islander Health Workers in planning the development of their training packages [7].

In the National Health interactive technology net development program Ernest Hunter emphasized the importance of engaging end users in the development and production of program material rather than being passive recipients [12].

Other adult learning principles directing the choice of the program's goals, objectives and educational strategies can be summarised as follows:

- Adult learners are typically autonomous and self-directed, and are motivated by education that has intrinsic value to personal goals and a sense of self,
- Adult learners bring with them a great range of prior experience, and
- The necessity to learn something must be clear to the adult learner before they will commit to learning it [36].

Employing the adult learning approach in the program planning will help to accommodate Aboriginal and Torres Strait Islander Health Workers' needs and goals, and facilitate learning activities rather than imposing standards for performance and content [5]. The model will be an open and flexible learning program, available in short self-instructional modules which can be studied by individuals at their own pace, place and time; and structured to give learners control over their learning [37].

Population Health Approach

The term "Population health" focuses on populations as entities not only on individuals. Using a systematic population focused approach can have a greater effect on individual health outcomes than individual care [38]. This approach can be realized through emphasizing health promotion and disease prevention strategies at a population level and stressing the underlying social, economic, biological, genetic, environmental and cultural determinants of health of the whole population during program planning [39].

The population health approach fits the Aboriginal and Torres Strait Islander Australian view for their health; they see health more holistically as including the physical, mental, social, emotional, spiritual and cultural well-being of the whole community, and not merely the absence of disease or infirmity. They believe that social and spiritual dysfunctions can be associated with the cause of illness. It is a whole way-of-life view and it also includes the cyclical concept of life-death-life (Hausfeld 1977) [40] [41] [14].

A population health approach will be adopted in the structure of the program planning to ensure the population health perspective as well as the individual clinical perspective is included. The program content will focus on how to treat patients within appropriate guidelines and protocols as well as describing how to improve living conditions, nutritional status, environmental conditions, socioeconomic factors and any other risk factors that contribute towards a particular disease.

Medical Education Approach

The education content of a well-planned curriculum has more impact on learner satisfaction than the technology used to disseminate it [36]. A common approach in developing education and training programs is to collect existing material and to assemble what appears most useful and interesting [42].

Designing a course for health professionals should have aims or goals, which meet the needs of the learners, patients and society. Kern's (1998) design of a six-step approach for this purpose [9] includes:

- Problem identification and general needs assessment,
- Specific needs assessment,
- Defining goals and objectives,
- Determining the educational strategies and the designing activities;
- Implementing designed activities and
- Evaluation and feedback [43].

This approach presents a step-by-step method, technique or way of developing training or educational courses.

3.1 Systematic Approach

The Interactive multimedia model design is based on a more iterative approach than traditional instructional systems design in which the information derived from needs assessments converts into a description of the project space and a concept map of the ideas that are to be included in the project [25].

A generally used way to address the numerous issues involved in the design and development of educational multimedia projects is to follow a systematic plan that outlines the analysis, design, development, implementation, and evaluation of the project [27] [18]. The systematic approach followed to produce these multimedia applications is the same regardless of the instructional delivery system [44]. This approach provides an easy to follow, step by step guide to creating a successful multimedia program [45, 46].

The complexity of interactive multimedia model software depends upon the context in which the software is used. Small interactive multimedia model programs, designed and constructed to enhance learning of particular concepts, have the advantage of being relatively simple to design and construct using low level software packages which require minimal levels of programming and development time [47].

Theorists have argued for a cultural dimension in the design process and the need to provide a cultural sensitive learning environment. In order to design a culturally appropriate instruction program for Aboriginal Australian learners, the instructional designers need to follow design principles and instructional methods that best match constructivist principles [9]. The instructional design needs to be sufficiently flexible, reflect the particular culture, values and expectation of the target group and ensure that learning activities and tasks are designed to take learner needs and perspectives into account [16].

4 Cultural Matters in Program Development

The main goal of program development should not be just to create an interactive multimedia model for Aboriginal and Torres Strait Islander Health Workers but also to ensure that the model promotes Aboriginal approaches and values [48]. In a study of learning preferences for Aboriginal learners, Barners emphasises that several aspects of Aboriginal culture practices were evident and could impact on their learning [49]. For Aboriginal learners, the creation and inclusion of Aboriginal perspectives in instructional design is an important dimension and a means of recognising and integrating cultural knowledge [16].

Cultural Localisation

Cultural Localisation is a means of incorporating the values, styles of learning and cognitive preferences of the target population [9]. Environmental factors such as socio-cultural backgrounds, experiences in upbringing and earlier educational experiences will have an impact on Aboriginal learning styles [50]. Over the last two decades the most influential theory of Indigenous education has been Harris' Aboriginal Learning Styles theory [51].

Harris (1980) observed Aboriginal communities in the Northern Territory for two years and based on this research, identified five major traditional informal learning style or strategies [52]. He concludes that the learning styles and the ways in which Aboriginal learning styles differ from mainstream non-Aboriginal learning styles are:

- Learning by observation and imitation,
- Learning by personal trial-and error,
- Learning in real life activities performed by the learner,
- Context specific learning and,
- Person orientated [52] [53].

Barner offers an insightful perspective on Aboriginal learning preferences summarised in the following:

- Aboriginal learners are more group oriented, and less concerned with personal achievement,
- They prefer to learn in a holistic way by having an overview, then major headings prior to detail,
- They prefer the use of diagrams and visuals to help explain written text,
- They prefer to learn in practical settings,
- They prefer oral to written [49] [50].

Researchers found that computer education fitted with this perceived learning style theory and Aboriginal learning preferences, appeals to Aboriginals' visual-spatial strengths through the use of colorful graphics. This requires little writing and so suits an oral cultural background, and allows learners to take greater charge of their own learning [54] [51] [53].

To make the computer software and the computer instruction more culturally appropriate for Aboriginal people, the software design must take into account the learning styles of Aboriginal people. It must have more graphics and be less text based, be self-paced, with instant rewards and have an absence of negative remarks [55]. Learners should not be expected to have advanced computing skills, but development of information literacy skills need to be integral to the learning outcomes [16].

Cultural Knowledge Base

The initial phase of education in any new program is based upon the learner's background knowledge, which is a sum of all abilities acquired as a result of exposure to earlier learning experiences [56]. An understanding of cultural knowledge base or "Pre-existing knowledge" is especially important when one culture is trying to share unfamiliar or new information with another culture. This means the new knowledge taken to traditional Aboriginal people should build on their existing, culturally accepted truths and knowledge base and must be intellectually thorough or it will be rejected [15].

In the Aboriginal culture, illness is associated with social and spiritual dysfunction, therefore the Aboriginal medical system seeks to provide a meaningful explanation for illness and to respond to the personal, family and community issues surrounding illness [57]. Particular consideration should be given to the indigenous Australian concept of health in the program development [58]. Collins suggests incorporating elements of traditional and cultural aspects into the health service for Aboriginal people: "*the NT Aboriginal Health Worker training program emphasised a bicultural approach where the best elements of both cultures are incorporated into health services*" [8].

Cultural Contextualisation

Henderson emphasises that instructional design cannot, and does not, exist outside of a consideration of culture, and conceiving cultural contextualisation as a variable of consequence in interactive multimedia model instructional design is justifiable [26].

Cultural contextualisation in program development can be achieved through consultation and working with representatives of the target population and community elders who provide an understanding of social and cultural constraints [59]. Instructional designers must incorporate the skills and value of the Aboriginal community, and can influence material and symbolic culture in creating and developing interactive multimedia, in order to create a unified and authentic learning environment [16].

It is important to communicate at the appropriate level for the Aboriginal population and to understand appropriate communication and cultural differences for example through adapted pictograms and diagrams as opposed to just verbal communication when designing culturally appropriate information packages for Aboriginal and Torres Strait Islander Health Workers [60].

The educational software should be designed in a suitable way for disseminated information between individuals as Aboriginal people commonly share learning experiences in small groups, thus reinforcing the social and collaborative focus of learning, and removing any risk of embarrassment of being wrong [16] [51] [53]. Knowledge sharing can be fostered by designing a stories module to be used by Aboriginal and Torres Strait Islander Health Workers in their health education and promotion roles within their own communities. An associated website can provide further new information that builds on that given on the CD meaning that health care professionals will be able to access a wealth of pertinent information regardless of their geographic location [61].

Oral Cultural Backgrounds

With free and full access of Aboriginal people to information and knowledge about the world around them in a language they can understand, they will be better able to take more control of their own lives and they will themselves create interventions to deal with the problems they face [62].

In Aboriginal society, communication should be “heart to heart and mind to mind”, this communication is like hearing the inner soul of a person [15].

Acknowledgement of Aboriginal learning as a cultural activity and fosters cultural security through respect, oral communication and traditional story telling are important contribution factors in success with Aboriginal learners [63]. Aboriginal cultural is traditionally oral [51] [64]. Learners coming from oral cultural backgrounds might not be able to fully engage with a text-based medium so the use of third party visual and audio tools would be required [53].

The story telling is considered as an integrated learning approach with a holistic view in which knowledge is integrated into social contexts, and it has been proven successful in Aboriginal education [65] [66]. Starting the program by discussing a realistic health problem in the form of a story makes more sense to health workers, in term of what they have already experienced [65]. Storytelling and the use of narrative in interactive multimedia programs can offer ways of engaging with the material at different levels [67]. A story teller could mention some issues briefly, or elaborate on details- what to do, how to do it, when, where, and perhaps why [68].

5 Conclusion

The proposed plan is to develop an interactive educational multimedia health program culturally relevant to Aboriginal health workers, to be used in their practice locations. This program could provide support for Aboriginal and Torre Strait islander Australian Health workers in their practice locations.

A review of the published literature has identified the ideal approaches for the development of an interactive multimedia self-paced educational health program. It recommends the adaption of socio-cultural and constructivist learning theories. Adult learning, population health and the medical education approaches will be used as methodologies for program development.

The systematic approach towards a culturally appropriate program for Aboriginal health workers needs to be full of cultural dimension in the design process and to provide a cultural sensitive learning environment.

Evidence from the literature suggests that culturally localisation, cultural knowledge base, cultural contextualisation and oral cultural backgrounds are the main points of concern in the development of a culturally appropriated program for Aboriginal and Torre Strait islander Australian Health workers.

References

1. Thurab-Nkhosi, D. *Training of Health Workers in Small Island States: Bridging the Distances*. in *Distance Education in Small States*. 2000. Ocho Rios, Jamaica: Commonwealth of Learning.
2. Phillips, R., *The Developer's Handbook to Interactive Multimedia: A practical guide for educational applications*. 1997, USA: Kogan Page Limited.
3. Pacza, T., L. Steele, and M. Tennant, *Development of Oral Health Training for Rural and Remote Aboriginal Health Workers*. *Australian Journal of Rural Health*, 2001. **9**(3): p. 105-110.
4. Gerrard, M.D. (2004) *Critical Learning: Bicultural Community Health Workers' views on prospective training opportunities*.
5. Grant, M., *Caring in the country: developing HIV/AIDS training and support for rural health and welfare workers*. 1992, Victoria, Australia: Commonwealth department of Health, Housing and community services, Deakin University Publishing Unit, Health Education Centre, Barwon South Western Region Incorporated 20, 25-26.
6. Soar, J. and T. Yuginovich. *A model for internet-based training to support rural and remote Practice Nurses in providing sexual and reproductive health education*. in *IPSI 2006* 2006. Marbella, Spain
7. CIRC (2000) *Training re-visions: a national review of Aboriginal and Torres strait Islander health worker training*.

8. Collins, E., *Aboriginal Provision of Health Services Before and After Colonisation And Aboriginal Participation in And Control of Health Programs*. Aboriginal And Islander Health Worker Journal, 1995. **19**(5).
9. McLoughlin, C. and J. Oliver. *Instructional design for cultural difference: A case study of the Indigenous on line learning in a tertiary context*. in *ascilite*. 1999. Brisbane.
10. Haq, Z. and A. Hafeez, *Knowledge and communication needs assessment of community health workers in a developing country: a qualitative study*. BioMed Central- Human Resources for Health, 2009. **7**(59).
11. Collyer, N.E. (2006) *Training Community health workers: Using Technology and Distance Education*.
12. Hunter, E., et al., *Bridging the triple divide: performance and inovative multimedia in the service of behavioural health change in remote Indigenous settings*. Australasian Psychiatry, 2007. **15**: p. 44-48.
13. Dyson, L.E. *Cultural Issues in the Adoption of Information and Vommunication Technologies by Indigenous Australians*. in *Fourth International Conference on Cultural Attitudes towards Technology and communication (CATaC)*. 2004. Karlstad, Sweden: Murdoch University.
14. Barlett, B., *Aboriginal Health Worker' Guide to family community and public health*. 1995, Central Australia: Central Australian Aboriginal Congress Publication.
15. Trudgen, R., *Why Warriors Lie Down and Die*. Fifth ed. 2000, Australia, Darwin: Aboriginal Resource and Development Services Inc. 269.
16. McLoughlin, C. and R. Oliver, *Designing learning environments for cultural inclusivity: A case study of Indigenous online learning at tertiary level*. Australian Journal of Educational technology, 2000. **16**(1): p. 58-72.
17. Donovan, M., *Can Information Communication Technological Tools be Used to nSuit Aboriginal Learning Pedagogies?*, in *Information Technology and Indigenous People*, L.E. Dyson, S. Grant, and M. Hendriks, Editors. 2007, Information Science Publishing: USA.
18. Dagdilelis, V., *Principles of Educational Software Design*, in *Interactive Multimedia in Education and Training*, S. Mishra and R.C. Sharma, Editors. 2005, Idea Group Publishing: USA. p. 113-134.
19. Mooney, G.A. and J.G. Bligh, *Computer-based learning materials for medical education: a model production*. Medical Education, 1997. **31**: p. 197-201.
20. Park, I. and M.J. Hannafin, *Empirically Based Guidelines for the Design of Interactive Multimedia*. Educational Technology Research and Development, 1993. **41**(3): p. 63-85.
21. Alessi, S.M. and S.R. Trollip, *Multimedia for learning: methods and development*. 3 ed, ed. A. Burvikovs. 2001, Massachusetts. 580.
22. Mooney, G.A. and J.G. Bligh, *Information technology in medical education: current and future applications*. Postgraduate Medical Journal, 1997. **73**: p. 865-701.
23. Hannafin, M.J. and K.L. Peck, *The Design, Development, and Evaluation of Instructional Software*. 1988, New York: Macmillan Publishing Company. 412.
24. Villamil-Casanova, J. and L. Molina, *An Interactive Guide to Multimedia* 1996, Indiana.
25. Hedberg, J.G., et al. *Exploring user interfaces to improve learning outcomes*. in *Interactive Multimedia in University Education: designing for Change in teaching and Learning* 1994. Melbourne, Victoria, Australia: Elsevier Science B. V.
26. Henderson, L., *Instructional Design of Interactive Multimedia: A Cultural Critique*. ETR&D, 1996. **44**(4): p. 85-104.
27. Ivers, K.S. and A.E. Barron, *Multimedia Projects in Education: Designing, Producing, and Assessing*. 1998, Englewood, Colorado: Lbraries Unlimited, Inc. 201.
28. Molenda, M. (2002) *A New Framework for Teaching in the Cognitive Domain*. 4.
29. O'Brien, G.W., *The Development and Implementation of a Multimedia Program that Uses Analogies in Senior High School Chemistry to Enhance Student Learning of Chemical Equilibrium*, in *science and Mathematics Education Centre*. 2002, Curtin university of Technology: Perth. p. 200.
30. Abrams, A.H., *Multimedia Magic: Exploring the Power of Multimedia Production*. 1996, Massachusetts: Allyn & Bacon.
31. Cherry, K. *What Is Sociocultural Theory?* About.com.Psychology 2011 [cited 2011 30 April]; Available from: <http://psychology.about.com/od/developmentcourse/f/sociocultural-theory.htm?rd=1>
32. Ormrod, J., *Human Learning*. 3 ed. 1999, Sydney, New South Wales: Merrill, Prentice Hall Australia Pty Ltd.
33. Cole, R.B. and C.E. Engel, *Planning a Course of Continuing Education for General Practice-A Systematic Approach*. Postgraduate Medical Journal, 1975. **52**: p. 670.
34. Zeiger, R.F., *Toward Continuous Medical Education*. Journal of General Internal Medicine, 2005. **20**(1): p. 91-94.

35. Brundage, D.H. and D. MacKeracher, *Adult learning principles and their application to program planning*. 1980, Ministry of Education: Toronto, Ontario. p. 74-83,102-103.
36. Sisson, S.D., F. Hill-Briggs, and D. Levine, *How to improve medical education website design*. BMC Medical Education, 2010. **10**(30).
37. Harrison, N., *How to Design Effective Computer Based Training*. The McGraw-Hill Training Series, ed. R. Bennett. 1990.
38. Wagner, E.H., et al., *Improving chronic illness care: translating evidence into action*. Health Affairs, 2001. **20**(6): p. 64.
39. Smith, J.D., *Education to improve population health outcomes in chronic diseases*. 2005, Darwin: Menzies School of Health Research. 50.
40. Hamilton, A., *Child Health and Child Care in a Desert Community, 1970-1971*, in *Body, Land and Spirit. Health and Healing in Aboriginal Society*, J. Reid, Editor. 1982, University of Queensland Press: Qld.
41. NAHS, *Aboriginal and Torres Strait Islander Health Policy*. 1994, National Aboriginal health Strategy working party. p. 5.
42. Vanderschmidt, H., A.J. Segall, and T. Frostman (1997) *Designing Courses for Health Professionals*.
43. Kern, D.E., *Curriculum development for medical education; a six steps approach* 1998, The John Hopkins University Press: USA.
44. Orr, K.L., K. C.Golas, and K. Yao. *Storyboard Development for Interactive Multimedia Training*. in *15th Interservice/Industry Training systems and Education Conference*. 1993. Orlando, Florida.
45. Cartwright, S.R. and G.P. Cartwright, *Designing and producing media-based training*. 1999, USA: Focal Press. 216.
46. Harrison, N., *How to design self-directed and distance learning programs*. 1999, New York: McGraw-Hill. 359.
47. Kennedy, D.M. and C. McNaught (1997) *Principles of Good Teaching and Interactive Multimedia Design*.
48. Robbins, C., *Developing Culturally Inclusive Educational Multimedia in the South Pacific*, in *Information Technology and Indigenous People*, L.E. Dyson, M. Hendriks, and S. Grant, Editors. 2007, Information Science Publishing: USA.
49. Barners, A.L., *Learning Preferences of Some Aboriginal and Torres Strait Islander Students in the Veterinary Program*. The Australian Journal of Indigenous education, 2000. **28**(1): p. 8-16.
50. Milton, M. and L. Vozzo, *Using New Technologies to support the learning of Aboriginal Pre-service Teachers in 8th World Congress 2010 - Participatory Action Research and Action Learning*. 2010: Melbourne , Australia.
51. Dyson, L.E. *Design for a Culturally Affirming Indigenous Computer Literacy Course*. in *Winds of Change in the Sea of Learning*. 2002. Auckland, New Zealand: Australian Society for Computers in Learning in Tertiary Education (ASCILITE).
52. Harris, S., *Culture and Learning- Tradition and Education in north - east Arnhem land*. 1980, USA.
53. Duggan, T. *Supporting ways of learning for Indigenous Australian, Pre-undergraduate students using Moodle*. in *ascilite*. 2009. Auckland.
54. O'Donoghue, R.R., *Why the Aboriginal child succeeds at the computer*. The Aboriginal child at school, 1992. **20**(4): p. 48-52.
55. Steen, T., *What Does the Literature Say about Computer Literacy and Indigenous Australians' Language?* The Australian Journal of Indigenous Education, 1997. **25**(2): p. 14- 22.
56. Fedak, B., *Interactive learning and Multimedia Education with special focus on the framework design of an Interactive CD-ROM: Light and Architecture*, in *Faculty of Architecture*. 1999, Dalhousie University- Daltech: Ottawa ON, Canada. p. 44.
57. Saethre, E.J., *Conflicting Traditions, Concurrent Treatment: Medical Pluralism in Remote Aboriginal Australia*. Oceania Publications, 2007. **77**(1): p. 95-110.
58. Fleming, M.L. and E. Parker, *Health Promotion, Principles and Practice in Australia context*. 3rd ed. 2007, NSW, Australia: Allen & Unwin.
59. Travers, H., et al., *Pride and performance: Innovative multimedia in the service of behavioural health change in remote Indigenous settings*. Australasian Psychiatry, 2006.
60. Swain, L. and S.J. Taylor, *Pharmacy Student Education Helping To improve Indigenous Medication Management & Health*, in *Higher Education In a Changing World*, A. Brew and C. Asmar, Editors. 2005, Higher Education Research & Development Society of Australasia Inc: University of Sydney.
61. Geissinger, H., *Continuing professional development for rural and remote health care practitioners*, in *6th National Rural Health Conference*. 2001: Canberra.
62. Trudgen, R., *Intelligent Education to Close the Gap*, in *Aboriginal & Islander Health Worker Journal*. 2009. p. 4.

63. Foster, R. and M. Meehan, *Problem-Based Online Learning and Indigenous Tertiary Education: Reflections on Implementation*, in *Information Technology and Indigenous People*, L.E. Dyson, M. Hendriks, and S. Grant, Editors. 2007, Information Science Publishing: USA.
64. Berg, R.V.D. (2011) *Aboriginal Storytelling and Writing*.
65. Werner, D. and B. Bower, *Helping Health workers learn*. 1982, U.S.A: The Hesperian Foundation.
66. Grant, S., M. Hendriks, and L.E. Dyson, *The Indigenous Pre-IT Program*, in *Information Technology and Indigenous People*, L.E. Dyson, S. Grant, and M. Hendriks, Editors. 2007, Information Science Publishing: USA.
67. Gjedde, L., *Designing for Learning in Narrative Multimedia Environments*, in *Interactive Multimedia in Education and Training*, S. Mishra and R.C. Sharma, Editors. 2005, Idea Group Publishing: USA. p. 101-112.
68. Berndt, C.H., *Sickness and Health in Western Arnhem Land: A Traditional Perspective*, in *Body, Land and Spirit - Health and Healing in Aboriginal Society*, J. Reid, Editor. 1982, University of Queensland: St. Lucia, Qld.