

Key Factors for the Development of a Culturally Appropriate Interactive Multimedia Informative Program for Aboriginal Health Workers

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This research aims to create and evaluate a model for a culturally appropriate, interactive, multimedia and informative health program for Aboriginal and Torres Strait Islander health workers that aims to improve the capacity to independently control their learning within an attractive learning environment. The research also aims to provide recommendations for policy development and further research. This study involved four phases: program needs assessment, identification of the key factors that should be considered in developing the CD-ROM, model development, and formative evaluation for the model. A general needs assessment as a first step in program development highlighted the presence of continuing education gaps and indicated the need for a new means to deliver a sustainable, efficient and culturally acceptable program. This article explores the second objective in this study, which is the identification of the key factors considered for developing the program. The identification began with a systematic review of the literature which served as background information, followed by qualitative semistructured interviews with diverse key stakeholders to explore their expectations and recommendations. The findings indicated that the most important key factors could be categorised under four main categories: cultural factors, information technology availability and literacy, learning aspects, and interactive multimedia factors. Cultural factors included cultural inclusivity, oral cultural, pre-existing knowledge, and Aboriginal preferred learning styles. Information technology factors concerned technology availability and literacy. Learning aspects highlighted the impact of the learning theory in model design. Interactive multimedia development factors explored included the requirements for the process, fitting and design of the program. Recommendations for program design were also provided.

■ **Keywords:** interactive multimedia, self-paced, Aboriginal and Torres Strait Islander health workers, continuing professional training

Aboriginal and Torres Strait Islander Australians in rural and remote locations face substantial problems in accessing appropriate primary health care services due to large distances and the cost of logistics involved in transporting people to hospitals or clinics (Gruen, Weeramanthri, & Bailie, 2002). Cultural barriers are also regarded as major factors in reduced access by Aboriginal and Torres Strait Islander Australians of mainstream health services (Queensland Health, 2007).

Gruen et al. (2002), and Lehmann and Sanders (2007) suggest that access to and coverage of basic health services to communities be improved through assisting community members to provide certain basic health services to their own communities and offering a culturally appropriate service through a greater involvement of Aboriginal

and Torres Strait Islander health workers (ATSIHW) in the planning and delivery of services. ATSIHW are playing a very important role overall in health services and are considered key providers of primary health services to their communities, particularly in remote and rural areas. They are often overloaded with competing demands. The pressure to know a little about everything is a common theme (Grant, 1992; Pacza, Steele, & Tennant, 2001). Trudgen (2000) describes the challenges facing Aboriginal and Torres Strait Islander health workers saying:

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the main problem is the huge expectation put on them. They are expected to understand complicated medical terminology in a foreign language with almost no training, as well as managing clinics and be clinicians, health promoters and education experts. All these responsibilities are rolled up into the one job (p. 75).

As reported by Soar and Yuginovich (2006) there has been limited attention given to the maintenance and ongoing enhancement of ATSIHW skills and knowledge following the completion of formal training. Provision of education and skills transfer, as well as professional support to ATSIHW, would help them to enhance their skills so as to make an even more effective contribution (Gruen et al., 2002). Lazakidou, Ilioudi, and Daskalaki (2006) stressed the importance of more clearly recognising and appreciating the role of information technology (IT) in health care education. Collyer (2006) suggested that IT could offer potential for improving continuing education of ATSIHW and consequentially for improving the quality of care provided within their communities. Geissinger (2001) supports using a CD as a delivery mechanism for continuing professional education for health practitioners in rural area and suggests also that health workers living in remote areas need to be provided with a CD player as an add-on component if it is not supplied as part of their original computer equipment.

The benefits of a culturally appropriate interactive multimedia informative health program for improving the accessibility and the use of scientific data and information for health purposes is explored in this research. Expectations are that this would give ATSIHW opportunities to more independently control their learning within an attractive and interesting environment, and improve their capacity for quality of healthcare delivery and overall health outcomes (Phillips, 1997).

This study involved four phases: (1) program needs assessment, (2) identification for the key factors should be considered in model development, (3) model development, and (4) model evaluation. A needs assessment, as a first step in program development, was carried out using a qualitative semi-structured interview with key stakeholders. The assessment indicated the opportunities for additional means to help to deliver a sustainable, efficient and culturally acceptable program for ATSIHW. The needs and opportunities for improving services for ATSIHW are supported by previous published studies and the findings of the qualitative semi-structure interviews that were part of this research.

Literature Review

An online search for electronic sources and library research for printed sources was conducted. The search covered literature databases (Medline, PubMed Central Journals, PMC journal, ERIC, BioMed Central, Informaworld, El-pub) and included use of the World Wide Web

(www) and Google Scholar. The search employed keywords such as 'Aboriginal and Torres Strait Islander health worker', 'primary health care', 'Aboriginal and Torres Strait Islander health', 'Aboriginal and Torres Strait Islander cultural', 'bush medicine', 'traditional healing', 'Aboriginal and Torres Strait Islander learning style', 'individual training', 'just-in-time training', 'interactive multimedia', and 'computer based education and training' in single search terms, concepts and their combinations.

Previous studies indicate that there is a need to leverage knowledge more effectively and better support continuing education of health workers, not only to update information and skills, but also for promoting empowerment and to make them feel better supported in their jobs (Community Services and Health Training Australia Limited, 1998; Minore et al., 2009; Ueffing et al., 2009). Gruen et al. (2002) claimed the provision of education and skills transfer, as well as professional support to ATSIHW, would help turn them into a more skilled workforce, able to make an even more effective contribution. Ueffing et al. (2009) indicated the development of learning methods, materials and approaches is one of the most important principles and guidelines for health worker education and training scale-up. Using information technology as a new learning approach is understood to be a key tool for bridging the health services and the digital divide through enhancing health care of underserved populations and education of remote health care providers (Hunter, Travers, Gibson, & Campion, 2007; Sargeant, 2005).

There are a variety of factors that can have an impact on the success of implementations of new technologies, including determining learner characteristics, assessing their ability to access technologies, and their comfort level with and preferences about technologies (Willcockson & Phelps, 2010). Bierman (2005) investigated a number of factors associated with the use and adoption of new technology by a society, with emphasis on communication technologies; the results showed that chance of technology adoption rises with increases in the motivation, knowledge, skills, and supportiveness for the user. Based on Rogers' diffusion of innovation theory, innovation, communication channels, time, and social system are the four key components of adopting new innovations and technology (Sahin, 2006).

The ATSIHW program delivery should have a flexible approach, to avoid a 'one size fits all' approach, and recognise cultural and linguistic barriers. Approaches need to be undertaken in a way that each individual is given the opportunity to use a relevant program that can be delivered in a manner or mode that recognises their previous experience and skills, specific needs, learning styles and required outcomes (Aboriginal and Torres Strait Islander Health Registered Training Organisation National Network, 2009).

The key factors that impact the development of a culturally appropriate, interactive, multimedia and informative

health program for ATSIHW could be classified under four major categories: cultural, information technology, learning aspects, and interactive multimedia factors.

Cultural Factors

For new information to be accepted by Aboriginal societies, the process can be just as important as the quality of the content (Trudgen, 2000). Foster and Meehan (2007) suggest the important contribution factors in success with Indigenous learners are acknowledgment of Indigenous learning as a cultural activity and fostering of cultural security through respect, oral communication and traditional story telling. McLoughlin and Oliver (2000) stressed that instructional designers must incorporate the skills and values of the community in creating and developing interactive multimedia, in order to create a unified and authentic learning environment. This cultural inclusivity could be achieved through placing of learning tasks in the context of the Aboriginal life or cultural experience. It increases the learner's motivation by allowing learners access to learning resources in a manner that matches their values, beliefs and styles of learning (Donovan, 2007; McLoughlin & Oliver, 1999).

In Aboriginal society, communication is understood as best from 'heart to heart and mind to mind'. This communication is considered to be like 'hearing the inner soul of a person' (Trudgen, 2000). Gjedde (2005) indicated the narrative format has been a traditional way of teaching in many cultures, and using a narrative cultural appropriate interactive multimedia learning environment could support the learner toward the understanding of the events and the meaning they hold, and not just achieving knowledge of factual events. Story telling is considered an integrated learning approach, with a holistic view in which knowledge is integrated into social contexts, and it has been proven to be successful in Indigenous education (Grant, Hendriks, & Dyson, 2007; Werner & Bower, 1982). Story content should be meaningful, capable of engaging the learners, and should take into consideration possible differences in social and cultural background (Gjedde, 2005). A story teller could mention some issues briefly, or elaborate on details about — what to do, how to do it, when, where, and perhaps why (Berndt, 1982).

Trudgen (2000) explained that an understanding of cultural knowledge base, that is, the 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 have to be intellectually thorough or it will be rejected. In Aboriginal culture, illness is characterised by 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 (Saethre, 2007). Collins (1995) suggested it can help

to incorporate elements of traditional and cultural aspects into the health service for Aboriginal people, through using a bicultural approach where the best elements of both cultures are incorporated into health services.

Previous studies recommended some cultural principles could be taken into consideration during program design. These principles include:

1. The program designer must take into account the learning styles of Aboriginal people. The program must use graphics as much as possible and be less reliant on text. It needs to be self-paced, with instant rewards and have an absence of negative remarks (Steen, 1997).
2. The use of third party visual and audio tools and the adaptation of pictograms and diagrams as opposed to just verbal communication is recommended (Duggan, 2009; Swain & Taylor, 2005).
3. Program designers can influence material and symbolic culture in creating and developing interactive multimedia (McLoughlin & Oliver, 2000).
4. Learners should not be expected to have advanced computing skills, but development of information literacy skills need to be integral to the learning outcomes (McLoughlin & Oliver, 2000).
5. Particular consideration should be given to the Indigenous Australian concept of illness and health care in the program development (Fleming & Parker, 2007).
6. 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 publically wrong (Duggan, 2009; Dyson, 2002; McLoughlin & Oliver, 2000).
7. 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 (Werner & Bower, 1982)
8. An associated website can provide further new information that builds on that given on the program which means that health care professionals will be able to access a wealth of pertinent information regardless of their geographic location (Geissinger, 2001).

Cultural localisation, cultural contextualisation, oral cultural backgrounds, and cultural knowledge base are elements should be considered in development of an interactive cultural appropriate multimedia educational health program for ATSIHW.

Information Technology Factors

The format of continuing health education has been presented in the past in face-to-face sessions in a

geographical location, but is now in transition to the use of flexible modes and has moved to more extensive use of technology for learnings that support professionals so they can study on their own or in small groups in their local area (Leist & Kristofco, 1990).

Health education program offered by information technology is a promising innovation training method, especially for health care settings located far from a training facility in areas with poor transportation (Knebel, 2000) because they have the capacity to cross demographic, social, economic and national boundaries and connect the learner to information resources which are important for informal continued learning. The programs need to be culturally sensitive, relevant to local health care priorities and supportive of local resources (Sargeant, 2005).

Mugumya (2010) observed in a study for promoting continuing medical education among rural health workers using information and communication technology (ICT), that there were improvements and empowerment of the rural health worker in the area of computer literacy, and the project bridged the digital divide between the urban-based and rural-based health workers. This is evident through the increase of computer knowledge obtained by staff members who participated in the study. Ivers and Barron (1998) point out the importance of program's users to have the necessary prerequisite skills for using the computer and multimedia tools.

Information Technology Within Aboriginal Australian

Previous published studies have explored the fit of computer and information technologies with Aboriginal learning preferences and learning style theory. Technologies can appeal to Aboriginals' visual-spatial strengths through the use of colourful graphics. The use of technologies can require little writing so these can better suit an oral cultural background. This approach can produce more positive learning experiences for Indigenous learners, allowing them to take greater charge of their own learning, and help in the development of digital literacy (Duggan, 2009; Dyson, 2002; O'Donoghue, 1992). Donovan (2007) and Foster and Meehan (2007) claimed that multimedia and ICT are readily accepted and are being used creatively and passionately by Aboriginal learners, especially younger Indigenous learners and those using computers at work who were adept at using the technology. Duggan (2009), Kinuthia (2007) and Samaras (2005) indicated that Indigenous groups have historically taken advantage of new technologies depending on availability and access, and they refer the digital divide within the Indigenous Australian to the inequality and the limitation in access to computer facilities or the unavailability of suitable capabilities to use such resources effectively. The most important factor affecting Indigenous access to ICT is their geograph-

ical distribution as 70% of them live outside major cities (Samaras, 2005).

Learning Aspects

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 their impact on model design (Alessi & Trollip, 2001). Theories of learning could be 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 (Hannafin & Peck, 1988; Villamil-Casanova & Molina, 1996). 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 (Hannafin & Peck, 1988).

The socio-cultural and constructivist learning theories have been recommended to be used as the base for design of a culturally inclusive program for Aboriginal Australian learners (McLoughlin & Oliver, 2000). 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 (Cherry, 2011). 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 (Hedberg, Harper, Brown, & Corderoy, 1994). 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 (O'Brien, 2002; Phillips, 1997).

Interactive Multimedia Factors

Multimedia used for communication and education purposes has proved to be compatible with cross-cultural and with Aboriginal preference for communication and education (Coulehan et al., 2005), as delivery of information comes in a range of forms that may include text, graphic, sound, and video (still or full motion), which provides the user with a range of ways of interacting with the material it contains (Alber, 1996). Villamil-Casanova and Molina (1996) and Phillips (1997) indicated there are many key factors to be considered in designing interactive multimedia program from which the learner can actually learn, rather than being told, and those essential factors are critical parameters for planning the production of an interactive application. The most important factors are that the design of the model should be based on sound educational principles and theoretical approaches to learning

and instruction (D. Kennedy, 2002; G. Kennedy, Petrovic, & Keppell, 1998; Phillips, 1997). Effective learning from multimedia displays is subject to a number of requirements which can be categorised into the processing, fitting and task design requirements (Rouet, 2001). These requirements should take into consideration during program design.

Process Requirement

Previous studies revealed some principles for program development procedures, they include the following:

Multimedia principle: This means the presentation should consist of both words and pictures. Any relevant instructional graphics to supplement the written text should be incorporated to improve learning through the dual coding of verbal and visual information (Donnelli, Dailey, & Mandernach, 2009; Mayer, 2001). The integration of a variety of multimedia elements will appeal to different learning styles, help the audience comprehend and retain more information, and direct the learner's perception and draw attention to key elements, so the learner is actively engaged in the learning task (Cartwright & Cartwright, 1999; Hannafin & Peck, 1988; Villamil-Casanova & Molina, 1996).

Concise principle: This means to keep the model small and focused (Mayer, 2001; Phillips, 1997). Cartwright and Cartwright (1999) claimed audiences prefer short program that address the problem accurately and delivers the message efficiently.

Coherence principle: This means avoiding using material that is not essential to instruction, and excluding any extraneous words and pictures deemed as unnecessary information that impede learning (Donnelli et al., 2009; Phillips, 1997). In order to find the middle ground between maximising the interaction and avoiding unnecessary activities, information should be closely related to the specific objectives of the program (Hannafin & Peck, 1988).

Modality principle: Fahy (2005) and Donnelli et al. (2009) suggested including audio to explain graphics, as audio enhances learning more than text.

Measurable objectives: Hannafin and Peck (1988) pointed out the presence of appropriate measurable objectives improves the probability of program success.

Contiguity principle: Fahy (2005) revealed learners learn better when corresponding words and pictures are presented simultaneously and near rather than successively and far from each other on the page or the screen.

Fitting requirement: The significance of program content and the target audience's character and needs are important factors for developing an appropriate program.

Model content: The content of the program should present the information that will be conveyed as informative, and not just entertainment (Cartwright & Cartwright, 1999; Mayer, 2001). Villamil-Casanova and Molina (1996) point out that using multimedia materials that help convey the intended message or information is one of the critical elements in developing a successful multimedia application. Rouet (2001) and O'Brien (2002) observed that learners are most likely to use multimedia programs if the information presented is relevant to their goals and experiences, and fits their needs, given their skills and objectives.

Target audience: Previous studies revealed the successes of instruction interactive multimedia programs were greatly influenced by the audience's background and characteristics, and should be directed to the interest and abilities of the audience. This can be achieved by considering and identifying of the audience's needs and expectations, and assessing their knowledge and skill levels accurately (Cartwright & Cartwright, 1999; Fahy, 2005; Hannafin & Peck, 1988; Villamil-Casanova & Molina, 1996).

Task Design Requirement

Previous studies concluded some important issues which should take into consideration in designing the program:

Introductory objectives and clear directions: This factor is important so that it is more obvious to the learner what the goals of instruction are, what is expected of them as they traverse the program, what information, skills and strategies they will need to recall for use during acquisition, and which learning objectives should be achieved, so that the learning accumulates in a logical fashion (Cartwright & Cartwright, 1999; Hannafin & Peck, 1988; G Kennedy et al., 1998).

Navigation and orientation: A crucial aspect of an effective model is a consistent and clear navigation system that is accessible by the learner at any time and able to provide the learner access to general features and an overview of the entire application (G. Kennedy, et al., 1998; Luther, 1994). Determining the navigational structure — linear, hierarchical, nonlinear or composite — is an important design consideration in multimedia application development (Villamil-Casanova & Molina, 1996).

Interactivity: D.M. Kennedy and McNaught (1997) and G. Kennedy et al. (1998) emphasised that interactive multimedia software should provide a high level of interactivity as it encourages deeper processing of learning material.

Sequencing: Hannafin and Peck (1988), G. Kennedy et al. (1998), and Cartwright and Cartwright (1999) stressed that the content of the model should be cohesive, well structured and designed, organised into manageable

TABLE 1
Participants by Role, Gender and Years of Experiences

Participants	Roles	Gender (F/M)	Years of Experiences
01 JH	ATSIHW TAFE lecturer	F	4
02 RD	ATSIHW university lecturer	F	5
03 LS	ATSIHW university lecturer	F	4
04 AV	Director of Training centre for ATSIHW	F	7
05 JF	ATSIHW general manager	M	5
06 SL	ATSIHW program coordinator	F	3
07 RT	ATSIHW coordinator	M	15
08 MK	ATSIHW program manager	F	15
09 CWS	ATSIHW development officer	M	7
10 ZW	ATSIHW university lecturer	F	3

sections of content, and based on principles of instructional design.

Presence of consistency: There should be consistency between learning objectives and content of interactive multimedia program (G. Kennedy et al., 1998).

Aesthetics (appeal): Hannafin and Peck (1988), Phillips (1997), and Mayer (2001) claimed that in order for a project to be a success, the information must be presented in an attractive way, look good, and maintain learner interest. A thorough understanding of the aesthetic choices in program production design is critical for a program (Cartwright & Cartwright, 1999).

Sophistication: Hannafin and Peck (1988), and Mayer (2001) recommended that the IMM model designer needs to take advantage of the latest technology developments and use the computer's resources wisely.

Modularity: Luther (1994) and Phillips (1997) claimed that learning is best facilitated by breaking a subject down into a series of single thoughts; this splitting of a program into a set of independent parts can ease the development task.

Feedback: Hannafin and Peck (1988), and Hoffer and Barnett (1990) suggested evaluating the learner's response by providing specific immediate feedback with justifications for correct answers and explanation for the incorrect.

Individualised: Cartwright and Cartwright (1999) and Fahy (2005) identified that individualisation can help in adapting to the unique needs of each person's preferred learning style. Programs may be different in the level or depth, sequences of instruction, and length of time to complete a given section, and can be offered at different times and places to suit the needs of different learners.

Interviews

The purpose of the interview component of the methodology was to gain a perspective from various stakeholders on what are considered to be the keys factors which

would impact the development of a continuing informative program for ATSIHW. Data was obtained through semi-structured, open-ended, in person and telephone interviews from key stakeholders.

Ethical Considerations

Ethical approval for the study was granted from the office of research and high degree of University of Southern Queensland, and approval from Southern Queensland Institute of Tertiary and Further Education (TAFE).

About the Participants

Participants involved in this study were selected on the criteria of:

- having worked for a long time, not less than two years, in the area of Aboriginal health education and training, and
- having various roles as educators, general managers, program managers and developers, coordinators and health workers.

Consequently the research was derived from varied backgrounds and different points of view of those involved in Aboriginal health education and training.

Thirty stakeholders were personal invited, but only 10 agreed to participate. There were seven females and four males. Two of the participants started their career as Aboriginal health workers. Table 1 describes the participants by role, gender and work experiences.

Getting In

Participants were invited through a flyer distributed at their workplaces and personal approaches. Introductory letters and information sheets were distributed to the potential participants before the interviews. Open-ended, semistructured interviews of approximately 30 minutes were audio-taped with the stakeholders. Permission to use the recorder was requested and a signed consent form was obtained.

Analysis

Interview transcripts were returned to the participants for a final check and approval. Transcripts were analysed and interpreted for stakeholders' experience, opinions, expectations and perspective for model design, using thematic content analysis.

The interview transcription was organised and divided into sections to facilitate the process of coding data for analysis. Major themes within the topic have been identified from the literature review, or given by the participants in interviews, or arose from the interview guide topic. Issues and key themes were identified through reiterative review using QSR's NVivo 9 computer software to manage the data. The themes and issues were gathered into major categories which represent the keys factors that could impact the design and development of a cultural appropriate interactive multimedia informative health program for ATSIHW. They are: cultural factors, information technology availability and literacy, and learning aspects.

Interpretation of Findings

This study outlines responses from stakeholders of various but relevant backgrounds regarding the key factors which need to be considered and that would impact the program development. All participants agreed that there is no cultural obstacle that could prevent Aboriginal health workers from using IT as a new means to deliver a sustainable, efficient and culturally acceptable program. They concluded that there are a number of general factors, such as cultural issues, information technology literacy, the availability of the technologies, and learning aspects which have an enormous impact on program development, and there is a need to consider all these factors together at the same time.

Cultural Factors

The diversity of cultures between Aboriginal Australian peoples and the variety between ATSIHW' knowledge, background and code of practice in each Australian state have an impact on program design and content, and reflect the need for program to accommodate all this multiplicity. Participants explained that there is a need to produced program template which has a general, wide and stable character to suit work in every community:

We had great difficulty because Aboriginal health workers from Victoria have different experience than health workers from Darwin, from NT, so very difficult. (AV)

They are more traditional in the NT because of the geographic location and the set-up of communities. (JH)

You try if you were specifically doing health area in Qld but it may different if you going up to Torres Australia area you start to look at turtle and things of their culture up there. (LS)

And the planned tool kits is work in this area, and that area and every area. (JF)

All participants agreed that ATSIHW should be involved in the program development through their continuing formative evaluation of the program in all its development steps, and the program content should be relevant, and directed to their level:

I have my ideas but I can't, I don't know if they are correct or efficient and effective until I discussed with indigenous health workers, because who am I? (JF)

You can make a draft and get some advice before you finish the program. Just let have a look in them the sense is enough, cultural, get the message across, feedback. (RT)

If you want to make it culturally appropriate you need to be guided by health workers. (SK)

It is very important for anything we could develop that we have information by the health workers and have a say into the development of it. (AV)

All participants commented on the importance of cultural points that should be taken into consideration during program design. These points were seen as important in developing the right tool kits which can be used by all Aboriginal Australians. These points include the following:

1. Make the program simple, easy to understand and not too long, but at the same time it should be intellectually thorough and relevant: 'If you want to get across the point, make it how it is relevant to their life' (RT).
2. Design the program to suit different Aboriginal cultural backgrounds, by emphasis on their common general cultural issues, like storytelling; minimise the written text, narrative, more visual and colourful, and using diagram and pictures familiar to them.
3. Gender issues for the target group should put into consideration in program design.
4. Simplification of the medical terminology by using pictures and simple general words: 'Most Indigenous population do not have access or knowledge of higher medical terms, you would not go in that and talk in high medical jargon' (LS).
5. Using Aboriginal sound and accent in the narration.
6. Using Australian English as a best common language for all Aboriginal Australians.
7. Program content written with the Aboriginal patient in mind.
8. Using case study or scenario about Aboriginal people.
9. Knowledge sharing can be fostered by designing a stories module to be used by ATSIHW in their health education and promotion roles within their own communities.
10. Aboriginal health workers should share in program development through continuing formative evaluation throughout all the development process.

TABLE 2

Comparison Between the Results of the Research Approaches

	Literature review	Interview
Cultural factors	<ul style="list-style-type: none"> • Cultural localisation, cultural contextualisation, oral cultural backgrounds, and cultural knowledge base are elements that should be considered in the development of an interactive, culturally appropriate multimedia educational health program for ATSIHW. 	<ul style="list-style-type: none"> • The diversity of cultures between Aboriginal Australian peoples and the variety between ATSIHW knowledge, background and code of practice in each Australian state has an impact on program design and content, and there is a need to produce a program template that has a general, wide and stable character to suit work in every community.
IT	<ul style="list-style-type: none"> • Limitation in access to computer facilities or the unavailability of suitable capabilities to use such resources effectively. • Learners should not be expected to have advanced computing skills, but development of information literacy skills needs to be integral to the learning outcome. 	<ul style="list-style-type: none"> • The major barriers for implementing the planned model for ATSIHW are the availability and access to the equipment, its efficiency, maintenance, the cost to keep it running, and updating and training in many remote areas.
Learning aspects	<ul style="list-style-type: none"> • The underlying basis of designing instructional multimedia is the theory of learning, which should be employed to produce measurably better instructions. 	<ul style="list-style-type: none"> • The program should have clear, defined, measurable objectives and should achieve these objectives. The program should be continuing, sustainable, and planned for context and need analysis
IMM	<ul style="list-style-type: none"> • Effective learning from multimedia displays is subject to a number of requirements such as: multimedia principle, concise principle, coherence principle, modality principle, contiguity principle, model content, target audience, introductory objectives and clear directions, navigation and orientation, interactivity, sequencing, presence of consistency, aesthetics (appeal), sophistication, modularity, feedback, and individualised. 	<ul style="list-style-type: none"> • The program should be designed to be simple, not too long, easy to understand, intellectually thorough, and relevant. • Gender issues should be considered. Use of narration in the form of storytelling, and minimising the written text. • Interactive material should be more visual and colourful, with diagrams and pictures.

Some of the participants supported involving the traditional bush medicine in program content. They argued that it could be a way of attracting health workers, and also because most Aboriginal Australians still use their traditional healing methods, which could act as a cultural barrier for them to use western medicine and lead to drugs interaction. It should put into consideration that traditional bush medicine is different from one place to another and depends on the location and what native plants are available in different areas.

Availability and Literacy of Information Technology

The benefits of the program depend on the assumption that the ATSIHW have access to suitable information technology. This assumption has been assessed in the qualitative interview, by focusing on IT literacy and the availability of IT resources for the ATSIHW. Interpretations of material gathered in interviews indicated that most health workers should have basic computer literacy and facilities because they usually need to perform work on the computer, such as prepare a resource or undertake an administrative task. Some participants pointed out that the younger generation of Aboriginal health workers are more confident in using the computer than older workers. All the participants agreed that the major barriers for implementing the planned model for the ATSIHW are the availability and access to the equipment, its efficiency, maintenance, the cost to keep it running, and updating and training in many remote areas:

They can use the computer, the basic computer. (JF)

I think they become able to use the computer, I think because in health you have to do a lot of work on the computer. (RD)

We may get one or two in class not confident in using the computer, but they are not from the younger generation. (JH)

It is the older ones who shy away from the data collections system, and they get someone else to do it for them. They are scared they are going to blow up the computer or something. (MK)

There are many health workers do not have access to computer, health professional have access to computer, but health workers don't have easy access to computer. (AV)

You can find computers everywhere but the expectation that they all functioning may not actually be. (SK)

The most difficult things that may find difficult to technology is the maintenance. In those remote areas there is no technological support so things don't work . . . that just don't work. (LS)

Learning Aspects in Model Development

Participants indicated that the program should include clear defined measurable objectives and achieve these objectives. This achievement could be measured during the program evaluation. They have requested that the program should be continuing, sustainable and planned on need analysis:

If you are doing training you really do need to have an idea that there's going be a behaviour change at the end of it and know what it is. (MK)

It could be continuing. (RT)

Make sure that you planed the program based on the context analysis and need analysis. (JF)

Results

The findings in previous published studies and the interview results are complementary and supportive to each other, as shown in Table 2, and they will be used as the main guide in the development of the model, which is the third phase in this study.

Conclusion

This research aims to create culturally appropriate, interactive multimedia, health informative programs for Aboriginal and Torres Strait Islander health workers. In the first stage of the study, an assessment of program needs was carried out using a qualitative semi-structured interview with various crucial stakeholders. The assessment revealed the need for a new approach other than the traditional face-to-face approach, and one which is able to deliver a sustainable, efficient and culturally acceptable program as a source of continuous information.

The interviews have also been used to identify the key factors that impact the program development. The identification began with a systematic review of the literature, which compared findings with previously published information.

The main findings revealed that the most important key factors could be categorised under four main categories: cultural factors, information technology availability and literacy, learning aspects, and interactive multimedia factors. Cultural factors were cultural inclusivity, oral cultural, pre-existing knowledge, and Aboriginal learning styles. Interactive multimedia factors were the requirements for the process, fitting and design of the program. Recommendations for program design were also provided. These results and recommendation shall be used as a guide in the next phase of this research for development of an interactive multimedia health informatics model for Aboriginal and Torres Strait Islander health workers as a source of continuing education, updating and as a cultural appropriate sources of information.

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