Can Rapid Authoring Tools Meet the Needs of Different Learning Preferences?

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There is an increasing use of Virtual Learning Environments within colleges and universities utilizing these virtual platforms to deliver and/or complement traditional face to face courses. There is a wide array of learning technologies available for use within these virtual platforms but how confident are we that these learning tools support the learning process for students? As tutors and designers, we need to be sure that the learning tools we utilise in virtual platforms do not cause additional barriers for the online and distant learner. This research is designed to determine if rapid authoring tools can meet the needs of a variety of learning preferences of adult learners.

The research, through a quantitative, survey research design, examines the use of virtual tutorials, created using the rapid authoring tool Articulate Presenter 2007 with a focus on the learning preferences of the students as represented by the Neil Fleming's VARK model. The questionnaires were deployed and evaluated using SurveyMonkey in line with current student experience of giving feedback.

In total, ten variations of the VARK learning preferences were represented across respondents with the majority indicating a uni-modal preference. Overall, the majority of respondents indicated in the positive in relation to their experience of the virtual tutorial.

Keywords: adult learner, rapid authoring tools, elearning, VARK.

Introduction

Current economic crises and changes in societal attitudes have seen the numbers of adult learners increase in recent years. Educational institutions have responded by offering a wider choice of courses and course delivery modes with distant and blended learning gaining in popularity. This shift in focus in delivery method has seen an increase in the utilisation of VLEs (Virtual Learning Environments) and as such, the range of technologies utilised in the delivery of courses.

This research will be conducted with a group of adult learners currently studying social studies and management with The Open Training College, Dublin. The learners participating in this study are engaged in a blended delivery style programme that utilises a Virtual Learning Environment (VLE) and face-to-face workshops. The virtual tutorials created using the rapid authoring tool Articulate 2007 forms an integral component of the VLE in the form of virtual tutorials on module content and student support issues including exam preparation and assessment guidelines. This research will focus on investigating the effectiveness of these virtual tutorials and exploring the different issues that students with different learning preferences may have in using them.

Adult education is on the increase in Ireland (Aontas, 2012). For many, this increased demand for adult education is driven by the current economic downturn and the resultant need to upskill and/or retrain, for others it is driven by legislation such as the registration requirement for social care workers. Many of the students participating in the programmes under investigation are required by the inception of the Health and Social Care Professional Act, 2005, to acquire a formal qualification.

Literature Review

In Ireland an adult learner (mature student) is a learner who has reached age 23 years of age on January 1st of the year of entry to college (Qualifax, 2010). This is in contrast to the United Kingdom where those aged 21 or over are considered adult (mature) learners (University of Chester, 2010).

The theory of learning has been the source of much research and debate. Quite often the terms "learning" and "pedagogy" are used interchangeably, but in fact "pedagogy" specifically refers to how children learn, and there is a distinct term and theory for how adults learn called "andragogy". Malcolm Knowles is credited with popularising this theory, which is based on the following assumptions:

- Self-concept – the mature individual moves away from dependency towards self-direction.

- Experience – The experience accumulated over one's life forms an ever-increasing learning resource.

- Readiness to learn – Maturity brings a readiness to learn which is oriented towards the development of the individuals' social roles.

- Orientation to learning – The mature individuals' perspective on learning shifts from subject centeredness to problem centeredness and thus seeks immediate application of new knowledge.

- Motivation to learn – The mature individual has an internal motivation to learn in contrast to the younger learners' external motivation to learn. (Smith, 2002)

A wide range of educational studies conducted since the 1940s have shown how different learners have different preferences (or "styles") in how they are best able to learn. Felder (1996) considers an individual's learning style as *"characteristic strengths and preferences in how learners take in and process information"* (Felder (1996) in Cercone (2008)). An awareness of the different learning styles is important for educators to ensure that these different learning styles are considered when designing course material.

There are many theories in relation to learning styles/preferences including Multiple Intelligences, The Myers-Briggs Type Indicator, the Keirsey Temperament Sorter, VARK and David Kolb's Four Stage Model. In this research, the VARK Model is used that considers preferences for four distinct modes as follows: Visual (visual or graphically displayed information), Aural (spoken or heard information), Read/Write (information displayed in word format) and Kinesthetic (connection to reality through personal experience, examples, practice or simulation) (Fleming, 2001-2011). Learning preferences can be uni-modal (one clear preference), bi-modal (two clear preferences), tri-modal (three clear preferences) or quad-modal (equal preference for each mode). The VARK database reports that 60% of those who completed the online version of the questionnaire show a multi-modal preference. This finding is corroborated by Lujan and DiCarlo (2005) and Breckler et al (2008) in research which reported 63.8% and 60% respectively of respondents as multi-modal with 36.1% and 40% respectively of respondents in the single mode category (Lujan & DiCarlo, 2005) (Breckler et al. 2008). In contrast to this, research by Meehan-Andrews (2009) found that 46% of respondents were multi-modal with the majority of 54% of respondents in the uni-modal category (Meehan-Andrews, 2009).

The continuing research into adult and lifelong learning shows that participation is associated with many factors such as social, economic and demographic factors. (Crossan *et al*. 2003). Some of the barriers for adult learners participating in higher education include situational barriers (outside responsibilities, time limitations, costs etc), institutional barriers (course schedules, course choices) and dispositional barriers (low self esteem, fear of attending college) (Kelly, n.d.). Such barriers are observed across the generic adult population and are not specific to any particular learning style.

Given the wide range of research into how adults learn and the subsequent knowledge in relation to learning styles, considerable advances in supporting learners have been achieved in recent times. One such advancement is the use of learning technologies, and more specifically, assistive technology to support the learner in their studies. Such technologies can be in the form of hardware or software and can be considered as general purpose (suitable for all users) or special purpose (targeted at users with special requirements). The ease of use of such technologies to support learning is essential as is the need for such technologies to meet the varying needs of

learners. A study by Draffan *et al.* in 2007 reported that 84% of hardware users and 75% of software users interviewed were positive about the ease of use of the devices used. (Draffan *et al.* 2007). However, it should be noted that specialist equipment is not always necessary to adequately support a learner with additional specific educational needs. In fact, a study by Cobham *et al.* (2001) found that 75% of respondents reported generic devices as having the strongest impact with only 25% indicating specialist devices as most influential (Cobham *et al.* 2001 in Draffan *et al.* 2007).

In addition to the provision of accommodations, an awareness of how adults learn can aid the third level educator in devising an accessible course. A structured learning environment, which utilises a variety of techniques, is most conducive to a positive learning experience for all learners. A multi-sensory teaching approach, which includes auditory and visual material, is particularly beneficial. An approach, which is systematic and cumulative, will allow the student to gradually build their skills and knowledge and connect to previous learning, and thus aid the learning process (Cobham *et al.* 2001 in Draffan *et al.* 2007).

Many institutions are currently utilising Virtual Learning Environments (VLEs) to complement, or form the basis of, their course delivery. A VLE is a designed information space that allows for virtual contact between learners and educators. It is not exclusive to distance education courses and can be utilised to enhance the traditional classroom delivery (Dillenbourg, 2000). A VLE can be described as '*a collection of integrated tools enabling the management of online learning, providing a delivery mechanism, student tracking, assessment and access to resources*' (JISC, 2010a). There are many authoring tools available that can be utilized to provide additional material for learners such as virtual tutorials and self directed student quizzes. Authoring tools are applications (both web and non-web based) that can be used to create (or modify) web content for use by others (ATAG, 2012). One such tool is Articulate Presenter 2007, a rapid authoring tool designed to facilitate e-learning content through tutor prepared Virtual Tutorials. The Articulate software allows for flash-based presentations including interactive quizzes and other relevant course content to be presented to the learner through the VLE (Articulate, 2010).

The design of such tools requires careful consideration to optimize the learning experience for students. Consideration must be given to the use of audio, animation and text in the design of such supportive tools with information organized in a clear and logical manner.

Designers should avoid using large quantities of text given that reading from a computer screen can be up to 30% slower than reading from a printed text (elearning minds, 2011a). Web design specialists propose that text be broken into 'chunks' and spread over pages to avoid initially overwhelming the student. In so doing, students have greater control over the pace of their learning and thus provides for a more effective learning experience (elearning minds, 2011a).

Authoring tools will also provide for the use of multimedia elements such as audio and graphics/animation. The use of audio has dual benefits for the learner in that it not only supports the student in their learning but in addition, audio files are generally smaller than visual files and as such will download quicker in slower internet connections. In addition, studies have indicated that audio information is processed quicker than visual information (Shelton & Kumar, 2010). The audio should be utilized to reinforce the content rather than serve as a sole carrier of content while the graphics should serve to support the learning rather than distract the learner. Designers should ensure that audio and graphics/animations used are high quality. In addition, these elements should be static features to avoid distracting the learner - research has indicated that movement in our peripheral vision can dominate our attention and thus distract from the learning experience (elearningminds, 2011b).

In addition to consideration to the usage of multimedia designers should also be cognizant of the level of computer expertise of potential students. An awareness that students have varying degrees of computer expertise from novice to expert, designers should therefore ensure that tools utilized in an elearning environment are user friendly with clear instructions and ease of use essential to an effective learning experience (elearningminds, 2011b).

Considerable research has been conducted into what constitutes best practice in design and implementation in relation to adult and online learning. One resultant finding is the Seven Principles of Good Practice as developed by Chickering and Gamson in 1987. These principles advocate that good practice will encourage student-faculty contact, cooperation among students, active learning, provide prompt feedback, emphasise time on task, communicate high

expectations and respect diverse talents and learning styles (Graham et al. 2001). While each principle has its own merit, of particular note in relation to learning tools is the principle of encouraging active learning and the principle of respecting diverse talents and ways of learning. Applying such principles to the course design and learning tools utilised therein can ensure the learner has the opportunity to engage in active learning while at the same time recognising and respecting the diversity of all participants (JISC, 2010b).

In addition to considering the Seven Principles of Good Practice, applying the Seven Principles of Universal Design to the design of the VLE and Learning Tools used therein, can help to ensure an effective platform to support the learning experiences. These Seven principles of Universal Design call for equitable use, flexibility in use, simple and intuitive usage, perceptible information, tolerance for error, low physical effort and appropriate size and space for approach and use (Burgstahler, 2005).

All of these in combination with a sound instructional design model will ensure that the VLE is adequately designed and maintained and the most appropriate and effective learning tools are utilised to ensure best practice in teaching and learning. Several instructional design models exist, one of which is the ASSURE Model. This model was designed to assist educators to design and develop appropriate learning environments and draws on Gagne's events of instruction. The ASSURE model contains the steps of Analyse, State, Select, Utilize, Require and Evaluate (Heinich *et al.* 1999).

In a recent instructional design project, the author further developed the Assure model resulting in the ARDIER model incorporating the following steps

- Analyse the learners' needs

- Research current trends

- Devise the programme

- Implement the programme

- Evaluate the tools used and overall effectiveness of the programme

- Review on an ongoing basis.

The use of learning technologies such as virtual tutorials within the VLE can have particular advantages for the adult learner. The 24-hour availability of the course material allows the learner to read through the course material at a self-directed pace. It allows the learner to dictate the level of engagement with course material and other learners. The availability of visually enhancing material and technologies has been found to enhance the learning experience of participants (Hove and Corcoran, 2008). Other ways in which the VLE and learning technologies can enhance learning include greater choice over time and place of study, alternative modes of study, increased opportunity for self-reflection and participation in communities of knowledge, inquiry and learning (HEFCE, 2010). In addition, the use of appropriate and effective learning tools can provide the learner with much needed encouragement as 'abilities improve through repetition of skills and processes' (Draffan, 2007). The selection of learning tools should be carefully considered and educators should ensure that best practice guidelines, as previously outlined, are adhered to.

Key considerations in the selection of learning tools are the issues of accessibility and usability. Accessibility is concerned with 'ensuring something is fit for purpose for all potential users, ensuring all potential users can interact with the resource or experience' (JISC, 2010a). As the chief purpose of web-based content is to make information available, providers must ensure that they do not create disadvantage in the design of the VLE (ibid) and therefore learning tools utilised within the VLE should be suitable for use by all potential users. Content should be 'perceivable, understandable and operable by each user' (Jeschke and Vieritz, 2007).

Failure to address access issues from the beginning of the design phase can result in learners unable to navigate through the resource or utilise the learning tools to maximum advantage. As such, the design of the VLE and utilisation of different learning technologies/tools can accommodate for individual difficulties and be inclusive, or disregard such individual difficulties and be exclusive (Steyaert, 2005). Such thinking is in line with the recent developing understanding that many difficulties experienced by adult learners are the product of the context in which learning takes place. This has given rise to the concept of e-inclusion, 'the use of digital technology to assist those who find learning difficult' (Abbott, 2007). A key feature of e-inclusion is that technology is used to transform the delivery rather than modify the content. The

educators' aim should be to ensure that 'appropriate technology is available at the point of need to enable and enhance learning' (Abbott, 2007).

Therefore, one can surmise that the concept of accessibility and usability is the ability of the VLE and the technology 'to adjust to the needs of all learners, is determined by the flexibility of the environment and the availability of alternative but equivalent content' (Heath *et al.* 2005 in Pearson *et al.* 2008).

Such thinking is in line with an '*integrative approach where the focus is shifted away from making exceptions for different learners to anticipating and planning for student diversity*' (Seale, 2004).

Artefact Design
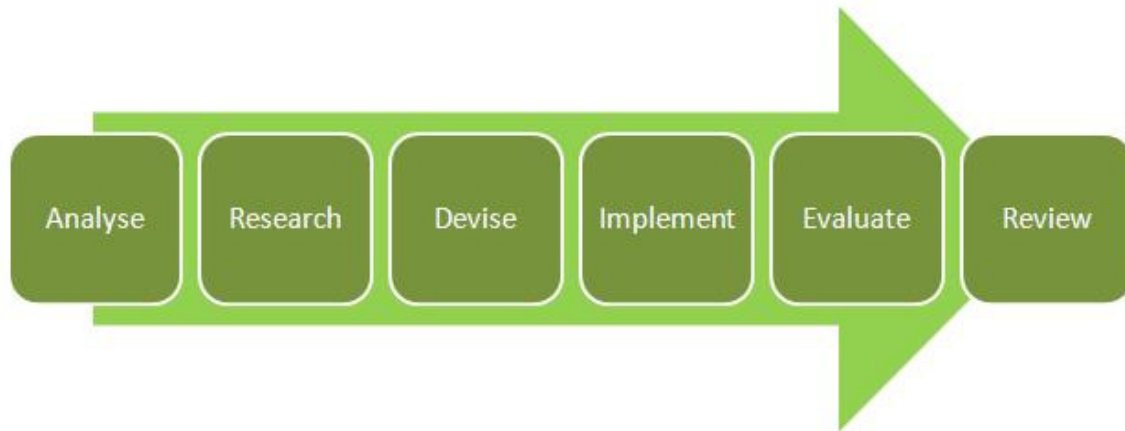
The instructional design method utilised was ARDIER, (Analyse, Research, Devise, Implement, Evaluate and Review) a design method developed by the author that built upon the instructional design tool ADDIE (Analyse, Design, Development, Implementation and Evaluation).

Analyse

The needs of the students were analysed to determine where support was needed the most. In this instance, the subject matter of these Virtual Tutorials, the topic of referencing and guidelines on using Ebsco were offered via text based documents and a screen-r video. However, students were still having considerable difficulty with reference style and using the Ebsco database. The need to have an additional source to support students with these two aspects of their study was identified.

Research

Ordinarily, the research phase would involve determining the most appropriate tool to use in the development of such tutorials. However, in this instance, the tool to be used was pre-determined by college management. Therefore, the research involved determining the most appropriate

layout to enable the student to pull the information required rather than pushing the information on the student.

Devise

In devising the tutorials, the author had to determine the most relevant and beneficial information required, ensuring to include sufficient detail to benefit the student without causing an overload of information and thus deterring the student from utilising the tutorial. Key points to consider in the design process include the quantity and layout of text and use of supporting graphics as well as inclusion of audio. Care was taken to ensure that graphics supported the text, and thus helped to reinforce the key message to be taken from the slide as indicated in the screen captures below.

Each tutorial followed a similar design style in that each slide contained minimum text and a supporting graphic. Each graphic was carefully selected to complement the text and thus support the student to remember the content
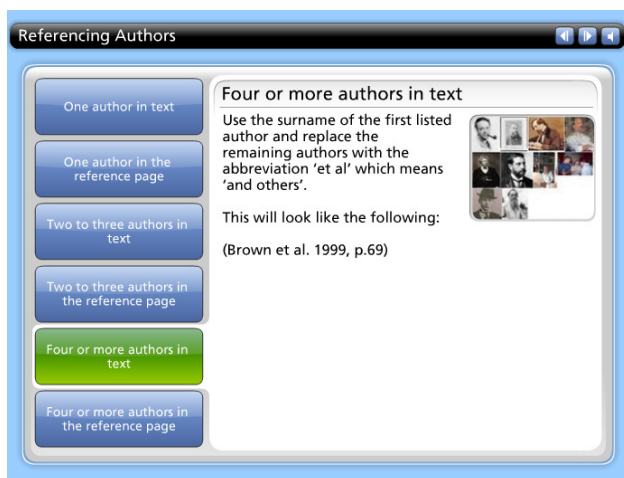
 Referencing Virtual Tutorial

 Ebsco Virtual Tutorial

Implement

The implementation of the tutorials involved uploading the tutorials to the college LMS, which each student has access to via an individual password and username. Each module within each year of study utilises the virtual tutorials for presenting module content, assessment guidelines and generic support such as the referencing and EBSCO tutorials. Students were instructed in the availability and use of the tutorials by tutors and through the colleges online support programme for learners new to the college. Ongoing technical support is also available to the student in relation to all aspects of the VLE.

Review

This research is the first large scale formal review of the virtual tutorials and as such will be of immense benefit to the college. Previous reviews of the virtual tutorials were incorporated into the module feedback and end of year feedback. Based on the results from this research, the current referencing and Ebsco tutorials will be updated to include more effective graphics and better sound quality.

The use of the ARDIER instructional design method provided a functional framework for the design process. This framework ensured a focused approach to the virtual tutorial process, from design to inception to review. This design method has become embedded in the researchers practice.

Virtual Tutorial (Rapid Authoring Tool) Questionnaire Design

A draft version of the questionnaire was piloted with a group of adult learners since the use of a pilot group is an essential element within the planning process to determine the length of time to complete the questionnaire, to determine the clarity of questions and instructions and to identify unhelpful questions (Bell, 2005 p.147; O'Leary, 2010 p.185). In so doing, potential difficulties with wording, layout and instruction difficulties from a respondent's perspective were identified and addressed.

The questionnaires for this research will be offered for completion to the students of the college given that it is the students who are best placed to provide feedback on the functional aspects of the virtual tutorials. The questionnaires were conducted using SurveyMonkey. The rationale for selecting this particular method lies in the ease-of-use of this resource coupled with the fact that learners are already familiar with this method of questionnaire by virtue of their involvement with the college.

According to O'Leary (2010), what may be obvious to the researcher may be less so for the respondent. Therefore, each section begins with a brief instruction to the candidate.

The structure of the questionnaire is as follows:

- The first section contains 9 short answer questions to determine student demographics including age range, need for supports and level of computer skill

- The second section is version 7.1 of the VARK model, since the focus of the questionnaire is to determine the suitability of this resource for learning preferences as determined by the VARK model. As section 2 consists of version 7.1 of the VARK questionnaire, which has been validated and reviewed by a panel of experts (VARK, 2012), no adjustments were required.

- The third and final section of the questionnaire is concerned with the respondents' usage of the virtual tutorials. This section provides the researcher with key information on the usage of the virtual tutorial and as such, the design process was allocated considerable time.

With the final analysis in mind, every effort was made to ensure questions were well structured (Bell, 2005 p.137) and presented in a clear, logical and aesthetically pleasing manner (O'Leary, 2010 p.184).

Methodology:

The methodology selected for this research falls within the quantitative tradition. The characteristics of this approach, which were particularly salient to this research, include the objectivity of this approach and the underlying belief in the power and ability of numbers to represent the world with vigour and accuracy (O'Leary, 2010 p106).

The method of data gathering utilised was Survey Research through self-administered online questionnaires, an appropriate method as it allowed for the same questions to be asked of all participants in the same order. The use of the online questionnaire gathering tool, SurveyMonkey, allowed for a large sample to be quickly surveyed. In addition, the potential respondents have used this tool previously and as such are familiar with its operation.

Sampling:

Given that this research draws on a quantitative design, the use of a probability sampling method would generally be considered the ideal sampling method within this design methodology to ensure a randomized and un-biased sample selection (Castillo, 2009). However, given that the total population is relatively small and randomization could potentially exclude students with a specific learning preference, it was decided that the purposive sampling method of total population sampling would be utilised.

In so doing, the characteristics of the population were determined (in this instance, active enrolment with the college which implied adult learner status was the key characteristic) and obtained the contact list through the SurveyMonkey survey tool which contains a current list of student contact emails. An email inviting all current enrolments of the college to participate in the research completed the total population sampling method.

Results

Data gathering took place during the period 6th May 2012 to 27th May 2012. During this period 234 questionnaires were forwarded. 59 (25%) of respondents commenced the survey with 50 (21.7%) respondents completing the survey.

The majority of respondents were female (82%) (Figure 1) while the most common age bracket was 36-50 (46%) (Figure 2)
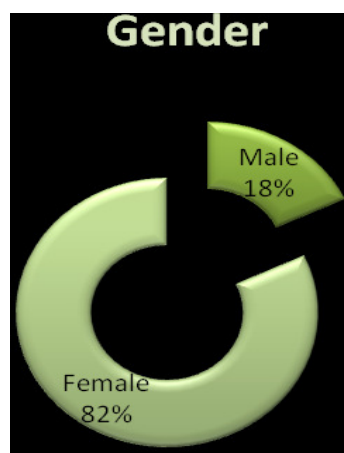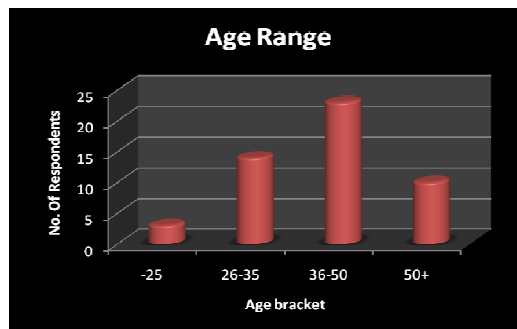

Figure 1 Gender

Figure 2 Age Range

The majority of respondents (70%) reported their computer usage as a lot while the remaining 30% indicated that their computer usage was very little. (Figure 3)
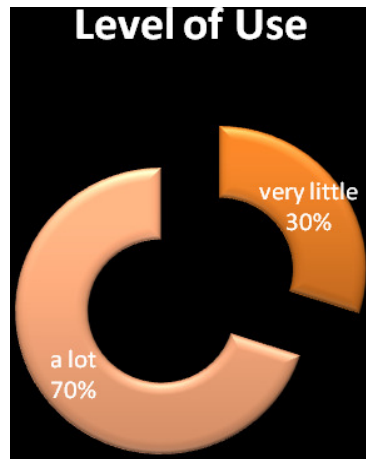
Fig 3 Level of Use

Computer expertise was categorized as novice (20%), average (56%), ECDL and above (20%) and degree using computers (4%) (Figure 4).
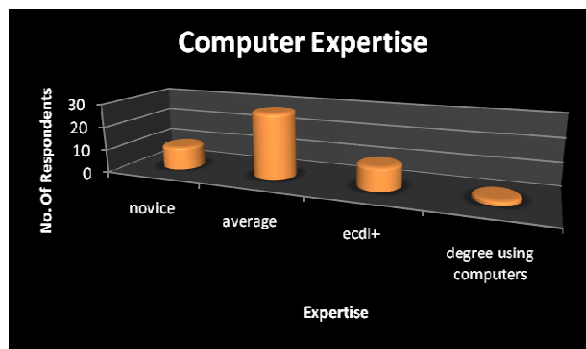
Figure 4 Computer expertise

The majority of respondents showed a preference for a uni-modal learning preference (72%), with the remaining 28% distributed among bi-modal preference (22%), tri-modal (4%) and quad-modal (2%) as illustrated in Figure. 5(a)
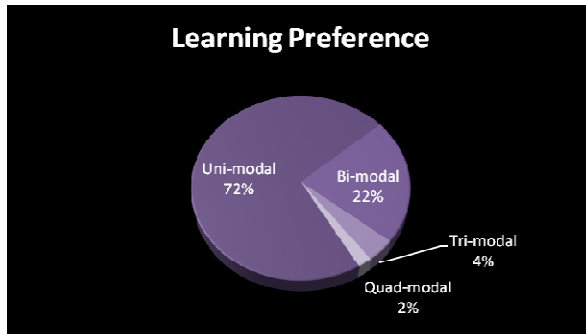
Figure 5a – Learning Preference

The learning preferences of the respondents included Aural (13%), Read/Write (42%), Kinesthetic (21%), Visual Kinesthetic (2%), Read/Write Kinesthetic (6%), Aural Kinesthetic (6%), Aural Read/Write Kinesthetic (2%) and finally Visual Aural Read/Write Kinesthetic (2%). No respondent was in the uni-modal Visual category. These learning preferences are shown in Figure. 5b.
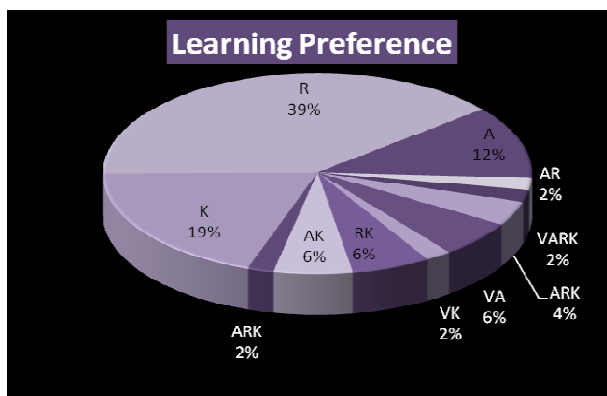

Figure 5b - Learning Preferences

Research in Learning Technology

All respondents utilised the Virtual Tutorials with patterns of usage including for all modules (68%), some modules (22%) and for support purposes such as referencing (10%) as illustrated in Fig 6 below.
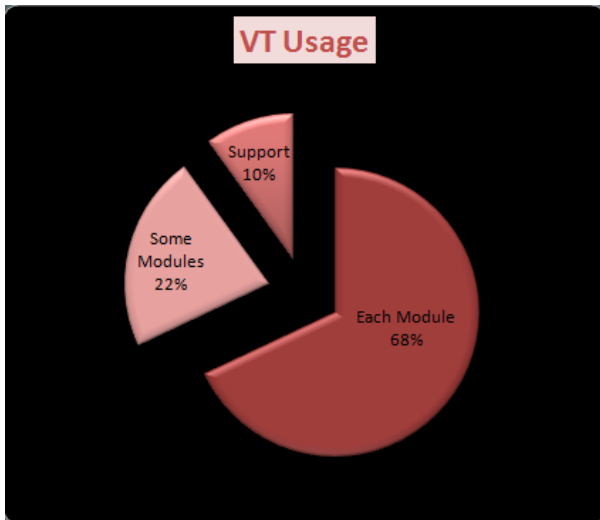

Fig. 6 – Overall Virtual Tutorial Usage

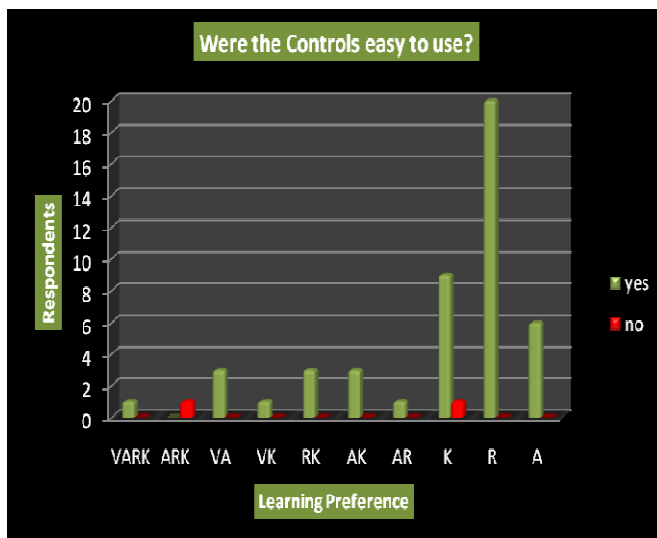The majority of respondents (96%) found the controls easy to use as shown in Figure 7

Figure 7 – Controls

The majority of respondents (74%) felt the graphics helped them to remember the content while the remainder (26%) felt the graphics did not help them to remember the content as illustrated in Figure 8.
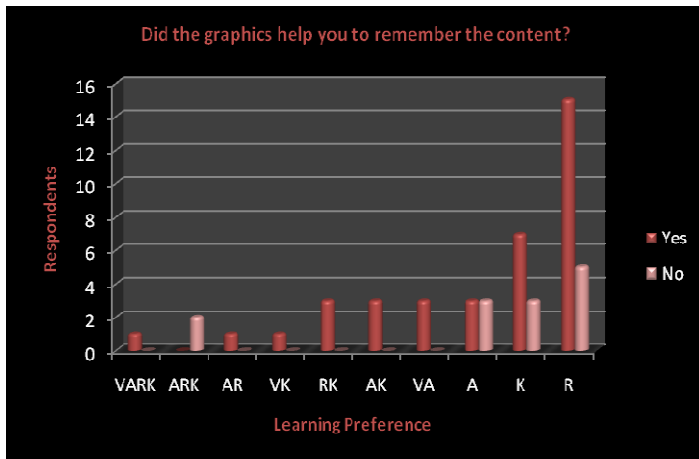

Figure.8 - Graphics

The majority of respondents (74%) felt the audio complemented their learning with the remainder (26%) considering the audio to distract their learning as illustrated in Figure 9 below.
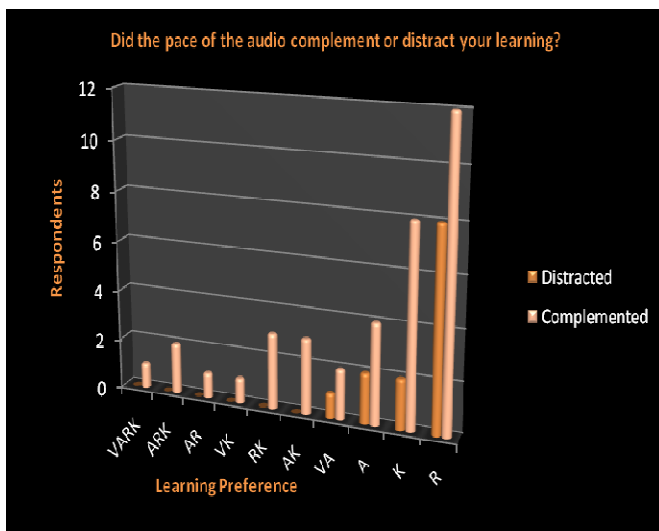

Figure 9 – Audio

Almost half of respondents (44%) felt that the audio lessened their sense of isolation while 26% felt that the audio did not lessen any sense of isolation. 30% of respondents selected the N/A category indicating that this group did not experience a sense of isolation (Figure 10).
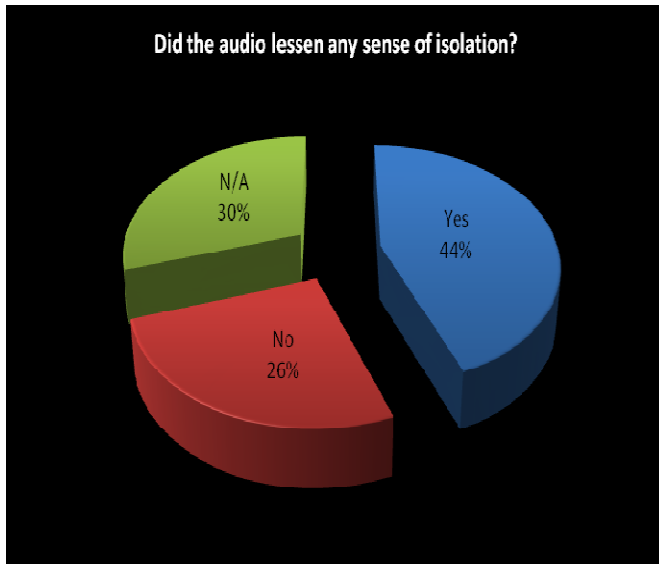

Figure 10 – Isolation

The majority of respondents (98%) felt the text was relevant with the remainder (2%) indicating the text was not relevant (Figure 11).
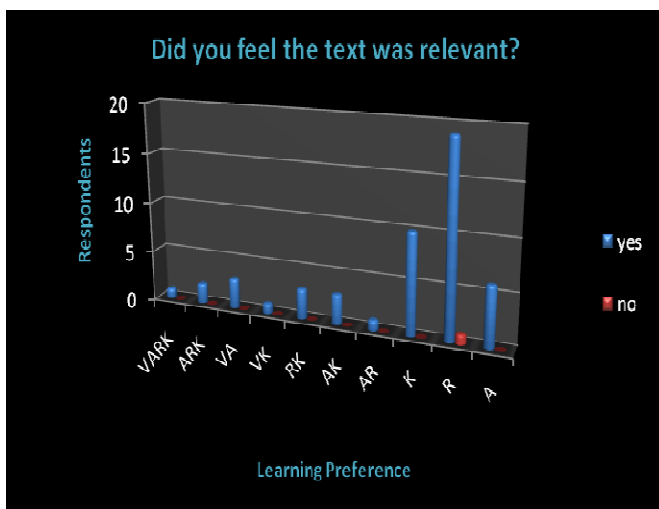

Figure 11 – Text

The majority of respondents (88%) felt there was sufficient text, with 10% of respondents indicating that there was too much text while 2% felt there was too little text (Figure 12).
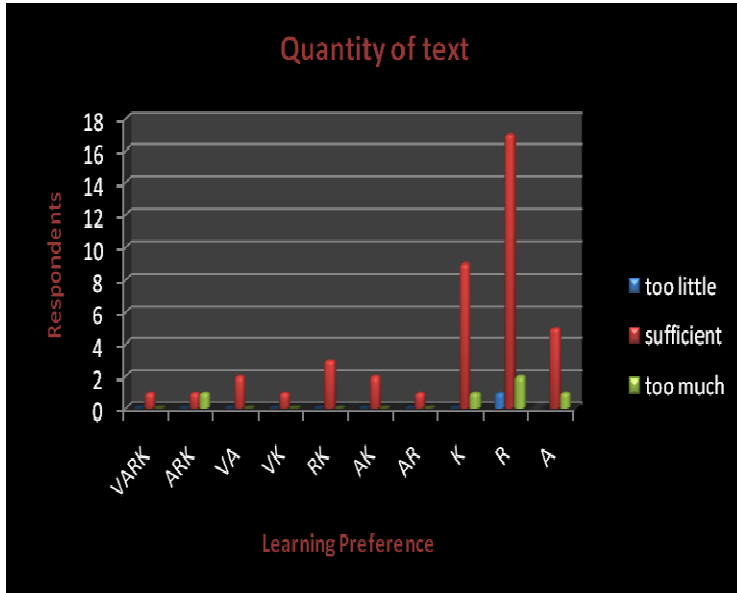

Figure 12 – Text

The majority of respondents (94%) rated the virtual tutorials in the positive with the remaining 6% giving a negative rating. The breakdown of these ratings can be seen in Figure 13.
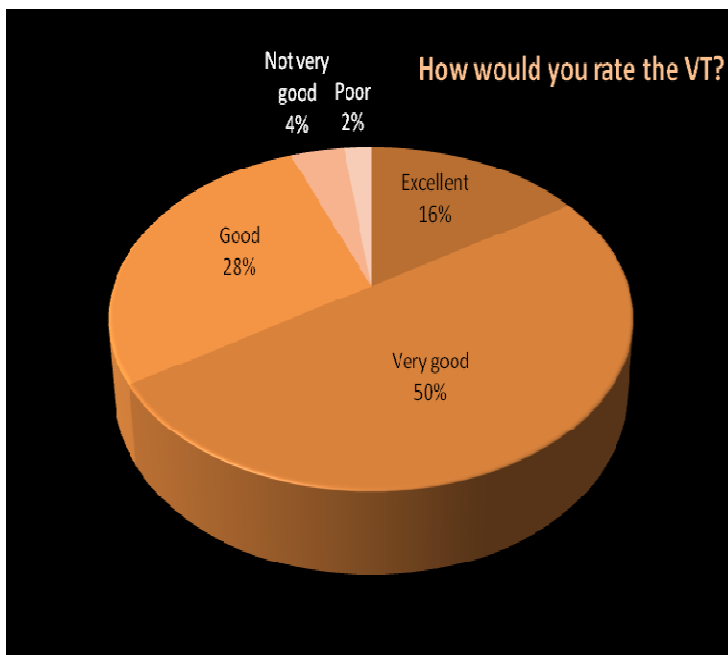
Figure 13- Rating

Respondents' preferences for the slide design included graphic only (2), text only (4%), text and graphic only (32%) and text, graphic and audio (62%) (Figure 14).

Figure 14 – Slide Design Preference

Respondents reported what they liked most about the virtual tutorials as a revision tool (36%), assisting learning and understanding (28%), meeting individualized needs (18%) and other such as colour, graphics and audio (18%) (Figure 15).
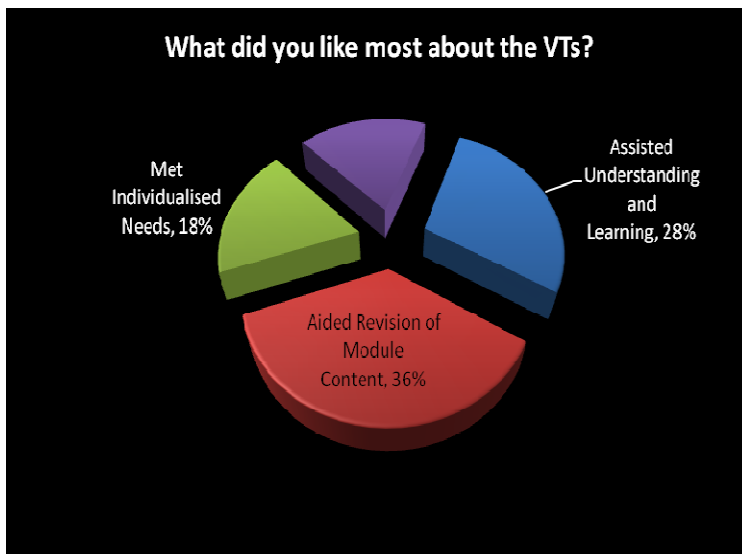
Figure 15 – What respondents liked most about the Virtual Tutorials?

Respondents reported that issues they least liked about the tutorials included the fixed slide sequence (22%), audio such 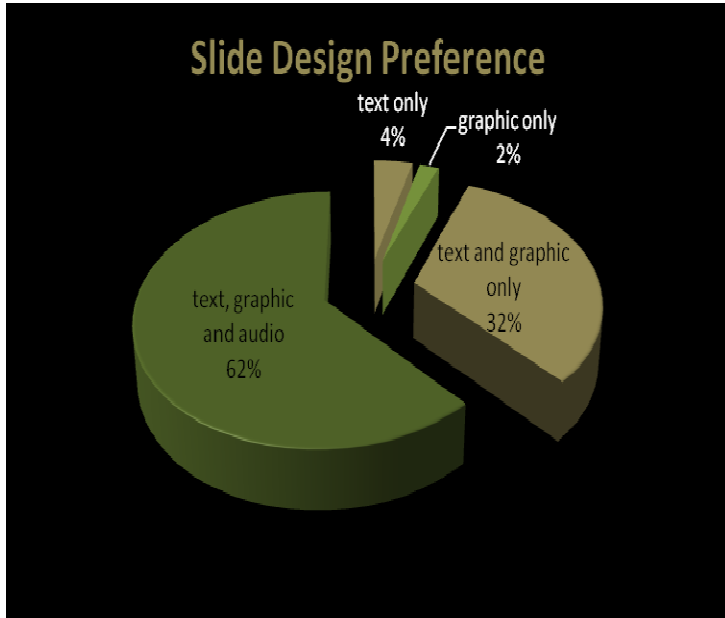as pace and volume (14%), technical issues such as not able to download (8%), repetition of module content/length (6%), other issues such as graphics and audio (20%). 30% of respondents reported that there was nothing they liked least about the Virtual Tutorials (Figure 16).
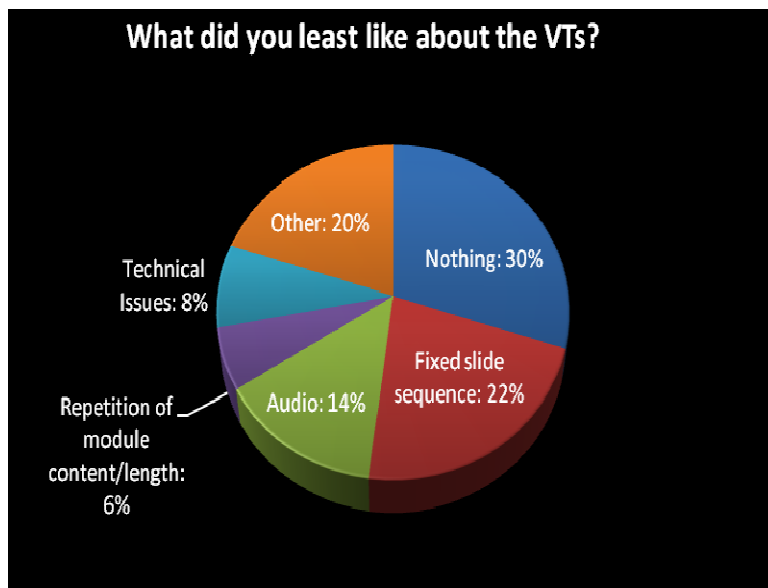
Figure 16 – What respondents liked least about the Virtual Tutorials?

The majority of respondents (66%) would not make any changes or additions to the virtual tutorials. The remaining 36% made the following suggestions:

- 12% of respondents recommended learners having control of slide navigation

- 6% recommended a shorter duration

- 6% recommended being able to download the Virtual Tutorials

- 6% recommended changes to the audio such as faster pace or better quality

- 4% recommended a female voice over (Figure 17).

Figure 17 – What would you add/change to the Virtual Tutorials?

Discussion and Conclusion

Overview:

This research was concerned with exploring if rapid authoring tools can meet the needs of different learning preferences. Given the multi-element design of these tools, this discussion will consider each element individually with a final separate conclusion. The elements for discussion include learning preference, controls, text, audio and graphics.

Learning Preference:

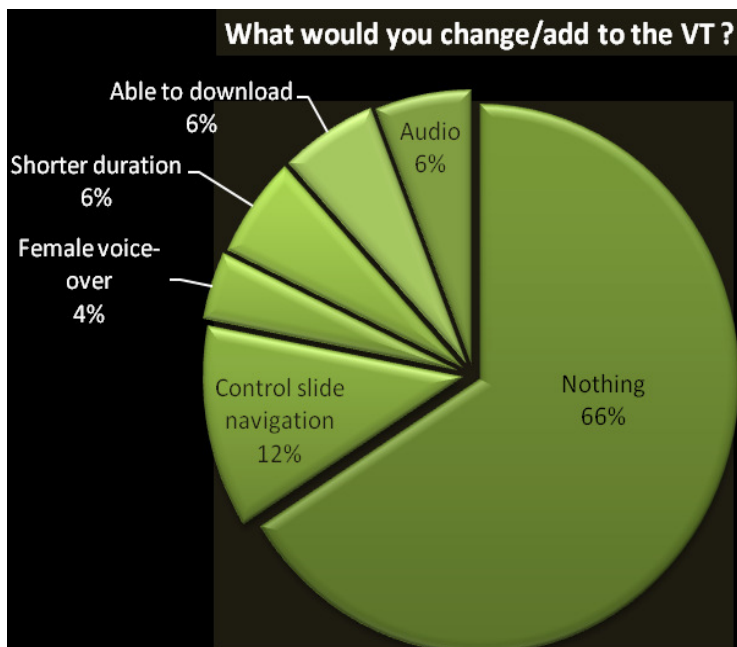It has long been accepted in academic circles and beyond that people demonstrate different preferences for learning. Much research has been conducted into this with various combinations of learning preferences reported with seemingly a majority reporting multi-modal preferences. In contrast to other research findings (Lujan & DiCarlo, 2005; Breckler *et al.* 2008), the respondents to this research showed a majority in the uni-modal preference category. There are several possible explanations for this apparent contradictory finding including, though not limited to, the response rate, the method of data collection and the individual preference of the potential respondent.

Given the subjective nature of this element, a deviance in findings across different research projects is not unusual.

Controls:

The desire to be in control of one's' learning is a central feature of the adult learner. Knowles is credited with popularizing the theory of andragogy of which a key assumption is self-concept, involving the desire to self-direct ones learning experience (Smith, 2002). A key consideration within this for elearning designers is ensuring that the adult learner can indeed direct their learning – this can be achieved in part by ensuring that any controls within the tools used are

accessible and easy to navigate. The 7 Principles of Industrial Design are also key considerations here, in particular equitable and simple usage and low physical effort. Draffan *et al.* (2007) and this research both find the respondents reporting positively in relation to ease of controls (Draffan *et al.* – 75%, this research – 96%). The result in relation to this element in the research indicate that there is no difficulty with the controls of this particular authoring tool and as such one can surmise that the controls do not create any additional barriers for learners across the range of learning preferences.

Text:

The use of text is an essential component within an online tutorial. Best practice indicates that text should be chunked and large quantities avoided to optimize the learning potential for the student (elearning minds, 2012). The majority of respondents (88%) felt that sufficient text was utilised in the virtual tutorials, indicating that the text element of these tutorials does not inhibit the learning process. 10% of the respondents felt there was too much text. This would most likely have hindered the learning process for these respondents given that reading text from screen can be up to 30% slower than from printed text (elearning minds, 2012). A smaller proportion of respondent (2%) felt there was insufficient text though it is unclear if this hindered their learning. Overall, the result of this section indicates that currently, designers are using sufficient text to meet the needs of the majority of learning preferences. However, this is something that should be constantly monitored to ensure its continued effectiveness. Responses in relation to the relevance of the text show that the majority (98%) feel the text is relevant with a small minority (2%) indicating the text was not relevant. Again, this indicates that designers of the tutorial are not causing any additional barriers to the students learning with the choice of text utilised.

Audio:

The use of audio is considered to support the learning process. Current research into best practice indicates that audio should be of high quality and in line with earlier discussion in

relation to control of one's learning a mute option should be available to afford learners the opportunity to use the tutorial without the addition of audio. The results of this research show that the majority of respondents (74%) felt the audio did indeed complement their learning. This finding is consistent with best practice guidelines (elearning minds, 2011) which posit that audio should support the student in their learning. However, 26% of respondents felt the audio distracted their learning. This was due in part to issues with the quality of the audio and issues with the pace of the audio being different to the pace of the respondents reading. For those respondents who were unhappy with the audio, the option to mute the sound was utilised. However, the disadvantage of this for the learner is that they do not get to avail of the auditory benefits of the tutorial. Another important finding in relation to audio was its effectiveness in decreasing the sense of isolation commonly felt by online and distance learners. The majority of respondents (44%) felt the audio lessened their sense of isolation with 30% saying it did not lessen their sense of isolation. 30% indicted this was not applicable, highlighting that 70% of respondents feel some sense of isolation in their chosen study model. An unanticipated finding in relation to the audio was a preference for a female voice over.

While this research indicates that for the majority the audio element is supportive of the learning process, the number responding in the negative indicates that there is some degree of obstruction caused by the current audio usage.

Graphics:

Graphics in the form of animations or pictures should also complement the learning rather than distract the learner and be of high quality. The current study found that the majority of respondents (74%) felt that the graphics helped them to remember the content. However, 26% felt the graphics did not help them to remember the content. Comments from respondents in relation to this include noting that the *'tutorials would be as effective without the graphics'* and *'pictures linked to words would help'*.

While the higher proportion of respondents responded in the positive indicating an overall satisfaction with the graphics, the numbers responding in the negative must not be ignored or

forgotten as this indicates a barrier to the learning process for over a quarter of respondents. This is an area for further consideration by the virtual tutorial designers.

<u>Conclusion:</u>

Overall, the tutorials have been met with a general positivity from participants. The overall rating of the tutorials was in a clear majority with 94% of respondents rating it in the positive. 30% of respondents indicated that there was 'nothing' that they liked least about the tutorials with no similar negative statistic reported in relation to what they like most about the tutorials. Although up to 26% of respondents felt that the graphics and audio distracted their learning, the majority of respondents (62%) indicated that their preference in slide design was for a combination of text, graphic and audio. Only 4% of respondents indicated a text only slide design with 2% indicating a graphic only slide design. The remaining 32% indicated a preference for text and graphic design. From this we can see that a multi-media slide design is the preference of the majority of learners (94%) in this research. The majority of respondents (96%) indicated the controls were easy to use, a finding which is in line with the Principles of Universal Design.

This combination of findings indicates that the virtual tutorials created using a rapid authoring tool (Articulate) do not pose significant additional barriers to the learning process across the range of learning preferences. As such these findings indicate that the virtual tutorials are compliant with the Seven Principles of Universal Design, most notably the principle of respecting diverse talents and ways of learning.

A key message from this research is the issue of user control in relation to slide navigation. Prohibiting the learner from determining the sequence of slide navigation not only frustrates the learner and thus negatively impacts their learning, but this practice also contradicts key learning's in relation to adult learning research, most notably Knowles' assumptions regarding the need for the adult learner to be in control of one's learning. However, it should also be noted that the current controls are considered by the majority to be easy to use and as such the physical act of manipulating the controls does not constitute a barrier for such respondents.

Another key message lies in the use of audio and graphics. While the majority of respondents reacted positively to both elements, over a quarter of respondents reacted in the negative to both elements. As designers, it is incumbent upon us to ensure that the audio and graphics utilised in tutorials are supportive rather than distractive of the learning process.

Recommendations

1. Control of navigation should be with the learner to maximize the learning experience for the learner.

2. A rigorous quality assurance procedure should be initiated to include the proof hearing of all Virtual Tutorials to ensure minimum background and static interference. A central location for recording audio could assist in eliminating deviances in audio quality.

3. A shift away from stock animated graphics is recommended to be replaced with appropriate photographs with a central repository of suitable photographs made available to all tutor designers.

4. All tutor/designers should receive instructional design briefings at least once per academic year. Such briefings should include virtual tutorials in line with those provided to students to afford teaching staff the opportunity to experience instruction in the same manner as that offered to students.

5. Encourage online group work to address the issue of learner isolation.

6. Learning preferences should be considered during the development of instructional materials

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