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One Size Fits All Learning Preferences - An Exploration of Rapid Authoring Tools

Niav McEvoy

Abstract

Virtual Learning Environments (VLEs) are increasingly being used by colleges and universities to deliver and/or complement traditional face-to-face courses. The range of learning technologies available for use within these virtual platforms is considerable, but how confident are we that these learning tools support the learning process for students? It is crucial that the learning tools utilised in virtual platforms do not cause additional barriers for the online and distant learner. This Survey research study is designed to determine if rapid authoring tools can meet the needs of a variety of learning preferences of adult learners. The study focuses specifically on the use of virtual tutorials, created using the rapid authoring tool Articulate Presenter 2007, to establish the learning preferences of the students as represented by Fleming's (2011) VARK model. In total, ten variations of the VARK learning preferences were represented across respondents, with the majority indicating a uni-modal preference in an online self-administered questionnaire. Overall, the majority of students responded positively 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 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 and as such, the range of technologies integrated in the delivery of courses. For this researcher, this shift in delivery is particularly evident within the work environment with the recent addition of virtual tutorials through articulate software being offered.

A key concern for any institution utilising VLEs and learning enhancement technologies is the issue of accessibility. Differences in learning preferences and the presence of a specific learning difficulty such as dyslexia can result in access issues for many learners. AHEAD, the Association for Higher Education Access and Disability, indicates that up to 8% of the population is affected by Dyslexia with over 50% of higher education students affected by the condition (Heelan, 2009) cited in Loftus, 2009). Statistics such as these raise the issue of accessibility as a source of concern; a recent study by Santarosa & Basso (2009) found that while proposals by the VLE Moodle conform to the regulations for web content, these proposals did not consider the requirements of people with special educational needs in their foundations for development.

Research Aim

This research is concerned with determining if Rapid Authoring Tools (Articulate Tutorials) can meet the needs of different learning preferences of students. The study explores if such rapid authoring tools (Articulate Tutorials) utilised by the college are indeed accessible and beneficial to all learners of the college, irrespective of their learning preference. Specifically, it investigates if such tutorials are supportive of the learning experience for all learning preferences or if it disadvantages any particular group/learning preference. It will be interesting to note if the virtual tutorials create any additional barriers for learners in accessing or benefitting from the course materials.

Literature Review

In Ireland an adult learner (mature student) is one 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, resulting in the emergence of the theory of Andragogy in relation to how adults learn. 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).

In addition to Andragogy, adult learning theory also incorporates the concept of Experiential Learning as posited by Carl Rogers. This theory considers that where the subject matter is relevant to the personal interests of the student, significant learning can occur; new attitudes or perspectives, which can threaten the concept of self, are assimilated easier where external threats are at a minimum; learners will learn faster where threats to the self are low; learning which is self-initiated is the most lasting (Culatta, 2012).

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, p.56) 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; this model 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, 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 & 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).

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 VLEs to complement, or form the basis of, their course delivery. The 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 which 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) which 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.

An accessible design strategy would see designers avoid the use of 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 (eLearning Minds, 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 (eLearning Minds, 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 & 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 Chickering & Gamson's principles, 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).

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 & 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 & Vieritz, 2007). 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, p.78).

Methodology

A Survey methodology was selected for this research, and it 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 p.106). The method of data gathering was 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.

Given that this Survey research draws on a quantitative design, the use of a probability sampling method would generally be considered ideal 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. A distinct advantage of this method is the reduced likelihood of missing a specific learning preference through the randomization process. A distinct disadvantage occurs if a large proportion of the population decides to not partake in the research which can impact on the ability of the researcher to make analytical generalizations (Lund Research, 2010).

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 the contact list was obtained through the *SurveyMonkey* online 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.

Virtual Tutorial Design

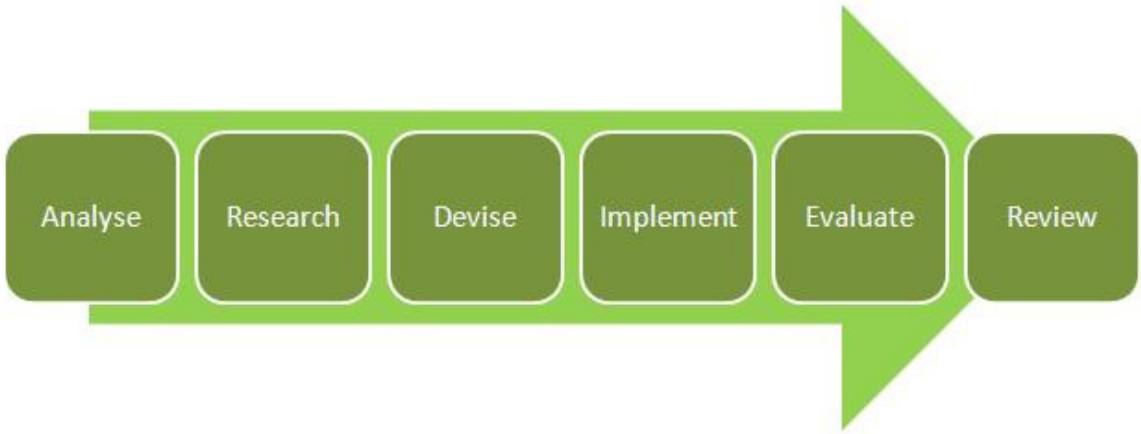

Figure 1 The ARDIER Model Used in the Study

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. The needs of the students were analysed to determine where support was needed the most.

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. 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, see Figure 2.

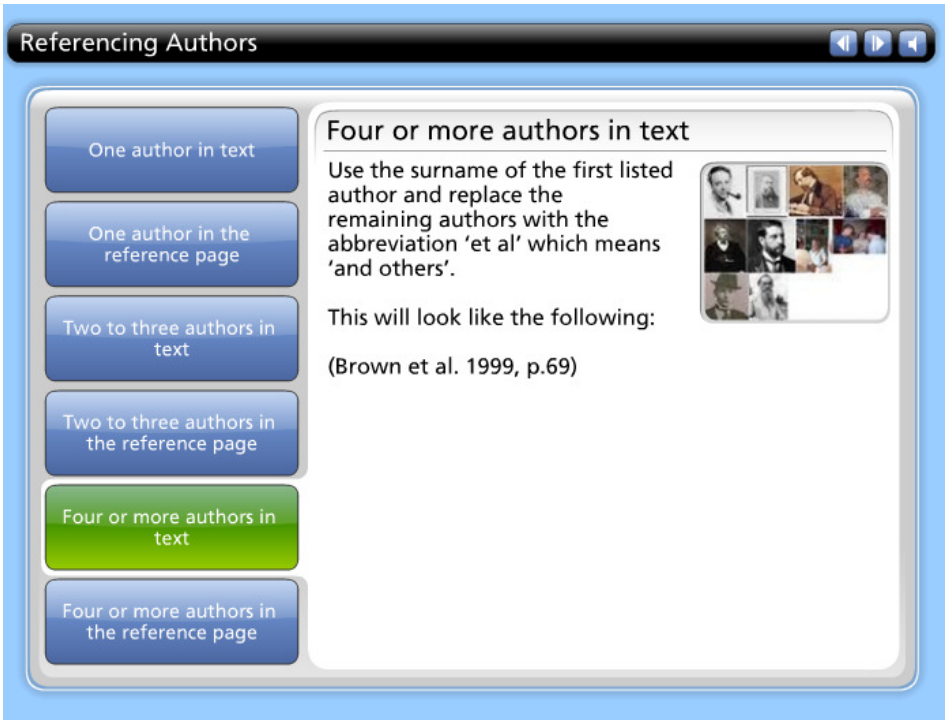

Figure 2 Referencing Virtual Tutorial

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. 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 sufficient benefit to the college. Previous reviews of the virtual tutorials were incorporated into both the module feedback and end of year feedback, though the numbers of questions concerning the virtual tutorials were limited. Based on the results from this current study, updates to existing tutorials to include more effective graphics and better sound quality will be implemented.

Results and Discussion

This research is 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 considers each element individually, with a final summative overview provided. The elements for discussion include learning preference, controls, graphics, audio and text. 59 (25%) of respondents commenced the survey with 50 (21.7%) respondents completing the survey. The demographics of the participants in relation to gender, age range, level of usage and computer expertise are outlined in the following charts.

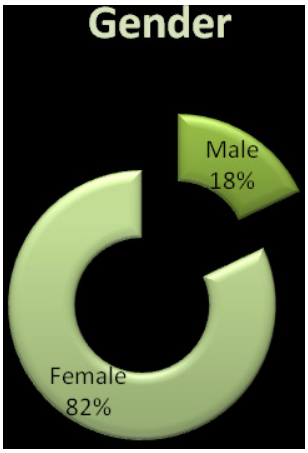

Figure 3 Gender Balance of Participants

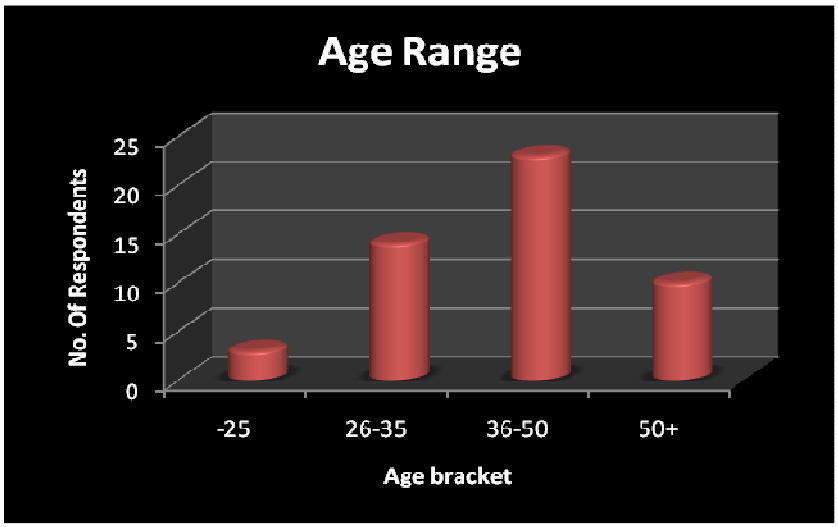

Figure 4 Age Range of Participants

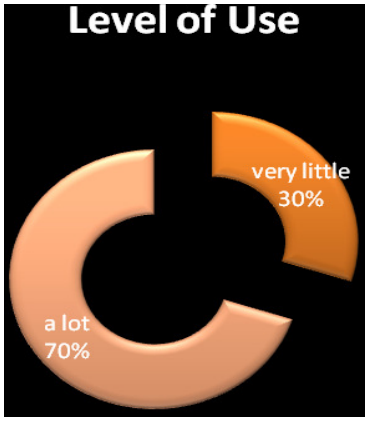

Figure 5 Level of Virtual Tutorial Use

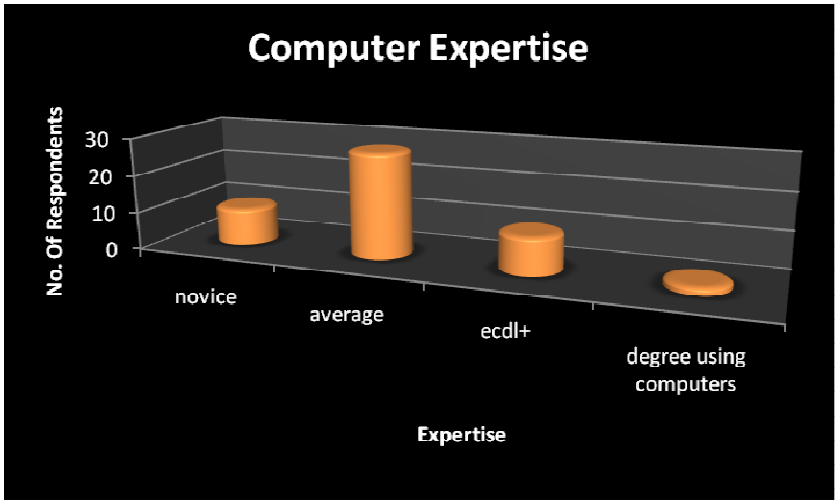

Figure 6 Computer Expertise of Participants

Learning Preference

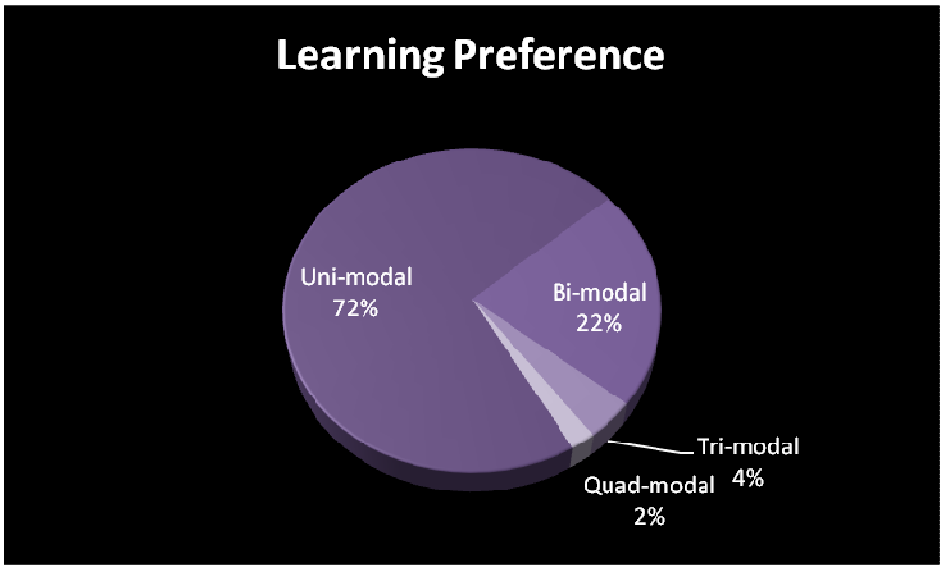

Figure 7 Learning Preference Indicated by Participants

In contrast to other research findings (Lujan & DiCarlo, 2005 and Breckler *et al*., 2008), the respondents in this study showed a majority in the uni-modal preference category. This finding also deviates from the statistics of the VARK database which reports that 60% of those who complete the online questionnaire show a multi-modal preference. 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, deviances in findings across different research projects is not unusual.

Controls

Given that the desire to be in control of one's' learning is a central feature of the adult learner, a key consideration 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. This research found the majority of students indicating that the controls were indeed easy to use.

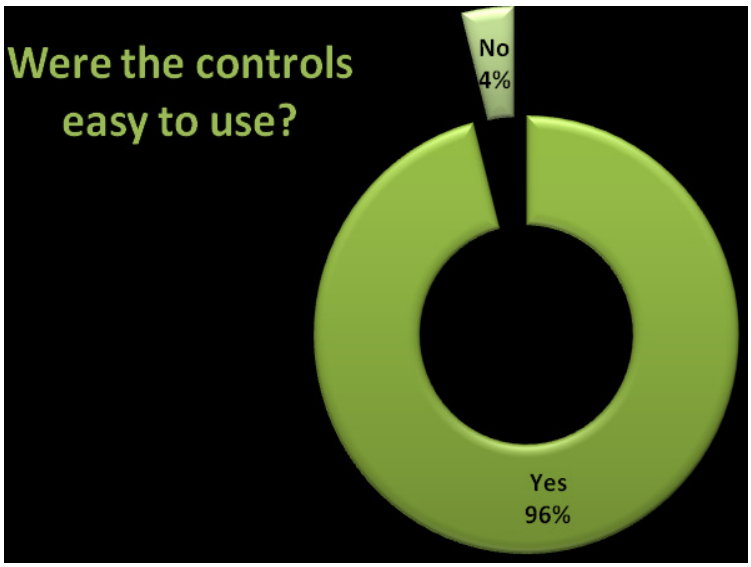

Figure 8 Ease of Use of the Virtual Tutorial Controls

In the design of the Virtual Tutorial, The Seven Principles of Industrial Design are key considerations, 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 ease of use of the controls was echoed across all the learning preferences as indicated in Figure 9. From this, one can surmise that the controls do not create any additional barriers for learners across the range of learning

preferences. However, it should be noted that best practice in relation to Instructional Design should be followed to ensure ease of use of the controls.

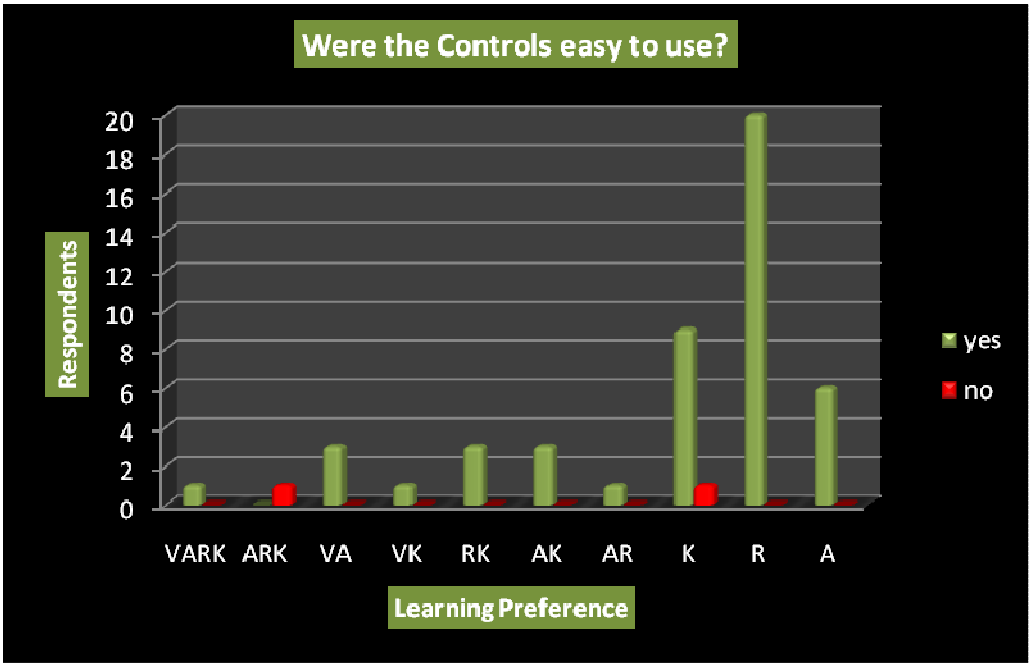

Figure 9 Relationship between Learning Preference and Virtual Tutorial Controls

Graphics

Graphics in the form of animations or pictures should complement the learning rather than distract the learner and be of high quality as indicated by Hove & Corcoran (2008). The current study found that the majority of respondents (74%) felt that the graphics helped them to remember the content as indicated in Figure 10. However, 26% felt the graphics did not help them to remember the content. This latter finding indicates that the current use of graphics requires further consideration to ensure such graphics are indeed visually enhancing and supportive of the learning material.

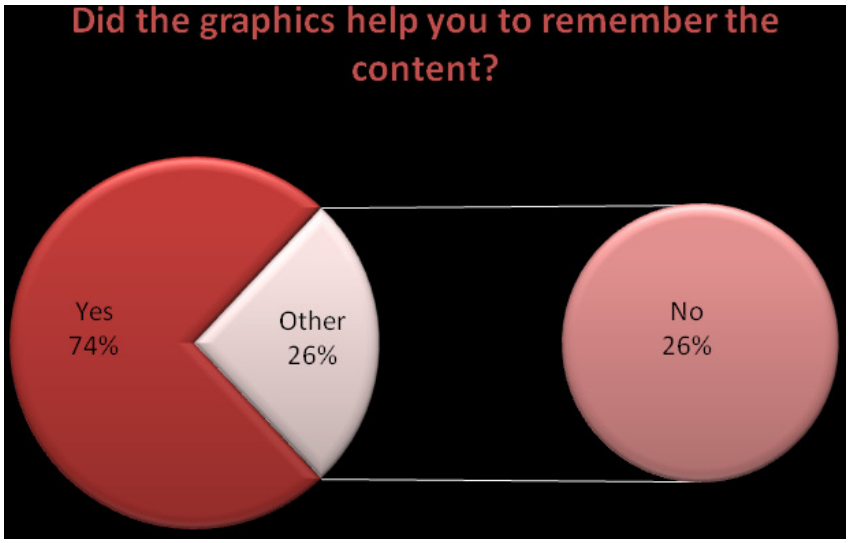

Figure 10 Influences of Graphics on Content Recall

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'*. The higher proportion of respondents who responded in the positive represented learners across the range of learning preferences as indicated in Figure 11. This overall satisfaction with the graphics indicates that the chosen tool is both effective and appropriate (Draffan, 2007). However, 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.

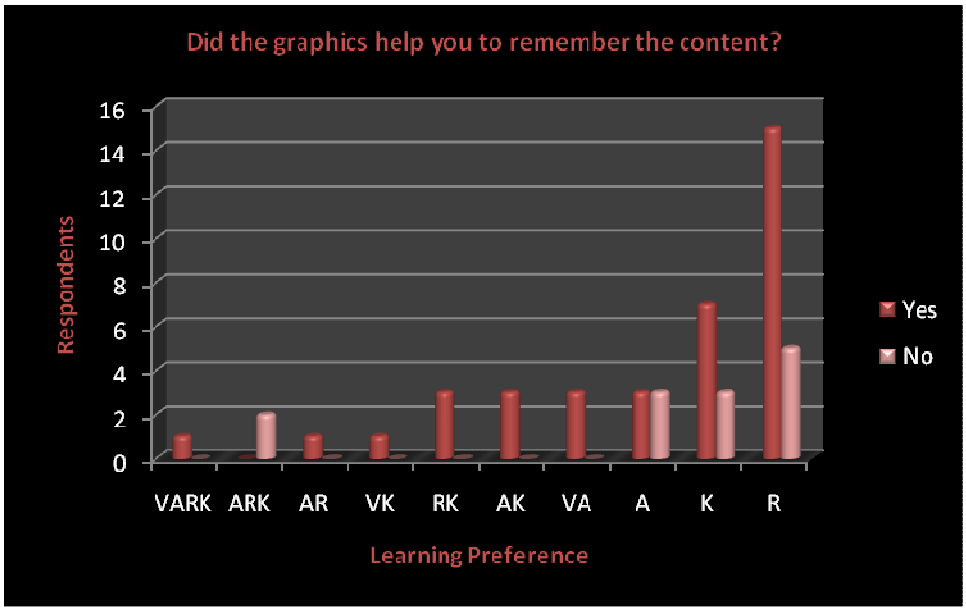

Figure11 Relationship between Graphics and Learning Preference

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 (Figure 12). This finding is consistent with best practice guidelines (eLearning Minds, 2011) which posit that audio should support the student in their learning.

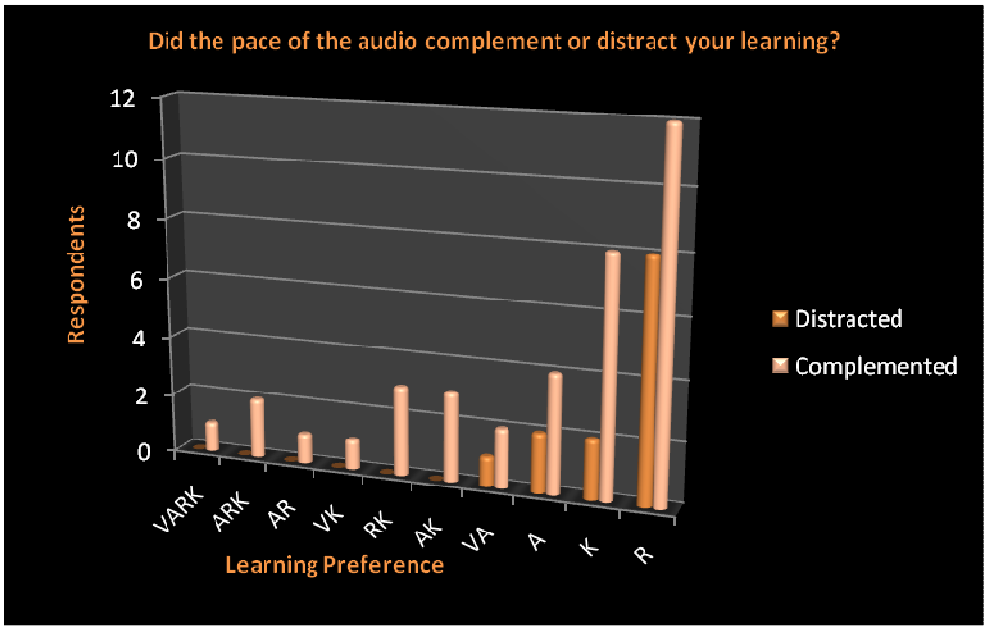

Figure 12 Impact of Audio on Learning

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. While the use of audio is primarily used to address the audio learning style, it can also serve to allow for *virtual contact between the learner and the educator* (Dillenburg, 2000). In this instance, the majority of respondents (44%) felt the audio lessened their sense of isolation with 26% saying it did not lessen their sense of isolation. 30% indicated this was not applicable, highlighting that 70% of respondents feel some sense of isolation in their chosen study model (Figure 13). While this sense of isolation is a result

of the study mode rather than the actual VLE or virtual tutorials, it is an issue which instructional designers need to be mindful of in the overall design process to ensure that that the learning experiences '*enables and enhances learning'* (Abbot, 2007).

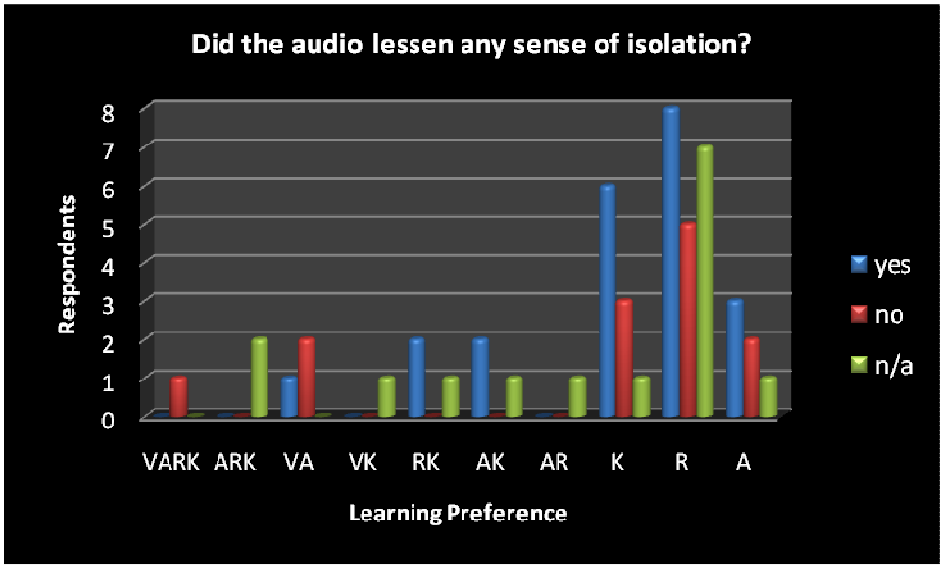

Figure 13 Influence of Audio on Isolation

An unanticipated finding in relation to the audio was a preference for a female voice over – there is currently no valid research available to either support or contradict this finding and as such further research into this finding may be warranted. 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. Is an issue that warrants further investigation to determine what the actual barrier is here and what practice needs to change to address this issue for learners.

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). This research investigated the quantity and relevance of the text utilised in the Virtual Tutorials. Figure 14a shows the majority responded positively in relation to the quantity of text used indicating that for the majority of respondents (and across all learning preferences) there was no barrier to learning attributable to the quantity of text used. However, given that reading text from screen can be up to 30% slower than from printed text (ibid), the finding that 10% of respondents felt there was too much text cannot be ignored. However, it is unclear if the learning process was hindered in any way for the 12% who responded in the negative. 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 which should be constantly monitored to ensure its continued effectiveness.

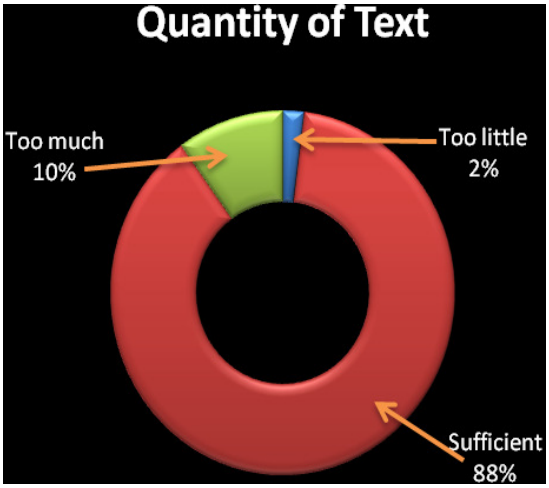

Figure 14a Perspectives on the Quantity of Text

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 (Figure 14b). Again, this indicates that designers of the tutorial, in adhering to best practice as previously outlined, are not causing any additional barriers to the students learning with the choice of text utilised.

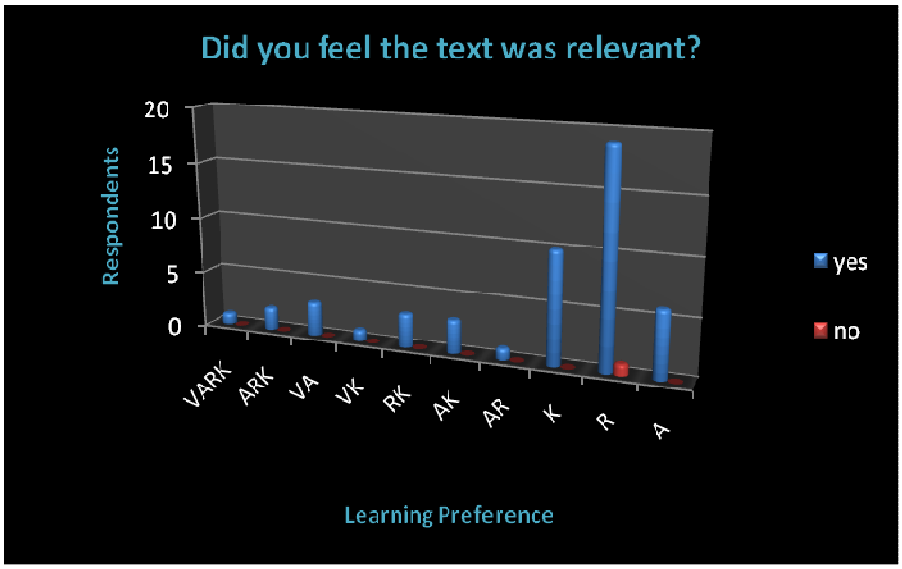

Figure 14b Relevance of Text

Overall Impression of the Virtual Tutorials

Overall, the virtual tutorials have been met with a general positivity from participants with the overall rating of the tutorials across the respondents in a clear majority (Figure 15).

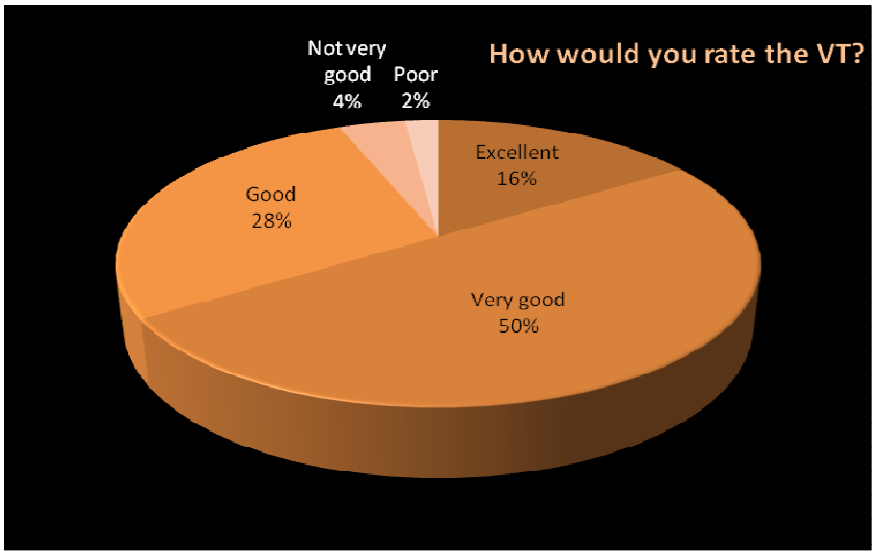

Figure 15 Rating of the Virtual Tutorials

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. Figure 16 displays the breakdown of slide design preference.

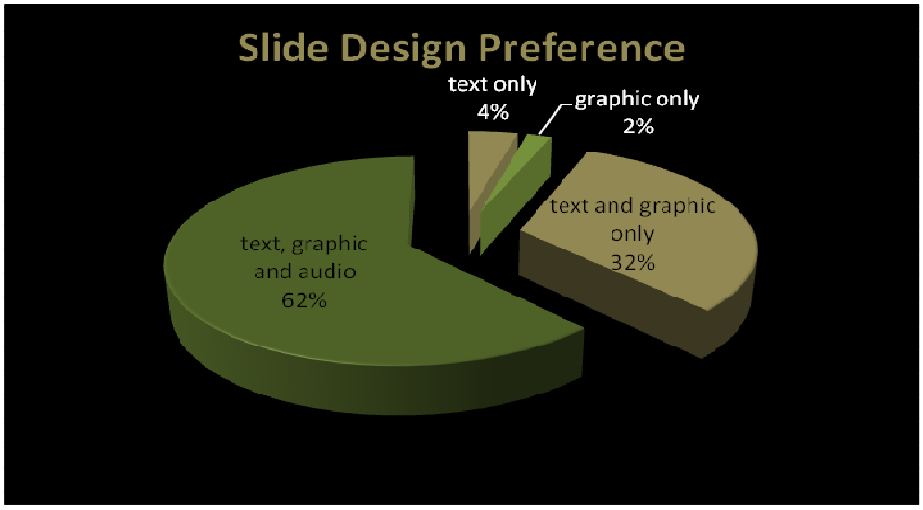

Figure 16 Slide Design Preference

From this we can see that a multimedia slide design is the preference of the majority of learners (94%) in this research. Figure 17 shows us that the majority of respondents are happy with the current design of the Virtual Tutorials and notes the areas respondents would change.

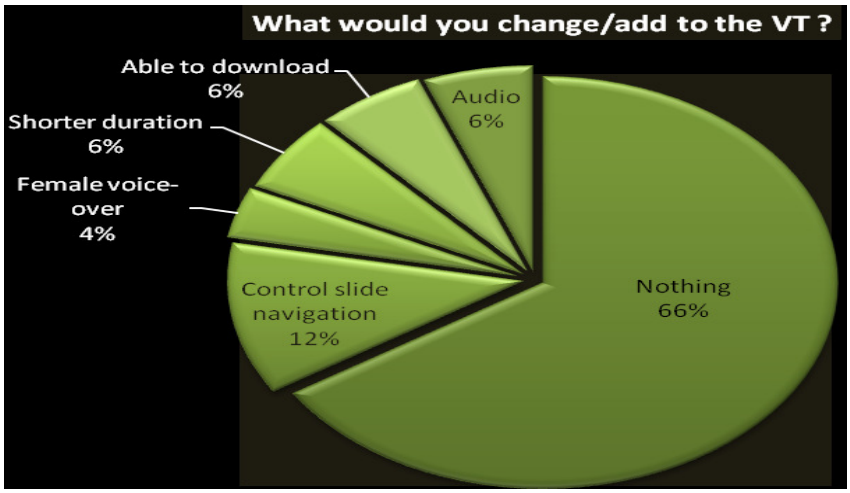

Figure 17 The Receommended Changes or Additions

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. 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 finding 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.

The significant consideration for any Instructional Designer is to adhere to best practice in the design of Virtual Tutorials. While the tool used to create the tutorial is important in terms of design features and usability, it is essential that the Instructional Designer draws on the available research into best practice and utilizes these in the design process. As designers, we need to be mindful that the design process can detract from the beneficial features of an authoring tool.

Recommendations

1. Control of navigation should be with the learner to maximize the learning experience for the learner. The learner should have control of the sequence in which they view the slides of the virtual tutorial. In relation to the quizzes, students should have control of the navigation, unless this negates an assessment process. In devising the virtual tutorials, the designer should ensure to check that this is enabled in the design process.

2. Audio quality should be to a minimum standard and a rigorous quality assurance procedure should be initiated to ensure this. This should involve the proof hearing of all VTs to ensure minimum background and static interference. A central location for recording audio could

assist in eliminating deviances in audio quality. In addition, the mute button should be made more visible to learners to accommodate those who do not wish to avail of the audio option.

3. The graphics utilised should be clearly representative of the text. Again, a rigorous quality assurance procedure should be implemented to ensure the appropriateness of all graphics. A shift away from stock animated graphics is recommended to be replaced with appropriate photographs.

4. All tutor/designers should receive instructional design briefings at least once per academic year. A designated section on the college learning centre should be made available to tutors where additional supportive materials can be uploaded. Such supportive materials 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. As 70% of respondents indicated that they felt some sense of isolation, tutors are well placed to address this issue through module assessment. The use of on-line teamwork and promoting a community of practice can greatly reduce the sense of isolation of students. In addition, encouraging students to upload a photo to their profile can 'put a face to the name' and as such lessen the sense of isolation. However, this researcher acknowledges that this latter recommendation has implications in relation to privacy issues.

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

Future Research

This research highlighted some unexpected findings which were beyond the remit of this paper. Some of the issues which warrant further investigation include the following:

- Use of female voice over in virtual tutorials and online tools.
- Further investigation into the isolation experienced by online and distant learners and effective ways to address and thus reduce and/or eliminate such isolation.
- Development of supporting documentation, e.g. instructor guides, FAQs, links to technical help for staff and students.
- Instructional design to encourage and support online participation among the computer novice online learner.
- Further investigation into the advantages of multimedia in online learning.

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