

A Digital Media e-Learning Training Strategy for Healthcare Employees: Cost effective Distance Learning by Collaborative offline / online Engagement and Assessment

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Abstract—Within the healthcare system, training and continued professional development although essential, can be effected by cost and logistical restraints due to the nature of healthcare provision e.g employee shift patterns, access to expertise, cost factors in releasing staff to attend training etc. The use of multimedia technology for the development of e-learning applications is also a major cost consideration for healthcare management staff, and this type of media whether optical or on line requires careful planning in order to remain inclusive of all staff with potentially varied access to multimedia computing. This paper discusses a project in which the use of DVD authoring technology has been successfully implemented to meet the needs of distance learning and user considerations, and is based on film production techniques and reduced product turnaround deadlines.

Keywords—DVD, healthcare, distance learning, cost.

I. INTRODUCTION

The genesis of this research project was established by problems associated with the introduction of new assessment procedures in the determination of child and adolescent psychiatric disorder. Healthcare professionals working in this field had developed a text based assessment tool which was under review and testing within the psychiatric community. Issues regarding access to clinicians for group assessment were not solely confined to the nature or appropriateness of the subject matter, but stem significantly from logistical and time constraints endemic in professional healthcare practice, as commented in [1]. The assessment of the tool, required individual and group sessions whereby the effectiveness of the questions used (normally within an interview session with the parent or carer of the child) could be discussed and rehearsed. However, the only effective mechanism for assessment was the use of transcripts from existing case interviews. The use of DVD media for group training sessions with the emphasis on a minimal technological and end user knowledge requirement, was seen as key to maximising structured assessment and adoption of new psychiatric diagnostic procedures, especially

where the subject matter requires the use of high quality video and audio materials. However, in order to effectively repurpose the same training materials for use as individual learning, the use of hybrid optical and online/ offline digital media structures can be employed, and thus deliver training and collaborative learning in a profession which suffers from increasing workloads.

II. BACKGROUND TO THE USE OF DVD TECHNOLOGY WITHIN HEALTHCARE EDUCATION.

An initial case study covered the development of a DVD title for healthcare professionals as detailed by Quinn [2] for general practitioners and diabetes specialist nurses, authored in conjunction with the pharmaceutical company Pfizer UK. Here the decision was made to use DVD as a means of allowing healthcare professionals access to learning materials at home and bypassing any need for computing or internet based skills, and the use of structured clear navigation as suggested by Koltringer [3]. Three patient interview scenarios were filmed, with the option to observe the actual consultation and then to repeat the same with an additional audio dub, highlighting the main points of the interview style and emphasis on the observance of body language. Three cameras were used in each interview to record the healthcare professional and the patient separately, with the third recording both participants. The ability to switch in editing between these views gave the interview a similar structure to that of a film sequence, and could also allow an option for the DVD user to switch between angles as the interview progressed. The interview was then viewed by the healthcare professional, who added a commentary which was dubbed into the original soundtrack, and offered as an alternative track on the DVD. Feedback from an evaluation period, showed that many users were in favor of the DVD delivery, the simple use of remote control interaction to access menu choices, structured navigation in terms of disabling some navigation options to avoid user confusion, and following a clear simple hierarchy of menu / track access, added to the ease of use of the product. The learning style was observational and influenced by association of audio input to match key visual clues during the interview. Included in the DVD was PDF and text based on screen information / graphics, as additional support, but not essential to understanding the main intent of the product. Figure 1 shows the structure of the DVD title and alternative viewing options.

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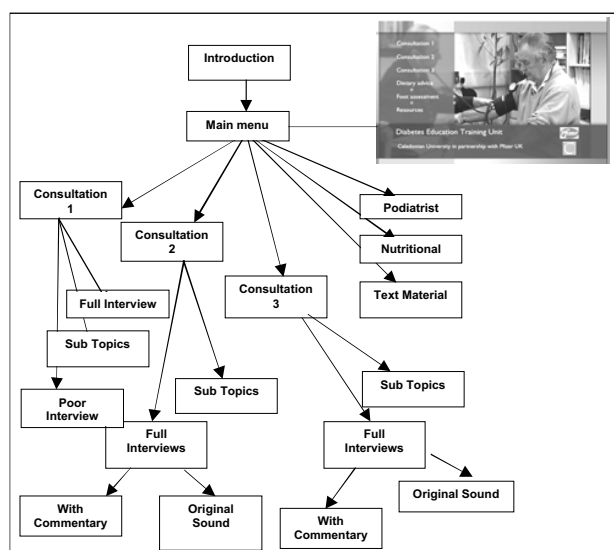


Fig. 1 The structure of the initial DVD project.

III. PASSIVE INTERACTION STYLE AND DVD METAPHORS

Current research seeks to explore the use of a highly directed form of on and off campus learning support, by using a linear / passive approach to content communication. In essence the materials generated for the initial case study, follows a structure biased to linear presentation and directed navigation. The basis for linear interaction and a highly dialogue structured approach is in part supported by anecdotal evidence from healthcare workers gained as part of the initial product development cycle, as to effectiveness of previous digital media training materials. Navigation, interface design, and issues of access to rich media (video sequences in CDROM materials) largely dependant on the individuals home multimedia PC specification, support for alternative platforms and operating systems (Macintosh), and technical support, were all cited as less than positive experiences of distance learning.

One of the goals of the research project is to realise material that will report higher levels of repeat usage than the use of CDROM or web materials. The use of DVD as the on/ off campus media element, has advantages in terms of the perceptions held by the user as to the content. With its strong connotations to television and film, DVD is ideal for a passive learning approach, but with interaction ability which can be either forced / structured or user controlled. It is worth noting that current DVD authoring systems can replicate many interactive features of CDROM based materials, discussed by Lynn [4], and can appear similar to that of the typical interface design encountered via multimedia presentations or web pages. However it is the ability to minimise the impact of on screen interaction, and the need to "learn the interface" which allows for a guided tutor led approach to retaining attention and promotion of a dialogue.

The metaphor and use of the phrase "DVD" as a vehicle for motion picture delivery, is firmly established in the mind of the public. This action of "watching" a DVD, supports it's use as a medium for directed learning unlike the interactivity presented to the user by a CDROM or web based structure. If we compare game styles on popular consoles to that of educational multimedia titles, and the observational (passive) interaction with DVD media, then it is not that constant interaction equals engagement or even learning. Interaction is one of the central tenants of the promotion of multimedia learning, however lecture based instruction still forms the majority of learning methodologies within formal education at all levels. Within game play, on one level, the interaction could be limited to a task based approach, the goal being to score points or attain access to each new level. On the other, games which are based around a narrative/story theme, whereby the user/player has to engage with concepts such as timeline, interaction with characters, character development, emotion, etc fall into the same arena as the motion picture or television series. If we compare time spent on console games titles (young adult males) that are based around first person viewpoint, and direct one to one interaction with plot characters, to that of time spent on any investigation based web or CDROM resource, it would be a safe bet that there would be considerably more investment and energies within the first example. Taking into account the entertainment factor of a console game, the nature of the game activity etc, this still leaves us with an environment which requires memory rehearsal (navigation in 3D space), solving puzzles, strategies developed over time to complete tasks, at the same time as possible high sensory input and motor skills output. The question this raises, is there also more opportunity for retained learning using materials which are constructed to suit the first person viewpoint, in the same way that television programmes in documentary style are edited and presented.

It is this shift in emphasis from content driven multimedia to that of film media that deals with attention span and engagement, that is core to the passive interaction approach.

IV. DVD AND HYBRID MULTIMEDIA SYSTEMS

One of the key benefits of the use of DVD media as the main instructional product is within it's ease of use (typical 5 button remote control access) and ease of device playback. In this mode, passive interaction takes place between the teacher/tutor and the pupil/student, by structuring the content as a dialogue based around chapters, with options for directed navigation embedded into the flow of the information. However if the same media is accessed within the education / workplace environment via a computer, then further interaction is made possible. Figure 2, shows the possible options for on and off campus delivery. In Figure 2, the student can access the content of the DVD in three modes. The first is the basic DVD player only mode, which will present the content within the limits of current DVD authoring. Secondly the user can access the DVD content via a Shockwave HTML multimedia structure by including an interface via HTML pages stored within the DVD (DVD-ROM). The final option is to access further content via the internet, which can be static or dynamic

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graph TD
    School[School] --- DVD[DVD Disc]
    Home[Home] --- DVD
    SchoolServer[SCHOOL SERVER  
Html / Flash content] --- Internet[INTERNET]
    SchoolServer --- SchoolAccess[Access via Computer & intranet / internet]
    SchoolAccess --- TVDVD[Access to TV DVD player]
    Internet --- DVDHybrid[DVD MULTIMEDIA HYBRID]
    DVDHybrid --- HomeAccess[Access via Computer & modem / web]
    DVDHybrid --- HomeDVD[Access via DVD player or Games Console]
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Creating an on / off campus support structure with DVD media

Part 1 - The technology

On Campus

The diagram illustrates an on-campus support structure. On the left, a server rack is labeled 'Server'. A line connects the server to a central 'DVD image' icon, which is a CD/DVD with a blue and white design. Below the 'DVD image' icon are two small icons representing 'VIDEO_TS' and 'AUDIO_TS' folders. A line connects the 'DVD image' icon to a workstation on the right, which is labeled 'Workstation' and includes a monitor, keyboard, and system unit.



Fig. 3 Examples of hybrid DVD interaction with multimedia applications an online media.

V. PRODUCTION OF DVD TITLE

Prior to the production of the final DVD product, a prototype DVD version was created for initial feedback and testing. This was based on a traditional design common to cinematic titles which utilised only a small subset of the potential interactivity offered within current software authoring applications. For the purposes of evaluation the menu and sub menu structures were contained within a two layer hierarchy used previously within a similar healthcare instructional title, (interface burden, Kappel [5]) in order that navigation tasks were not regarded as an issue for evaluation but rather the focus was on the media content. Figure 4, shows the prototype DVD structure. The main interview sequence during which a series of questions were asked of the child's parent / guardian was duplicated into 2 tracks one with a lower third graphic showing the correct scoring for each question. The intention was to ask clinicians to watch the interview and score each question from their own judgment, and then replay the interview to assess their performance with the scoring displayed. Figure 5, shows an example of the interviewer's question script from the text based assessment tool.

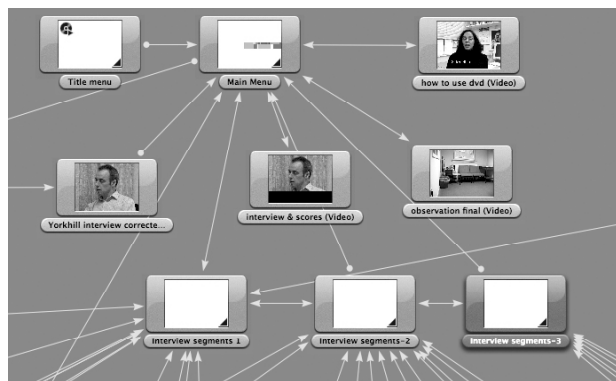


Fig. 4 Concept DVD structure.

Question 1: AVOIDS EYE CONTACT	
Interviewer	Okay I will just ask you a few questions. Do you think David avoids eye contact or do you think he has got good eye contact?
Mother	No, I think he has got good eye contact.
Interviewer	Right okay, so would he look you directly in the eye?
Mother	Yes.
Interviewer	Does this happen with everybody?
Father	Unless you are trying to tell him something.
Mother	Or he could be anywhere, but looking at you then.
Father	In every day life he has got very good eye contact, but when it comes to a point David could and before you

Fig. 5 Interview assessment tool & transcript.

A scene by scene menu similar to the scene selection structure found on movie DVD titles, was also added in order that the user could receive coaching as to what to look out for in each question and how to score the same. This feature served to explain the concepts behind the assessment process and provided a video glossary of each question for healthcare staff

new to the technique. Figure 6, shows end user's experience of using the DVD application.

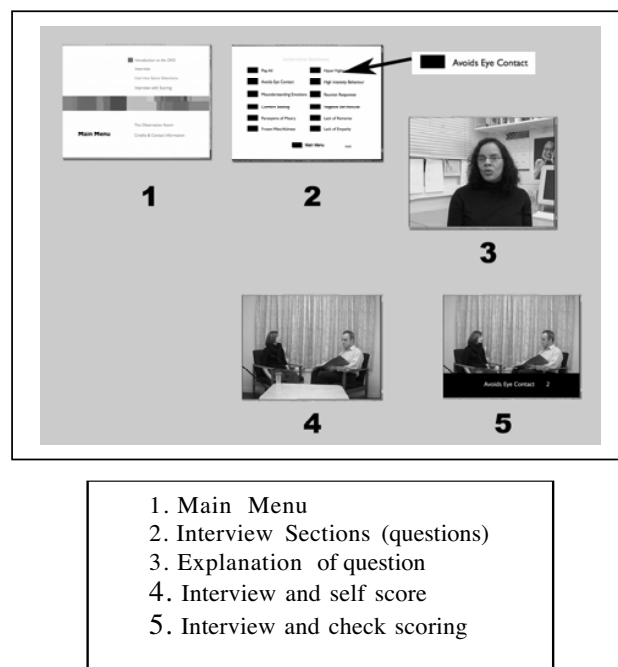


Fig. 6 User options.

VI. EVALUATION OF THE DVD PROTOTYPE

Generally there was the feeling that the DVD didn't provide a realistic representation of what parental interviews are like. There were comments that the conversation shown on the DVD between the clinician and the parent/carer seemed unrealistic. However all of the material used in the DVD was from real life examples taken from actual clinical interviews. Clinicians suggested that what might be more engaging and realistic would be an actual parent describing their child. They felt this would help to show the clinician's expertise in managing and teasing out answers. They also raised questions about whether the child would be in the room at time of the parental interview. This is something that commonly happens in a clinical setting but wasn't shown in DVD. There were comments that the parallel use of the DVD and questionnaire help show how questions could be asked. Only looking at the questionnaire on its own made the questions appear disjointed. The DVD helped the questions flow and seem relevant and provided comfort to the clinicians that there was some leeway in how the questions could be asked.

There was positive feedback about how the sections were divided up with glossary examples being given by the lead researcher at intervals in the DVD. This led to a sense of being guided through each question. Other positive comments included that the DVD was very easy to look at and listen to. Suggestions of other items which should be included in the DVD were an introduction about the topic, the research project and how the DVD can be used. For example one of the assessment tools involves an observation task which could be integrated more fully into the DVD.

Some though not all clinicians expressed a desire to practice using the assessment tool, either with the DVD example or with other clinicians, before using with families. The majority expressed feeling comfortable to start using it after the group training session. Clinicians put forward the view that it would be helpful to have another example interview or two on the DVD to rate before using in the clinic, therefore allowing clinicians to compare their own answers with the 'right' ones on the DVD. Often it was difficult to get feedback about the DVD itself from the clinicians as they were concerned about the workload regarding the research project itself. Or they had clinical questions about the symptoms highlighted in the DVD. Some teams that had been trained using the DVD are now using this with children that are not in the research study. Clinicians are finding the experience very useful in raising issues about this assessment tool and this particular child mental health problem. In order to address some of the issues above raised by clinicians and the research team a new DVD was commissioned, and is in the process of undergoing testing and evaluation.

VII. FUTURE WORK: ONLINE COLLABORATIVE GROUPS

Professional DVD authoring applications contain the ability to write program instruction scripts which any modern DVD player can interpret and process. Although there is limited capacity within the media player to store and execute programs, it is sufficient to allow for degrees of interactivity more recently seen on commercial titles such as interactive quizzes and special features within cinematic releases. A second disadvantage of incorporating extensive programming within a DVD title is that the code which sets different register variables within the hardware of the DVD player is only present during power up, as the majority of commercial units do not incorporate non volatile memory for storage.

A solution to these problems is to develop the DVD title as both stand alone product for playback via a DVD player, and to integrate the DVD media within a desktop multimedia environment and networking access to the web. This creation of a hybrid DVD, gives access to well established interactive programming which is both powerful and simple to construct, as well as adding unlimited additional information via web page links to overcome the static nature of optical media. Programming scripts and behavior libraries developed for applications such as Adobe (Macromedia) Director, and Flash can be employed within multimedia applications with limited programming experience. This type of hybrid approach to media presentation, can take advantage of dual layer interactivity, from both the interaction contained within the DVD title, and the overlay of a web / multimedia interface. Both these environments can interact with each other by connecting the video track / chapter timecode to trigger events within the web page or multimedia program. For example, during the interview sequence, the response of the clinician or the parent / child can be used to present additional information on screen, and if this information resides within a web environment, it can be changed over time by simple updating of the web site.

An identified issue for training within this sector of healthcare is the problem of group training due to logistical realities and staff workloads. Although the product can be used individually as a self study tool, interaction with other professionals is key to development of understanding and

skills. With the relatively recent popular growth of social networking sites, and established internet messaging tools, as well as browser specific group networks (Google Groups), a DVD title can be part of an interface within allows for real time communication. Figure 7, shows a suggested interface design for clinical discussion using a session facilitator, and a chat room messaging display panel with logged in clinicians. As each question within the assessment tool is covered by the DVD video clip, voting on the correct method of scoring is via buttons over the video window. Users will have a copy of the DVD present within their computer, which provides all of the high quality video media without any cost to bandwidth and online interaction.

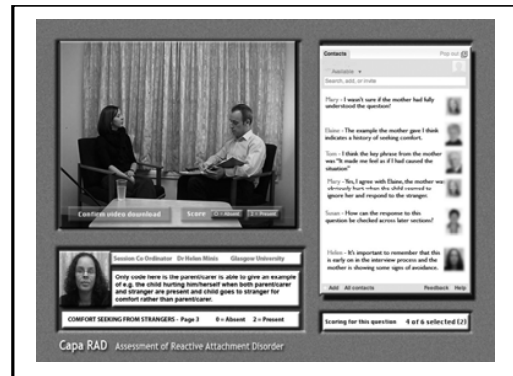


Fig. 7 Online simulation interface with DVD playing within the multimedia application.

VIII. CONCLUSION

The use of DVD media and the production techniques associated with film directing / editing and the generation of instructional media which follows dialogue driven design, is a highly inclusive form of e-learning development. Clients understand, and can easily participate within the production process, unlike other forms of multimedia creation. This has significant cost implications as the project time is reduced by virtue of enhanced client involvement. The communication of the clients business or research to the third party multimedia developer is facilitated by both accessing a common language and technology afforded by the DVD environment.

REFERENCES

- [1] Department of Health (UK) (2001), "Working together- learning together, A framework for lifelong learning in the National Health Service". London Department of Health.
- [2] Quinn, P., "Producing a DVD for use in Diabetes Education" Computers and Advanced Technology in Education, August 2004, Kauai, Hawaii, pp 516-521
- [3] Lynn, J, Harrison, D, Cheng, K, "Digital Versatile Disc Technology: A cost effective delivery mechanism for interactive technical documentation systems" 12th International Conference on Management of Technology, IAMOT 2003, Nancy, France, pp 34 (abstract), ISBN: 0-9712964-5-6.
- [4] Koltringer, T, Tomitsch, M, Kappel, K, Kalbeck, D, Grechenig, T, "Implications for designing the user experience of DVD menus", Conference on Human Factors in Computing System, 2005, Portland, USA, pp 1566-1568, ISBN: 1-59593-002-7.
- [5] Kappel, K et al, "Developing user Interface guidelines for DVD menus", Conference on Human Factors in Computing Systems, 2006, Montreal, Canada, pp 177 - 182, ISBN: 1-59593-298-4.