CAN AVATARS REPLACE THE TRAINER?
A case study evaluation

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Abstract: E-learning implementations have become an important agenda item for academic and business institutions as an enabler to complement their education and training needs. However, many of the existing e-learning systems, present several limitations such as them being static, passive and consisting of a time-consuming set of services. This has highlighted the need for functionality, which allows more creativity, autonomy, and flexibility on behalf of the learner. The inclusion of avatar technology in e-learning environments has been of growing interest, aiming to encourage the learner to become more engaged and motivated whilst augmenting the use of human trainers. However, the empirical investigations on the effect of animated agents in teaching and learning has revealed diverse results in a continuum from avatars being helpful to them being distracting. This research has evaluated the utility of avatars. Unusually, the research has chosen a qualitative, interpretive approach with supporting case study data as the chosen research methodology. The justification for this research approach will be made and the initial findings will be presented together with a proposed conceptual framework.

1 INTRODUCTION

Computers and electronic media are key to today's learning environments and have been widely used to support teaching and learning (Somekh 2000). E-learning implementations have received a growing exposure with many academic and commercial organisations utilising them to support strategic initiatives regarding the effective delivery of their educational systems. E-Learning approaches have brought in great benefits to the whole educational domain (Sun, Williams et al. 2003). For the academic institutions, e-learning is viewed as an important tool to help them offer educational and administrative support that is accessible, user-friendly and responsive to the learners. This flexibility is assumed to benefit both the learners and the institutions in many ways such as learning at the learners' pace (Honey 2001; Picciano 2002), saving on travelling and hotel expenses.

This paper will examine the application of avatars, computer representations of users, in e-learning environments (Murch and Johnson 1999).

The research aims to provide additional insights into the learners' views and values of avatars in the e-learning environment, by using a qualitative approach, which may produce additional insight into users' perceptions and requirements of avatars. The underlying epistemology for this research has been interpretivism, and the focuses has been on the complexity of human sense making as the situation emerges (Kaplan and Maxwell 1994). It is hoped that the outcomes of these phenomena will be useful to the practitioners and researchers of courseware and avatar development. These will be in the form of a synthesized contribution of rich insight of phenomenal events leading to a proposed framework or of guidelines for avatar design and implementation in e-learning environments. In addition, the research aims to enrich the awareness of factors affecting e-learning effectiveness and demonstrate the value of research using interpretive analyses in the Information Systems (IS) field.

The paper is structured as follows. It begins with a brief introduction of e-learning and avatars, followed by the research method and design. An

illustrative set of research findings are then presented using an interpretive, qualitative case study followed by a brief discussion. The paper ends with proposals for future research directions.

2 E-LEARNING TECHNOLOGIES

E-Learning has been defined in many different ways, one of which learning using the internet as well as other forms of electronic media (Rosenberg 2001; Fallon and Brown 2003). It is claimed that this flexibility lets the courseware be delivered to the learners in a way that is most suitable for their learning style, time and place of preference (Rosenberg 2001). E-learning systems are a collection of tools for online courseware presentation with various optional customisation capabilities (Fallon and Brown 2003). Agent technology – both embedded within the technology or embodied as an avatar representation - has been proposed to explore the possibility of releasing the instructor's time and assisting the learners with specific learning needs (Jafari 2002). With avatars, it is expected that learners will be able to interact visually with emotional context and state, simulating continuous instructor presence in e-learning environments (Fabri and Moore 2002). Whilst this is a prime intention for incorporating such technology, to some learners, animation is annoying; for example – flashing graphics, like Clippit™ available in Microsoft Office, may divert attention from the content of a page and hence hampered the learning process (Dehn 2000; Bouras and Philopoulos 2001; Tversky, Morrison et al. 2002). In addition, some commented that they are lacking in pedagogical value, for instance, there is no clear evidence that they can enhance the flow of communication (Dehn 2000; Moundridou 2002). As such, the incorporation of avatars in e-learning systems and their contribution to the efficiency and effectiveness of learning continues to be an open research agenda.

3 RESEARCH METHODOLOGY

The research on the effectiveness of e-learning in general and avatars in e-learning in particular, is relatively new, and very little is known about their effectiveness compared to traditional classroom education (Piccoli, Ahmad et al. 2001). The researcher is interested in understanding the meaning, values and views of the learners with respect to avatars, namely how this technology makes sense to both the learners' learning experiences and the lecturers' teaching practices which will lead to a description of patterns or themes relevant to this study. Since this research focuses on the use of avatars by the learners and instructors in a single case study, the setting for this research is a specific social interaction between them rather than the examination of a social situation or community over time (Miles and Huberman 1994). The fundamental nature of this research study is interpreting human action and perceptions, and the researcher acknowledges the need for an epistemological and methodological approach that is interpretive and qualitative in order to explore and understand the situation through a case study. This research focuses on the complexity of human sense making as the situation emerges and attempts to understand phenomena through the meanings that people assign to them (Walsham 1995). Interpretive research can help IS researchers to understand human thought and action in social and organizational contexts; it has the potential to produce deep insights into information systems phenomena including the management of information systems and information systems development (Klein and Myers 1999). Empirical studies, which collect data on stakeholder views, can be broadly classified as 'interpretive case studies'. Qualitative methods of data collection, which involved in-depth interviews and participant observation, have been used, and the hermeneutic mode of analysis has been applied to the data.

The research site, which took place in July-August 2003, was at the private University Technology PETRONAS in Malaysia, where an e-learning facility has been established. The users were familiar with avatar technology such as Microsoft Assistants including Genius™, FI™ and Clippit™ which were installed on every PC in the campus as their personal assistant should they face any difficulties in using the applications. In addition, some of the interviewees were even more advance having interacted and explored this technology by installing avatars of their choice on their own PC or laptop.

The data collection tasks were conducted with appropriate preparation and strategy to ensure efficiency and validity. In-depth interviews were the primary data source in this study, additionally meetings, direct observation, and documentation were used. The guidance, as outlined by Walsham (95) on the nature and method of conducting interpretive case studies in IS research was a useful reference point especially when conducting the

empirical work and generalizing from the interpretive research (Walsham 1995). An interview template was constructed as an instrument to guide and maintain the discussion. In most cases, active interviewing as suggested by Holstein was assumed with the researcher furnishing precedence, incitement, restraint and perspective as the interview proceeded (Holstein and Gubrium 1995). The aim was not so much to capture the representativeness of the population but rather to continuously solicit and analyze representative horizons of meaning centered on the "hows" of meaning as well as the "whats" of interviewees' experiences. Twenty-six interviewees were involved in twenty-one separate sessions. The interviewees were asked to give feedback on their comments and some of the statements from certain interviewees were presented to other interviewees to obtain their reaction. Figure 1 shows the details of the interview activity that took place.

Number of interviewees	26 (14 Undergraduate, 6 Post Graduate and 6 lecturers)
Length	1 – 2 hours
Number of sessions	21 (18 single interviewee sessions, 3 multiple interviewees sessions)
Type of interview	Informal with mixed of and unstructured and semi-structured interviews.
Techniques of interview	Open ended and close-ended questions derived from the research questions.
Location	University meeting room.
Setting	Audio and video facility for recording purposes and demonstration of avatars

Figure 1: The Interview Activity

During the data analysis phase, transcriptions of the interview data were coded by categories based upon the researcher's interests, the existing literature on e-learning environments, and impressions gained during the interviews themselves, which arose out of the data. As highlighted by Walsham (Walsham 1995), "*Interpretive researchers are not saying to the reader that they are reporting facts but rather they are reporting their interpretations of other people's interpretations*" (p.109). In addition to the guidelines by Walsham, Klein and Myers proposition of a set of principles for conducting and evaluating interpretive case studies in information systems were used to guide this study (Klein and Myers 1999).

4 CASE STUDY FINDINGS

The research presents a detailed analysis of avatars in e-learning environments by case study, it highlights a number of key findings but only one aspect, namely the roles of avatars is partly

presented here. Figure 2 shows a role-ordered matrix, which highlights the users' view of potential different roles that could be taken by avatars, which may benefit them in e-learning environments. Paraphrases, which incorporated both the positive and negative issues, were developed.

Traversing the columns of the matrix, beginning with the lecturers' column, the lecturers who used this technology suggested that they were willing to delegate the laborious, "low risk" tasks like searching for academic and administrative information and replying to none crucial e-mail or phone calls to avatars. They were of the opinion that existing avatars could play a greater support role in e-learning so as to allow them to spend their time undertaking more valuable and quality activities such as research, consultancy and supervisory tasks. On the other hand, there were some issues raised by the lecturers who were quite reluctant to recognize certain potential roles of avatars. They perceived that such avatars pose a potential threat to their teaching career and might affect their social lecturer-student relationships. Others felt that this technology was troublesome, time consuming and merely a cosmetic, which will not simplify the already heavy workload. However, should this technology be developed to complement and enhance the role of the lecturers, the avatars' roles may be considered as beneficial, provided that their expertise was well protected and their style and mode of teaching were within their control.

Moving across to the postgraduate column, the learners call for more roles to be played by avatars namely the roles of both lecturer and advisor. However, these roles emerged with a condition that the avatars are able to serve them effectively and efficiently, not merely by their being attractive, expressive and human. One of the interviewees commented "*To me when I look at MS Clipper, it is just like any other icon and I don't really care how it looks. The most important thing is whether it can fulfil my requirement. If it can't, no matter how good it looks, I am not going to use it. Look is not important – it is the practicality, speed and quality of response that count…*"

Moving on to the undergraduate column, the need for avatars to assume additional roles such as student counselor and lecturer was highlighted. It was proposed that these roles would help them overcome feelings such as shyness and inferiority, by engaging with a more open, informal environment - one of virtual communication with the avatar. This group views avatars optimistically and looked forward to more assistance and guidance through this technology in the near future. Similarly, as with previous groups, it is the quality of the services that

Avatar Roles	Type of Users		
	Lecturer (6)	Post Graduate (6)	Under Graduate (14)
Personal Assistant (PA)	Pros: Routine laborious tasks. Answer the FAQ. Issues: Don't 'over ruled me'	Pros: Search material in a more efficient way Issues: Prompt & effectiveness.	Pros: Quite optimistic and look forward. Issues: Accurate search engine based on my interest.
Tutor/ Demonstrator (PT)	Pros: Explain in different ways. To complement me in my absence. Issues: nil	Pros: Useful when learning new software Issues: Not impressed by looks but service.	Pros: 24/7 service, interactive, guiding assignments" Issues: Sustain the learner's interest.
Lecturer (L)	Pros: Help new lecturer Issues: Will be a threat. Can't beat F2F.	Pros: Able to get quick advice. Issues: Work for kids, but not adults.	Pros: one to one. May overcome shyness Issues: Social ability.
Counselor/ Advisor (C)	Pros: nil Issues: May sacrifice student-lecturer relationship	Pros: Advice on general research matter Issues: Experience count.	Pros: Advise on career opportunity & personal matter Issues: Knowledge first then appearance.
Peer (P) Buddy	Pros: nil Issues: nil	Pros: nil Issues: nil	Pros: Companion when lonely Issues: nil
Enter- tainer (E)	Pros: Nice when get bored Issues: nil	Pros: nil Issues: nil	Pros: nil Issues: nil
PA = Searching for academic information, reminder, reply e-mail. PT = Tutoring, error identification, demonstrate, experiments. L = Q & A, clarification, conceptual & motivational discussion etc. C = Give advice on the academic matters. P = Quick confirmation/reference, social chatting/discussion. E = Virtual entertainer during free hours – relax			

Figure 2: Role Order Matrix

matter to them most rather than the look. One of the interviewees stated *"To me the main thing is efficiency, because I don't judge a book by its cover. If it has a good look but it does not give any learning benefit, it is good for nothing. The first priority is the efficiency, then come the graphics."*

Moving down the table to focus on the various potential roles of avatars that emerged from the interviews, as mentioned above, the interviewees are generally more concerned with quality of service for

each role rather than the graphical look of the avatar's representation in the e-learning environment. The users cross-referenced quality of service to information usefulness, details, currency (up to date), accuracy, response time as well as the presentation of lessons to the users. One of them stated, *"To change the representation cosmetically, won't help, whether the representation is in 3D or 2D, Caucasian or Asian look…it makes no different. It's the quality of help that is important."*

When questioned further about the graphical look of the avatar representation, the cultural influence on look and feel was not of primary concerned, no preference was identified Asian or Caucasian characteristics. In addition, an avatar's presence should add value to the learning process by improving interaction and simplifying steps towards understanding the subject matter faster and more easily. When asking about the social personality of avatars in assuming their roles, the users expressed a desire for avatars that used a more informal, friendly language, communicating at the intellectual level of the user, again taking into account the user's profile and preference. The users, nevertheless, will not treat avatars as humans even though they incorporate elements of social characteristics such as the ability to communicate through voice and emotional facial expression. Avatars are perceived as a tool for learning and will remain as a "machine" despite the social features embedded within them.

5 DISCUSSION

The key findings of the interviews showed that users prefer to have interactions with avatars and their various supporting roles; unique user profiles were the key to avatar acceptance; avatar service quality is of utmost importance. The aim of this paper was to explore the users' views of the role of avatars in supporting e-learning environments. The results have shown that the interviewees' views vary with respect to the roles of avatars and that they were not driven by technology sophistication. Avatar personae whether male or female, Asians or Westerners, 2D or 3D, human or caricature were of a secondary importance. User requirements also focused on the quality of service that the avatars could offer - they would vary according to the users' profiles.

The above essentially explains why there exists the diverse views of animated agents in teaching and learning which is in a continuum from avatars being helpful to distracting as found in various empirical investigations (Dehn 2000; Bouras and Philopoulos 2001; Tversky, Morrison et al. 2002; Baylor and Ryu 2003). Distraction and annoyance was caused

by the inappropriate roles and behaviour, which has lead to the rejection of avatars by some users. Should the role and behaviour be appropriate, taking into account the users' profile, the result would probably be more conclusive as to who rejects or accepts avatars and why. Hence, from then on detail fittings of avatars could be incorporated according to the users needs and preferences. This paper proposes a conceptual framework of avatars' "chemistry" in e-learning environments, integrating the three key elements that emerged from the above findings namely the avatars' roles, service quality and user profiles, shown in Figure 3.

The three-axis circle in the middle depicts the three core elements mentioned, each with its own attributes. The first is the roles taken by avatars, as highlighted in the previous section, which outlined the six relevant roles of avatars in the e-learning environment. While these roles were vital in this case study as viewed by the interviewees, they were by no means final and absolute as they only emerged from this single case study. Additionally, these roles vary in their degree of relevance and usefulness, which very much depends on the user needs. Nevertheless, the inclusion of these roles in the framework will facilitate the development of appropriate avatars that may serve the user. The framework uses hexagons to represent the six roles of the avatar, as the symbol allows for future expansion without difficulty in the event that more roles may emerge or be eliminated as the study is undertaken.
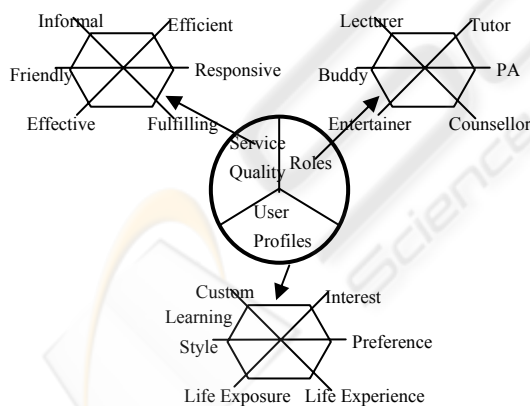

Figure 3: A conceptual framework of avatars' "Chemistry" in the e-learning

The second element, namely user profiles, comprise of users' interests, preferences, life experience, learning styles and customs, all of which are unique to an individual learner that has made his learning experience a personal journey. Over a period, the learners develop the ways they prefer to receive, process and present information and ideas,

known as their learning styles (Ayre and Nafalski 2000). For instance, some people find it easier to understand a new concept by reading a textbook, whilst others prefer a verbal explanation. Likewise, people may vary in how they most effectively demonstrate their understanding whether graphically, verbally or in writing. The matured formation of this learning style has then become a custom in that it influences the learner's interest and preferences. All these factors are usually within contexts that need to be accounted for and have been identified as parts of the avatars' elements. Again, these factors were by no means final and comprehensive as they were only discovered from this single case study.

The third element, which is no less important, as identified in this case study, is the service quality of the avatars in the e-learning environment. This element, which appears in many research papers (Dehn 2000; Baylor and Ryu 2003) as quantitative measurements, has continued to be an essential element comprising of efficiency, effectiveness, responsiveness, friendliness, and the informal-casual personality as well as a fulfilling service that the avatars could offer. Even though this case study did not measure the elements quantitatively, the learners mentioned them in a number of instances during the interview indicating that they continue to be imperative. Nevertheless, it is believed that discounting the first two elements within this framework would not make the avatars capable of satisfying the users' needs.

There are a number of implications arising from the above framework and two of them will be highlighted here. At the individual level, recognizing the varying needs and expectations of the learners makes avatar development very challenging for the future. Avatars should be designed in such a way that they are highly adaptive, flexible and customisable in order to suit the learners' needs, preferences, styles and customs. The lecturers' needs would have additional challenges, one of which was to complement and to assist the lecturers inside and outside the classroom settings. This would certainly be a unique situation for each lecturer who would expect different level of assistance at different times driven by the needs of the learners. This three-way relationship would be an interesting research opportunity and challenging tasks lie ahead for avatars' design and development in this area.

At the organizational level, organizations that have a vision towards embedding this technology in their e-learning environments, should take into consideration their overall e-learning goals and strategies regarding how much this technology delivers value to their business. Ultimately, the organization may look from an IS quality

perspective in order to value the worthiness of this innovation with respect to the overall organizational value systems so as the benefits of this innovation can be thought-out. The notion of IS quality as proposed by Vidgen and Wood-Harper would be appropriate to these situations to place emphasis on user views of quality on top of production views of quality (Vidgen, Wood-Harper et al. 1993).

6 CONCLUSIONS AND FUTURE WORK

This paper addresses the roles of avatars, which has emerged from a case study investigation. The roles of avatars have been presented as a supporting tool to enhance e-learning services to users. Avatar services have been explored with the aim of evaluating the more advanced features available to e-learning users. Exploiting the characteristics of avatars, such as autonomy and social ability is likely to fit well within an overall e-learning framework. Moreover, the quality of interaction and services are expected to be more interesting to the users which may lead to effective and efficient learning provided that the agents behavior or interaction are based on user profiles. Full exploitation of avatar technology is expected to increase user satisfaction. This paper has also demonstrated that a qualitative, interpretive approach utilizing in depth case study analysis as the chosen research methodology was able to help the researcher to explore and understand the users' views on avatar roles, both socially and culturally in e-learning environments. The future work is directed towards the full implementation of avatars in e-learning environments but many prerequisites have to be explored as avatar interaction involves not only technical challenges but also requires study of the psychological, social and cultural backgrounds of users.

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