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The Human Computer Interaction Issues Associated with the Creation of Personalized Role Playing Simulations

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ABSTRACT
The human computer interaction issues associated with the creation of personalized role playing simulations are discussed in this paper. This paper is aimed at those who are interested in building authoring applications which enable educators to build role playing simulated e-learning resources to use with their students. One of the main issues which have come to our attention is that many learning designers and educators do not understand what exactly it is we are trying to achieve by creating personalized role playing simulations. Also, how to gauge the pedagogic merits which can be achieved by using these e-learning resources. Potential users require guidance on the most appropriate uses for this authoring application. The provision of exemplars of use of such personalized e-learning activities would assist potential users in creating their own role playing simulations. Other issues which are to be addressed in authoring applications for creating personalized e-learning activities are: documentation; training materials; preview mechanisms; integration; usability; and the use of clear and relevant terminology. Human acceptance is paramount to the effective use of educational software which is designed to facilitate the creation of personalized e-learning resources. In conclusion, if the realization of an authoring application for creating personalized role playing simulations is to be achieved the following issues must be resolved: relevance to the learning experience; efficiency in production; and improvements in the human computer interaction.

Categories and Subject Descriptors
C.0 Computer System Organization: software interface

H.5.2 User Interfaces: Training, help and documentation; user-centred design.

General Terms
Documentation, Design, Human Factors, Language

Keywords
Personalized learning activities, role playing, simulations, human computer interaction, learning, training, e-learning, technology enhanced learning, usability, evaluation.

1. INTRODUCTION
This research reports on early user evaluations of an authoring application for creating role playing simulations and the human computer interaction issues associated with the use of these authoring applications. The objective of this research is to design a human computer interface to facilitate effective interaction by non-technical authors when creating personalized role playing simulations for use by their students. Sonwalkar [16] claims that personalized learning resources are required to increase the effectiveness of technology enhanced learning. Role playing simulations are suitable for use when teaching students, training workers and other groups in society who wish to learn new skills. For example, role playing simulations would be suitable for teaching the card game of Bridge to elderly or retired people. These simulations could also be used in the training of non-technically competent people in the use of mobile devices.

2. METHODOLOGY
The research and development of an authoring application to enable the creation of adaptive simulations was undertaken as part of GRAPPLE which was an EU FP7 STREP funded project [8] part of which was conducted in the Knowledge and Data Engineering Group, Trinity College Dublin. The evaluation of the authoring application was conducted by a research member of the same group who was not involved in the development of the application. Participants feedback on the human computer interaction issues observed with this application are reported in this paper. And, some suggestions are proposed with respect to improving the human computer interaction of this authoring application.

Prior to the evaluation taking place two seminars of a half hour duration each were provided, firstly, to introduce the functionality of the application and secondly to discuss the pedagogical rationale. Subsequently, each participant spent two hours in total testing, evaluating the application, and answering the questionnaire provided. The questionnaire is available as part of the GRAPPLE deliverable: Refinement and Improvement of Evaluation Guidelines [17]. Ten participants evaluated the authoring application six of these had teaching experience.

3. MOTIVATION
Role playing simulations provide educators with an alternative teaching resource for presenting course material to students in a non-life threatening and safe environment. The motivation for this study is to create a user friendly interface for educators to create role playing simulations by identifying the human computer interaction issues associated with the creation of role playing simulations in order to improve the usability and effectiveness of

such authoring applications. Følstad and Knutsen [6] claim that the early involvement of potential users in the design stage of an application can alleviate the requirement for costly redesign and redevelopment. Gena and Weibeizahl [7] suggest evaluation can provide useful feedback for subsequent redesigns.

Virvou and Manos [18] claim human acceptance is an important factor in the successful use of educational software. Foss and Cristea [5] suggest that improved functionality and usability of authoring applications for creating personalized learning experiences is necessary to promote user acceptance. Nikoukaran et al. [12] suggest that quality and ease of use should be considered when evaluating an application.

Koshy [11] suggests that action research methodology facilitates evaluation and reflection. Hence, participants involved in the evaluation of an authoring application were invited to contribute their views and reflections on usability prior to any further development. Bargas-Avila et al. [1] mention the importance of user feedback when assessing the usability of online applications.

Bennet and Bennet [2] suggest that the use of technology in education facilitates self-directed experiential learning. Sonwalkar [16] suggests that the current use of learning management systems are predominantly used for the exchange of information rather than the provision of learning content which is supported by pedagogic rationale.

Parrish [14] concluded that learning design should encompass pedagogical intent and not just a pleasant interface to learning resources. An authoring application for creating personalized role playing simulations would enable authors to create re-usable e-learning resources with a view to enhancing students' retention of specific concepts and improvement in learning. Hockemeyer and Albert [9] recommend that personalized technology enhanced learning resources would effectively enable reusability.

4. PERSONALIZED ROLE PLAYING SIMULATIONS

4.1 Personalized role playing simulations

Personalized role playing simulations are suitable for use across disciplines. This application is suitable for use in every discipline which presents students with e-learning resources suitable to their prior experience or level of knowledge. Brusilovsky et al. [3] state that one of the problems yet to be resolved: is how to adequately assess a student's current knowledge when details of this knowledge exist in various different incompatible systems. Authors can select the personalized settings they wish to use in each e-learning resource. Chalfoun and Frasson [4] suggests that a smart interface for learning should be able to personalize learning resources to suit a user's evolving needs.

The objective of this research is to create authoring applications to be used by e-learning designers and educators in the creation of role playing simulations. Such role playing simulations can be used to enhance the learning experience of society in general by providing pedagogically sound e-learning activities which can be experienced rather than read or talked about. Parrish [14] suggests that by producing meaningful personalized learning experiences for students learning designers are adding quality to the learning resources created to engage students' attention. Raybourn et al. [15] suggest that complex problem solving and novel strategies are best learned experientially.

Følstad and Knutsen [6] stress the importance of discerning the difference between useful and non useful user feedback. The onus is on the evaluator to distinguish which feedback from participants is beneficial to improving the application and which user feedback can be ignored. While evaluating an authoring application for creating personalized role playing simulations, participants provided the following feedback with respect to the human computer interaction with the application:

- Exemplars of use should be available
- A training module should be appended to the package
- Documentation should be available
- The language used should be clearly understood
- A preview mechanism should be available to see the students view of the learning activity being created

4.2 Integrated Practice

Authoring application for creating personalized role playing simulations when complete will be integrated with existing learning management systems or e-learning platforms to provide learning designers, teachers and trainers with an alternative medium for presenting course material to students in a format that can be experienced by students.

Kalyuga and Sweller [10] found that personalized learning resources proved to be more effective than non-personalized learning resources. Personalized role playing simulations could be used to facilitate the learning needs of the elderly in our society. Other groups in society could also benefit from personalized e-learning resources, for example, learning mandatory skills (health and safety or manual handling) required for the workplace.

4.3 Simulations for Mobile Phone use

Role playing simulations created for using mobile phones could facilitate inclusivity for the aged in our society by making freely available easy to follow simulations of how to effectively use mobile devices (Figure 1).

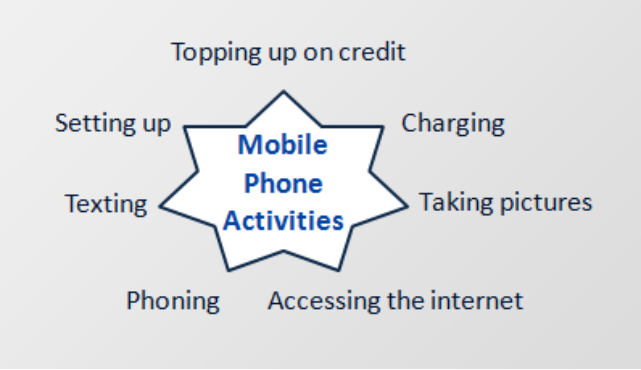

Figure 1: Mobile Phone Activities

Users do not have to use all the options available in the application, but users should be aware of the functionality of the available options, to assist them in selecting the combination of options best suited to their needs. Norman [13] recommends that

the full range of functionality be clearly visible to the user, although the user is not expected to use all the available functionality of any application.

This proposed authoring application could be utilized by a range of users from different disciplines, including: lecturers; teachers; trainers; demonstrators; and instructors (Figure 2).

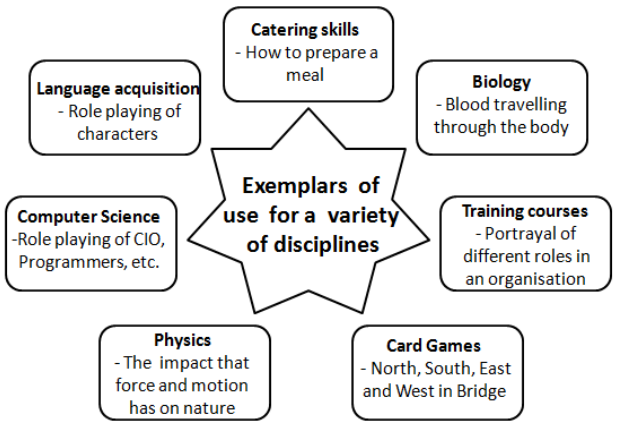

Figure 2: Exemplars of use

5. HUMAN COMPUTER INTERACTION

The human computer interaction involved in engaging with an authoring application which effectively enables non-technical learning designers and educators to create role playing simulations has to be clearly understood before such an interface can be created.

Potential users have to be inspired to use the authoring application, therefore exemplars of use should be created using the authoring application to show potential users the benefits to be gained by engaging students with role playing simulations. Documentation must be provided to assist potential users in effectively using this authoring application. Training materials provided should be sufficient to show potential users how to create role playing simulations on their own. A preview mechanism should be available to users to see at a glance the student view and test the student engagement with the role playing simulations created. The terminology or language used in the authoring application should be clearly understood by all, the use of technical language will deter potential users from engaging with the authoring application.

5.1 Exemplars of use

Exemplars of use are required to show potential users examples of where role playing simulations are relevant and beneficial to the students learning experience. The objective is to create exemplars of use that will inspire learning designers and lecturers sufficiently to make them wish to engage with creating some role playing simulations of their own. The exemplars of use should clearly portray how the flow of the units of learning would work together to make up a learning resource which would enable the students or learners to experience the intended learning outcomes sought by the learning designer or educator. Figure 2 portrays a list of suitable scenarios which could lend themselves to role playing simulations which students could experience.

5.2 Documentation

Explain how the authoring works in detail by providing comprehensive online documentation to assist users at every step of the process in creating role playing simulations. The use of a contextual hover would provide users with the necessary documentation which is relevant to the specific functionality the user is using when the request for documentation/or clarification is sought (Figure 3).

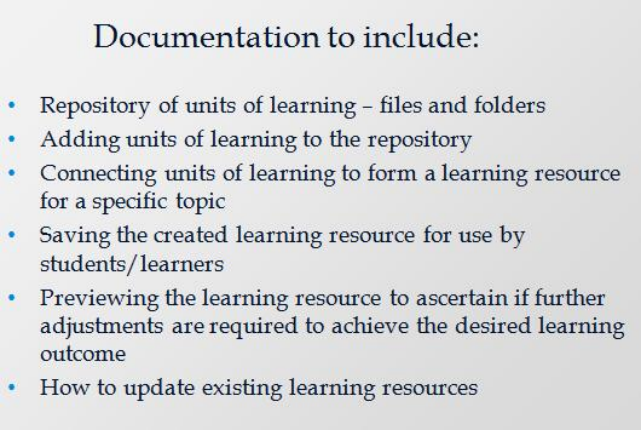

Figure 3: Documentation Samples

5.3 Training

The training material provided for learning designers and educators to follow should clearly explain to potential users the purpose and value of the learning resources which will be created during the training provided.

Training could be provided in the form of a flash movie or an interactive tutorial. The flash movie should be designed to portray the correct use of the authoring application. An interactive tutorial could also be used to ensure that the authors understand how to design and create e-learning resources which enable students and learners to experience activities in the guise of many roles. The units of learning selected to form the e-learning resource to teach learners a specific topic must be pedagogically selected to enhance the learning experience.

5.4 Provide a Preview Mechanism

By providing a preview mechanism, e-learning designers or educators can at any stage during the creation of role playing simulations see and test the learning resources which they are creating, observe mistakes or opportunities for improvements and amend accordingly.

5.5 Terminology or Use of Language

The technical terms used to create and deploy authoring applications for creating role playing simulations should be left in the background of the application and should not be visible to confuse and put potential users off using the authoring application. All the terminology used in the human computer interface of the authoring applications should be clearly understood by learning designers and educators across all disciplines.

These authoring applications are expensive and time consuming to create, but, when developed they should provide e-learning

designers and educators with an authoring application which is freely available to enable learning designers and educators to cheaply and quickly create role playing simulations to use with their students.

Depicted in (Figure 4) is the interface for the GRAPPLE [8] authoring application which was evaluated by participants.

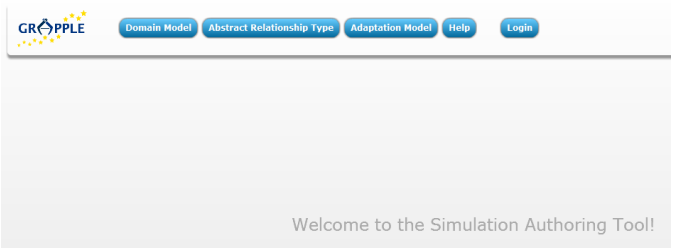

Figure 4: Interface for GRAPPLE authoring tool

Depicted in (Figure 5) is an amended human computer interface for a proposed authoring application for creating personalized role playing simulations. The proposed interface has yet to be developed.

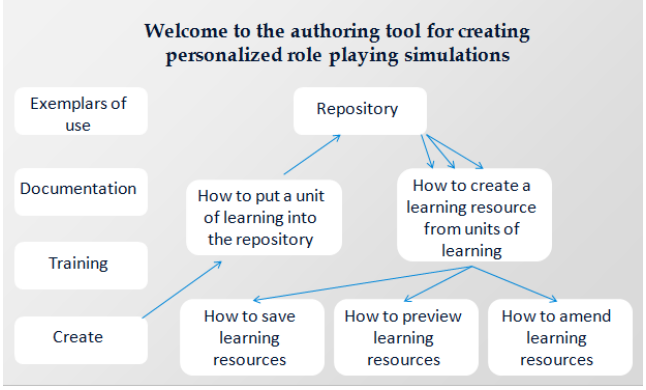

Figure 5: Proposed interface for authoring application

6. CONCLUSION

This paper discussed some of the relevant human computer interaction issues associated with the effective creation of personalized role playing simulations which should be considered by computer programmers prior to embarking on designing and implementing applications for creating role playing simulations. This study aims at providing designers of the human computer interface of authoring applications with some useful guidelines to ensure that the authoring applications are more effective, efficient and user friendly.

The human computer interaction with such authoring applications is significantly important. Learning Designers and educators will only engage with such authoring applications if they realize the benefits that students can get by engaging with role playing simulations, and are able to create these simulated learning experiences: cheaply; quickly; and with ease.

This paper was written to assist designers and developers of authoring applications to improve the human computer interaction with the applications they are developing.

The complete findings, based on participants' feedback with respect to the design and development of the GRAPPLE [8] authoring application, are available at: http://www.grapple-project.org/public-files/deliverables/D9.5-WP9-FinalEvaluation-v1.0.pdf/view. Thus closing the evaluation loop by enabling future developers to incorporate the user feedback gathered in the GRAPPLE evaluation process [8] outlined above into the design and development of future authoring applications.

7. FUTURE RESEARCH DIRECTIONS

This scope of this paper was limited to a discussion of participants' feedback on their human computer interaction with an authoring application for creating personalized role playing simulations. The pedagogical issues and concerns connected with the use of role playing simulations are separate issues which would be interesting to pursue as future research topics. Further research and improvements are required in the development of personalized authoring applications if widespread use is to be achieved.

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