Voyage to the Age of the Dinosaurs project, an experiential learning situation with undergraduates, graduates and visiting professionals

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Figure 1: Cretaceous World, background plate by Chan Ying Hol

Abstract

Experiential learning is a popular form of instruction within higher education. [Kolb and Fry 1975] The purpose of this paper is to detail how the experiential model can be blended within an open ended and ever evolving project management environment. The experiential model however is not only extended to facilitate the learning of undergraduate students but also to extend and challenge the preconceptions of visiting graduates and professionals, throughout the course of the projects development. [Chen 2008] This paper will discuss the process of how this blending is applied to the research and development of a 3d interactive game. We will present the methodology used for collaboration primarily from the perspective of the School of Art, Design and Media assets creation and design team, reference to the other collaborating partners objectives and methodologies will also be discussed briefly but are not the main focus of this paper.

CR Categories: K.3.1 [COMPUTERS AND EDUCATION]: Computer Uses in Education—Collaborative learning; K.8 [PERSONAL COMPUTING]: Games—[H.5.2]: INFORMATION INTERFACES AND PRESENTATION—User Interface, Screen design;

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1 Introduction

This paper is an interim report written mid-way through the projects development with the emphasis mainly drawn form the Artists’ perspective within the School of Art, Design and Media (ADM) at Nanyang Technological University, not as a full and comprehensive appraisal of the findings as posed by the original research proposal. A final and more in-depth report bearing greater significance to the goals of the funded proposal from all the collaborating partners will be presented at the projects conclusion.

The project is headed by the educational team within NIE and it is their brief to develop in collaboration with teams from within the School of Computer Engineering (SCE), and the School of Art, Design and Media (ADM) of NTU an immersive interactive and digital media educational tool, more specifically a 3d multi player game titled ‘Voyage to the Age of Dinosaurs’ that facilitates the learning of Earth system science subject matter within Singapore’s secondary level Geography syllabus.

The aim of the project for the team within NIE is to design content for ‘Voyage to the age of Dinosaurs’ that will support deep learning of earth system science that is both immersive and culturally appropriate in which the subject matter can be explored in a meaningful and comprehensive manner and in doing so provides a mechanism that links formal and informal learning. For the team within SCE the project provides an opportunity to implement intelligent agents within the game and to develop further research methodologies in the field of artificial intelligence design within pedagogical games. Further development in relation to graphical and tool programming will also be a primary focus of attention for the computer engineering team in the latter stages of the research. For the team within ADM in addition to giving the participants an opportunity to gain valuable and varied work experience in the design of virtual assets using a variety of software creation tools as is described in greater detail throughout this report, the project also provides a working environment which tests the aptitude, endurance, commitment, and enthusiasm of those working on the project at any given time. More specifically it tries to establish whether the participants can adapt to a variety of challenges that the project induces, it tests participants shift in perspective with regard to situational changes, obstacles real and in some instances contrived. Leadership qualities and styles, communication, and general group dynamics are also monitored and tested throughout the duration of the project.

This project affords the opportunity for undergraduates from within ADM, to practice their skills and knowledge gained in their study programs applying it towards applied research. Within this environment they gain experience much like what they would experience on an industrial placement. Valuable experience and knowledge gained by the undergraduates, visiting researchers and other academics and professionals within the research phases of the project relate specifically to the feathered nature of dinosaurs
present within the early cretaceous period. [Swisher III et al. 2001] This educational theme serves as a hook to facilitate and inspire the learning of earth system sciences for the secondary school students the game is ultimately designed for. They are provided with an opportunity to research material not only relating to the subject matter itself, in addition they have the opportunity to liaise with visiting expert paleontologists, educationalists and computer scientists, artists and animators and specialist members and collaborating partners on the project. The work is created as a collaboration with the National Institute of Education functioning as the lead in learning sciences based research. A core team is formed comprised of one representative from each research pool. Their task is to function as interaction designers, guiding the production teams and consolidating ideas from target consumer e.g., middle school students, team members and the established research goals. The core team attempts to create an achievable game plan with milestones for each version as the common objective for all teams. The contribution from each team is not limited to their task allocation. Team synergy is required to overcome obstacles in order to achieve research goals. A key example is the bridging of artistic design with the technical limitation of the game engine and the respective team’s scope of knowledge of the intricacies of the technology. The unique feature and challenge for the development of the artistic assets team at ADM is that within the NIE’s research proposal document the multi-user virtual environment (MUVE) is to be designed partly by the end user. Using this informant design methodology [Scaife et al. 1997] through workshop interaction, students and teachers assess whether or not the educational objectives are addressed. At the same time, students offer suggestions for what they would like to see in the next version. This is done with the belief that continuous improvement and refinement is not only limited to refining the work process, it also covers to some extent the games progressive development and redesign by linking it closer to the end users.

2 Design Methodology

Our research methodology is such that it develops in an ad hoc game design [Ducheneaut et al. 2007] with very little resources applied at the beginning. We started the project effectively without a design plan. The reason for taking this approach is the belief that this would enable researchers to assess and steer the design of the game based on observations of game interaction and subsequent evaluation. The decision to not define a lead interaction designer introduced an environment which tested the working methods of those present on the team. In particular, what was not addressed was what the game would be. This approach affected group dynamics not altogether in a positive way however, it does provide a method for building team collaboration. The researchers are given the opportunity to propose design solutions to various issues throughout the production cycle thereby gaining valuable insight on how their work patterns and styles might need to adapt in order to fit into this research environment.

3 Research and Development Process

Within ADM undergraduate research revolves around the development of concept art, and other visual development such as print graphics developed for the workshops; for the game our team developed models with textures, rigging and animation of early cretaceous feathered dinosaurs and motion capture of human characters. Figure 3 shows an example of an artist’s work attempting to define from the skeletal fossil remains muscles reference for modeling a feathered dinosaur. Figure 4 shows morphological research done by project artists attempting to recreate the examples of students’ models in their original state and those that have been modified after consultation with graduates and professionals. Revisions to the model created by students is also shown.

The undergraduates gain further insight into the use of standard
tools associated with their trade e.g. Maya, Photoshop, Mudbox, and Z-brush and other software packages such as Motion Builder and World Machine. Further work conducted by visiting graduates and research associates within ADM concerns portability between asset creation software and the game engines under consideration. Further research concerns work with a newly acquired motion capture facility. (see Figure 5) The visiting graduates and professionals have the same facility to enhance their skills and knowledge and to liaise with graduate and undergraduate students within the computer engineering group whose predominant area of investigation revolves around implementation, exploration and study of intelligent agents e.g. objects and creatures that are aware of the players choices and actions within the game environment. (see Figure 7)

A deeper and more rigorous investigation into game programming will be explored with respect to graphical elements and presentation and is the focus of further study within the ADM and SCE teams.

4 Management and Development Process

The management and development process to date has fluctuated throughout the course of the project between a fast paced production environment to that of a more inquisitive research environment.

As a result of the informant design methodology direction of the design brief conflict was instilled with respect to working practice i.e. a highly competitive results oriented industry contrasted with a speculative research environment.

During the research phase of the project undergraduates, graduates and visiting professionals worked as a team, where the objective was primarily to research the material (early cretaceous dinosaur morphology and environment) and to master the creation packages used for the art assets required for game development.

5 Reflection and recommendations for future development.

With input from game and film professionals the direction and emphasis of the project was re-assessed creating an additional dynamic. Though the attempt to create a learning game that utilizes experiential design through an ad hoc approach proved interesting it also highlighted a few problems which ultimately affected the project’s progress. It was then deemed that a more structured approach be adopted where the tasks and responsibilities of the collaborating parties were more clearly defined. The drive for a more direct and purposeful management structure was introduced. This phase provided a positive direction in that a semblance of organization was produced. This has proven to be precisely the correct model for future development.

NIE the educational leads within the project were responsible for setting out the preliminary design framework subject to the feedback from the end users and what they regard as being attractive and suitable features within a game in addition to balancing these requirements to the dictates of the Singaporean secondary year 2 Earth system science syllabus. These requirements are then disseminated in the form of work schedules for required content at each particular phase or milestone. NIE then carefully gauged these design requests subject to an assessment and understanding of the collaborating partners capabilities at any particular stage of the projects development. To some degree the requested content is open to negotiation.

For the art team the conceptual style is secondary to the functionality and workability of the assets within the game environment as the overriding goal is to accommodate the SCE team with workable material. It is also important however for ADM to explore and research new and evolving methods of construction and to keep an open mind to the restyling and improvement of the overall look of the game throughout the projects development. Artists work to transfer their research into assets ready for implementation in the game.

The teams within SCE are responsible for the implementation of the game ideas such that they form playable quests/tasks which are both engaging and informative subject to the educational requirements that NIE prescribe. It is also their responsibility to engage positively with the ADM team in establishing an effective and robust protocol for the implementation of virtual assets within the game world. [Yu et al. 2008]

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5 Reflection and recommendations for future development.

The team assembled for the project is an eclectic mix of people with some having little actual academic experience in research and oth-
ers with longer careers in established entertainment driven marketplaces. With more experienced people working alongside inexperienced entry level artists, students and researchers, opportunities for professional and creative growth are enhanced.

Several tests were undertaken with respect to the development and exportation of externally developed art assets and game engines by the computer engineering team. The engine of their choice BitManagement, was viewed by ADM as a poor initial choice as support, existing material and documentation was scarce. It was also viewed by ADM as being outdated. After review and with some relief another choice of engine, that of Torque was initiated. Given the lack of actual development on the project in relation to digital assets and functional demonstration material in the earlier engine, Torque proved to be somewhat better. It has provided a more useful vehicle in a scratch team development process than the initial choice would ever afford. The combination and collaborative endeavor initially produced a strong and effective working partnership which amounted to a somewhat modest but nevertheless successful outcome at our workshop and presentations.

6 Multicultural aspects to team building development within the Singapore environment

A unique and mitigating feature concerning research in Singapore on VAD is with regard to the various personnel involved on the project and their various cultural backgrounds and expectations. Within the collaborating parties each area lead has to some extent attitudes and work ethics affected by their cultural upbringing and experience. This in combination with specified areas of expertise can in some instances temper or indeed exacerbate circumstances and developments related to research. Having team members with different attitudes toward professional practice is prevalent throughout.

A definite feature that may not be representative of a normal working environment in the Singapore context is that the game industry is the domain of youthful entry level artists and developers. In Singapore the game community does not broadly exist. Working practices and methodologies have not been established from the grassroots level and therefore are being imported. This importation of what was developed elsewhere and is a result of external cultural pressures and opportunities has yet to become internalized in the locality. Our research, being both an artistic and engineering task that integrates design learning science concepts is a collaborative effort that has tested the working attitudes of team members involved and has produced perhaps a greater understanding and appreciation of the importance of relationships. This gives pause for thought and reflection to one’s own values and expectations.

7 Conclusion

The complications of collaborating within one academic environment has proven challenging however given focused goals along with a methodology that creates an inclusive design direction these challenges can be surmounted to a degree. From the perspective of the ADM team a systematic and logical work flow should be adopted to refine and enhance teamwork among all collaborators. A key element in our work flow should be to establish a clear and common objective, identify and enhance each teams contribution, manage the production of art assets and finally develop methods to improve and refine work patterns within all the collaborating parties.

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References


