Edutainment content management requirements from teachers' perspectives

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Edutainment Content Management
Requirements from Teachers’ Perspectives

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Abstract Education and training institutes are increasingly interested to invest and adopt games as one of the teaching and training tools in the classroom-learning environment. Inevitably, it has led to the need to assess the effectiveness and influential factors of these tools. Previous research reports had shown that teachers play an important role in implementation of Information Technology tools. This study aimed to discover the underpinning content management requirements from the perspective of teachers. Apart from the requirements, the finding identifies obstacles and hindrances that may affect the delivery of curriculum objectives through edutainment games. The question of this research is: “What are the content management requirements of in-class edutainment games from the perspective of teachers?” This study had discovered and identified the following key requirements: duration of the games, curriculum objectives, flexibilities, feedback on outcomes of games and pre-services. With the identification of teachers’ requirements, an Edutainment Content Development Design Framework (ECDDF) was proposed. The key feature of the framework is an interface matrix, which provides game customization facilities to be configured by the teachers at the ‘pre-game’ phase. The report serves to propose a guideline with constructive ideas for edutainment developers, game designers and users for the production and adoption of edutainment games.

I - INTRODUCTION

Edutainment takes the forms of TV programs, movies, video games and computer games etc. Among these various forms of products, commercial computer and video games are becoming more popular as compared to other media because of their interactive functions and features. Engagement of the use of these games has been regarded as a meaningful leisure activity [1]. Besides being used in social and leisure activities, computer games are also increasingly being used in formal education environments such as educational and training institutes, military academies and medical training institutions and therapeutic clinics, learning and rehabilitation tools [2, 3]. Over the past 30 years, digital games have become an integral part of the society. The total revenue of digital game industry is approaching $30 billion worldwide. The computer and video games industry is also believed having the potential to overtake the traditional entertainment industries such as TV, movies and music [4]. Due to its increasing growth of popularity, the computer and video game industry is attracting more attention than other media, such as book, television and board games [2].

In formal education learning environments, the benefits of computer games have been widely recognized. In particular, computer games can be associated with higher-order skill sets such as problem solving, independent learning and critical thinking. On the other hand, teachers are responsible for the implementation and execution of the computer games in the classroom environments. According to the report by [5], teachers are the key factors that affect the implementation of technology. Since computer games are having tremendous educational potential [6], and the teachers are playing an important role in the selection and implementation of the computer games in the classroom, it is therefore imperative to understand and be sensitive to the teachers’ requirements. A proper match or alignment between the needs of the teachers, the skills or knowledge gap of the students, and, the appropriate contents and facilities offered by the computer games, will determine the success of the teaching and learning objectives.

There are multiple objectives and expected outcomes from this study. First, the study investigated the important aspect of this research by reviewing relevant literature and reports. It then identified the content management requirements through an analysis on the feedbacks and discussions from a number of secondary sources. These have included educational computer games forums, web logs (Blogs) and relevant Internet websites. In particular, this study aimed to determine the content management requirements on the educational computer games from the perspectives of the teachers. Finding from this study has identified the requirements include: control on the duration of each session, control on the levels of the materials, flexibility for selecting or highlighting the relevant subject topics, and, synchronization of the teaching objectives and the course materials. These have been identified as the essential requirements. They are recognized as important in order to achieve the best learning outcomes in the classroom setting.

Based on the findings from this research, an edutainment design framework- Edutainment Content Management Design Framework (ECDDF), and an ECDDF Matrix are proposed. The design framework and conceptual model are illustrated in subsequent sections with diagrams and figures. Finally, the report concluded with discussions on the finding from this study, the proposed design framework, and suggestions for future research.

II. DEFINITION OF TERMINOLOGIES

Edutainment
The term Edutainment, is coined from combining the words entertainment and education. It simply means educating while being entertained [7]. Today, edutainment has quickly evolved from card and board games, television programs to video games.
**Computer Games, Digital Games and Video Games**

Due to the development of technology, the boundaries between computing and video technology are becoming blurred [8]. The terms, ‘digital games’, ‘computer games’ and ‘video games’ are increasingly being used interchangeably. Games, in the context of this research are referred to computer and video games. Accordingly to Fabricatore (2001, P3-4), ‘Videogames always include an interactive virtual play environment’ and ‘in Videogames, the player always has to struggle against some kind of opposition’ (cited by [9]). Meanwhile reference [8] defined video games as those games that have to be played on consoles, such as Sony’s Playstation and the Microsoft’s Xbox. Cyber games refer to those played over the Internet, in cyberspace with real online players. Hence, in this report, the terms “digital games”, “computer games” and “video games” will be used synonymously.

**Content Management**

Content Management (CM) is referred to the process of acquiring, creating, tracking, storing, accessing, organising the “content” into a repository for analysis or creation of other unique documents. On the high-end level, CM systems may provide workflow, authoring, editing and enabling the use or reuse of the collected data. In the context of this study, CM is concerned with three aspects. The first aspect is the ability to draw, measure, create, review and manage the outcomes and progress of the ‘game’. The second aspect is to provide facilities for the authoring, editing and organizing of the collected data into e-portfolio, e-assessment and e-service for the teachers. Thirdly, the aspect of providing customization facility to teachers and to make available a CM interface.

The following section presents the proposed Edutainment Content Development Design Framework (ECDDF).

**III. DISCUSSION AND PROPOSED FRAMEWORK FOR EDUTAINMENT CONTENT DESIGN DEVELOPMENT**

Based on the data collected, the requirements from the teachers’ perspective can be categories into three areas:

1. Technology and logistic concerns, such as: ‘Pre-service’ (training) for teachers. This will not be part of the proposed framework.
2. Content management requirements, such as timing control, customizable content subjects, provide Template-Based Storyboarding, feedback system and data sharing system. The subjects could be such as English, Mathematics, Geography, History, Economics and Accounting. These requirements will be incorporates in the proposed framework.
3. Game content requirements. This is the aspect involving designing of game content, whereby game designers will be able to collaborate with educators and producers to develop these requirements. These game content requirements are: explicit goals, use of real information in the game content, open source code, flexibility of games, length of time to learn and master the controls, regular saved features, adjust the sound level, provide pre-defined scenarios, provide mix mode learning environment and contents need to be ‘Learner Centric Style’. These requirements will not be the scope of proposed framework.

The data collected are served as the proposed content management requirements and insights for future research. Besides that, the data can also act as additional information for an overall comprehensive and scenario for consideration of adopting computer games in the classroom-learning environment.

**Summary of requirements**

With regard to the aspect of content management requirements, they have been summarized and the similar concepts are grouped together. These items are the underpinned concepts for the content design framework, which is presented in the next section.

*Finding 1.* Time limit or timing requirements.

As most of the face-to-face teaching classes are on a set time limit, 30, 45 or 60 minutes, games should be designed to fit the length of the training or class sessions.

**Proposal:**

In the proposed framework, each subject will be available in ‘micro’, ‘mini’ and ‘macro’ versions. Micro version should run for duration of 10 minutes, Mini version should be at 20 minutes, whereas the Macro version should be at 30 minutes. These features would enable the teachers to plan the duration of the games according to the duration of the class sessions.

*Finding 2.* Control the level of difficulty, and the ability to explore ‘freely’ and enabling selection of activities.

**Proposal:**

Design the learning contents into smaller “chunks”, each ‘chuck’ represent different subject (such as History, Chemistry and Maths.). Each subject would have different levels of difficulty for selection.

*Finding 3.* Progress rewards, as an incentive to learners.

Students are awarded with winning points as motivator to stay competitive, thus progress in leaning by achieving goals and learning outcomes. The following request is currently available in games such as, Civilisation III and Farmtasia as incentives to the players. Therefore provision of the requirement in this framework is not required.

**Proposal:**

The game should include progress rewards or incentives to motivate the student or player to continue or move on to the next level.

*Finding 4.* Provide Feedback and Data sharing system.

**Proposal:**
The assessment and evaluation will be provided to the teacher after the game play, at the ‘post implementation’ stage (details of the implementation stages will be discussed in the next section). The functions will be named as ‘e-assessment’ and ‘e-evaluation’.

Finding 5. Template-Based Storyboarding. Provide a set of design templates that can be chosen for ‘creating/customising’ the course. Pick and drop the content required.

Proposal:
The framework will provide the teachers with a template-based interface to “assemble” the “chunks” into a ‘customised’ game – the ECDDF Matrix. The interface enables teachers to make selection of these small “chunks” to be played and the duration to be played (see Table 3). In other words, these ‘chunks’ can be viewed as learning objects. From the designers aspect, each ‘chunks’ (content module) must have a clear theme which allows the module to be presented as a stand alone learning object, thus the preparation or ‘production’ time for each of these objects can be “produced/reproduced” on a efficient time basis.

Edutainment Content Development Design Framework (ECDDF) from the perspective of teachers

In this proposed framework, the implementation of computer games will be divided into three phases. The first phase is called the ‘Pre-game’. It is where the teachers using interface-template to ‘customised’ and prepare the games to be played in the classroom. The second phase is the ‘in-game’ phase, where the actual playing of game takes place. The third phase is called the ‘post-game’ phase, where the content management system generates, consolidates and organises the e-portfolio, e-reports, e-evaluation and e-assessment, feedback of performance levels, from the collected data, and provide these information to the teachers. Figure 3 illustrates the implementation phases.

The sources and references for compiling the above list are given in Appendix 1.

The ECDDF (Edutainment Content Development Design Framework) Matrix -template for game ‘customization’

At the pre-game phase, the teachers, ECDDF would provide the teachers with the ECDDF Matrix (Table 1) which serves as an interface template. The matrix comprises of variables, ‘Subjects’, ‘Levels’, and ‘Versions’ for each level and subject. The ‘Levels’ in the proposed framework will be adopting the cognitive domain of learning taxonomy – intellectual behaviour - developed by Benjamin Bloom, in 1956. These are: knowledge, comprehension, application, analysis, synthesis and evaluation [10].

The levels in the ECDDF Matrix are corresponding to the cognitive domain are listed below:

- Level 1 - Knowledge;
- Level 2 - Comprehension;
- Level 3 – Application;
- Level 4 – Analysis;
- Level 5 – Synthesis, and
- Level 6 – Evaluation.

Figure 1: Edutainment Content Development Design Framework (ECDDF)
The ECDDF Matrix is illustrated below.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Level 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Versions</td>
<td>V1</td>
<td>V2</td>
<td>V3</td>
<td>V1</td>
<td>V2</td>
<td>V3</td>
</tr>
<tr>
<td>Economics</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Chemistry</td>
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<tr>
<td>Accounting</td>
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<td></td>
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<tr>
<td>Physics</td>
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<td></td>
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<tr>
<td>Math</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Language</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Total Time</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

*Versions: V1: Micro-10 Minutes, V2: Mini-20 Minutes, V3: Macro -30 minutes

Example 1: Customised for Physics lesson

1) Class : Physics class at Level 4
2) Student : Year 10 students
3) Supporting subject: Mathematics and Language (proficiency at Level 3)
4) Game time : 20 minutes

The above matrix shows that ‘Level 4’, ‘Physics’ with ‘V3’, 20 minutes of game time are selected. The ‘Supporting subjects’, Mathematics and English are marked for Level 3 with ‘V2’ (V2 must be selected to match the selection of Physic with ‘V2’).

Teachers will be provided with a user manual associated with the matrix. The manual will detail the levels, subjects and the various versions of each subject. Supporting materials for each subject will also be included. The game will have default levels for the ‘supporting subjects’ according to the total game time which cannot be overwritten.

It is to say that the teachers are able to ‘skip’ or ‘advance’ to any levels or subjects as desired. It also means repeating the same levels are being made possible. Teachers are ‘in control’ of the games. They ‘customised’ the game at the levels that fit the best interest of the class, thus best achieving the learning objectives.
The section has provided a summary of the findings from the study of secondary source materials on the requirements for content management from the perspective of teachers. A framework for the design is given together with an example illustrating how it can be used. This framework has not yet been implemented nor tested due to time constraint. It is expected that this study has provided the groundwork.

IV. Conclusion

Previous researches and studies have shown that computer games are beneficial to both the teachers and students alike. The games will save time and effort for the teachers and trainers in the traditional teaching environment. Students or learners are motivated to play the computer games while acquiring cognitive - awareness, perception, reasoning, and judgment - and higher order thinking skills – critical thinking, analytical thinking, creative thinking and evaluation skills. However, to enable the teachers to manage the content effectively, game designers and producers need to be sensitive to their requirements. Taking care of teachers' requirements may foster their interest in adopting computer games and to improve the teaching environment.

The research carried out has identified the content management requirements from the perspective of teachers and proposed an Edutainment Content Development Design Framework with an interface Matrix. In short, some of the feedbacks gathered are: timing control of the games, customizations of the curriculums in order to best achieve the learning objectives, feedback management system, data sharing system, progress reward system and requirement for 'pre-service' (training) of the teachers.

Further exploring and conducting research surveys of teachers, students and stakeholders on the proposed educational computer game’s content management requirements will be an extension to this research. Besides that, establishing a prototype based on the Edutainment Content Development Design framework (ECDDF) proposed will be the next phase of this research. Another issue from the finding, which has not been discussed in the proposal, is the issue of open source code. The questions remained to be answered are whether the developers will agree to share their code in the open-source system. If yes, what should be the arrangements and the business model? This is another research topic relating to the theme of this research. Last but not the least, the research on the suitability and features of computer games that suit most for the classroom learning environments will be of great interest to all stakeholders including educators, developers, parents, designers and administrators alike.

APPENDIX – WEB RESOURCES

(1) http://www.answers.com/topic/classroom-management
(2) http://www.blogtopsites.com/sitedetails_45624.html
(3) http://innovation.ist.psu.edu/Development/bkp10/blog/index.cfm?dat a=20040519
(4) http://researchquest.blogspot.com/
(5) http://www.greenpit.ch/blogwordpress/
(6) http://researchquest.blogspot.com/2007/03/my-digital-natives-yours- shaping-how-we.html#links
(8) http://researchquest.blogspot.com/2006/10/game-features- educational-features.html#links
(9) http://www.bris.ac.uk/education/research/networks/gern (The Games and Education Research Network (GERN)
(10) http://www.silversprite.com/papers/42.pdf
(11) http://researchquest.blogspot.com/2006/10/game-features- educational-features.html#links
(12) http://talk.guardian.co.uk/WebX?50@@.ee9c219
(14) http://connect.educease.edu/blog

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