THE EFFECTIVENESS OF A LIFECYCLE APPROACH TO LEARNING PROJECT MANAGEMENT

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Abstract

This paper is based on an ongoing research project. Its main purpose is to demonstrate the effectiveness of adopting the project lifecycle approach to learning Project Management through an interactive multimedia system. This multimedia system, referred to as the interactive tool (or the tool) in the paper, is a flash based environment. It can be accessed from either the local storage device of a computer or the Internet under both Microsoft and Apple based operating systems. The tool follows the standard lifecycle phases of a project in teaching fundamentals of Project Management at the undergraduate level. In order to demonstrate its learning effectiveness, the tool was put to the test at three different universities in Australia, Japan and Canada. All the participants were taking Project Management as part of their studies. This combination provided the opportunity of studying participants from different learning, linguistic and cultural backgrounds. The test consisted of a specially designed workshop with customisations for each country. The main objective was to measure and gauge the learning outcome in each case. The findings confirmed that all the participants from every group achieved two main goals of learning the field; and enjoying the learning process.

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1. Introduction

It can be claimed that almost everything we do in life is a project. Whether they are trivial tasks or complex business activities, they can all be classed as projects as long as they have an outcome, beginning and end. In a modern and new society in which businesses operate under globalised conditions, changes are inevitable, and they are taking place more frequently than before. Managing these changes can be projects in their own right. This paper presents an approach for effective ways of teaching and learning fundamental project management concepts. The method utilises a specially designed software program which is very closely associated with the project lifecycle. In other words, the learner, right from the beginning, starts realising the role of lifecycle in learning and using project management tools and techniques. These ideas are incorporated into an interactive multimedia system based on the author's experience of teaching fundamentals of Project Management for several years. The system has captured and simulated the selected parts of the author's face-to-face teaching experience with proven success in terms of students' understanding and assessment results (see Nooriafshar & Todhunter, 2004).

The sequence of the topics covered in the interactive tool follows the main project lifecycle phases of Planning, Execution and Control. It also allows the user to perform what-if analysis by interacting with the tables and charts for better understanding (For information on project lifecycle, see Burke, 2010; Gido & Clements, 2012.) The interactive tool considers the established learning concepts such as the learners' modal preferences (see Fleming, 2011). It should be noted that the learning process is a guided process and the learner is encouraged and directed to actively participate in this process. Hence, the learner becomes an active participant in determining the solutions. There are also opportunities for the user to have control over the selection of a suitable combination of modes (visual, aural, text and kinesthetic).

In terms of the technical features, this Flash based tool is developed in such a way that it occupies a very small storage space. It can be accessed via the Internet or locally under both Microsoft and Apple based operating systems. The next section covers the main features of the interactive tool.

2. Main Features of the Interactive Tool

The interactive tool consists of Introduction, Work Breakdown Structure (WBS), Network Diagram, Gantt chart, Gantt chart Examples and the Glossary of the terms used. After a brief insight into the purpose and features of the interactive tool, the concept and methods of developing a Work Breakdown Structure are introduced. The audio visual lectures in the tool

are complemented with dynamic images which are drawn and completed in a step by step manner. Rendering the graphics is fully synchronised with the background audio. Hence, the learner can grasp the concepts both by seeing and hearing. In addition to these main modes of learning (visual and aural), a transcript of the lecture audio is accessible through clicking a tab. As a result of this rich combination of modal preferences, the learning experience is enhanced (see Murphy, 2004). The learner also has full control over which modes should be included in the session. The session can be paused or repeated as the learner wishes at any time. Therefore, the learner feels as if they are sitting in the driver's seat and controlling the learning session to suit their needs. The learner can also interact with the charts such as the Gantt chart and perform what-if analysis. As a result, a full set of all the different modes of visual, aural, text and kinesthetic are included.

In general, managing projects goes through a number of different stages which can be comparable with the circle of management as in the system's approach to modeling. In a systematic approach to management, we start with planning, and then move onto organising, controlling and improving. This circle can be reiterated until satisfactory results are achieved. In the case of the Project Management lifecycle, one can identify, at least three different phases and depict them in the form of an S-shaped curve. Hence, the curve, starts almost flat and as time progresses, the gradient increases and finally towards the end, a trailing off occurs.

The main components of the management cycle (Plan, Organise, Control and Improve) may be linked to these three different phases. In other words, the planning activity is placed on the initial phase, oraganising and controlling activities on the second phase and finally making improvements are placed on the final phase. Hence, the phases of Plan, Organise, Control and improve are very similar to the sequence of the project lifecycle phases in which one starts with planning, controlling, executing and finally closing out as the results are achieved. As mentioned earlier, the lifecycle phases are represented by the typical S-shaped curve which places the cost/effort emphasis, in terms of the rate of its change with respect to time, on the middle portion of the curve.

The interactive tool is based on the project lifecycle phases and goes through the three main phases in a systematic and sequential manner. Hence, the learning process becomes more logical and very much connected with the project lifecycle.

It should also be noted that the project lifecycle phases, in general, are not very dissimilar from the Operations Research (OR) approach to formulating, solving and then performing a what-if analysis.

The next section presents the main aspects of the learning experience with regard to the specially developed workshop.

3. The Learning Experience

In order to confirm the perceived effectiveness of the interactive tool, a workshop with a team-based case study component has been developed. The workshop follows the project lifecycle approach through the interactive tool. This workshop consists of three main sections. Part one is made up of a presentation which provides a lecture and insight to the fundamentals of Project Management. Part two consists of demonstration of the interactive tool to the participants. Part three aims to test and gauge students' understanding of the fundamentals of project management and lifecycle approach to managing projects.

The workshop was intended to be presented to students from different backgrounds so that an idea about its usefulness and, ultimately effectiveness of the interactive tool can be formed. Initially, the workshop and its test instrument were utilized by three different classes of students at the author's university in Australia. Approximately, over one hundred students were tested. The successful completion of the team based case study and the students' abilities to comfortably explain their approach and conclusions indicated that the interactive tool had served its purpose. In order to have a better understanding, it was decided to widen the experiment and extend the test to other universities too. It was considered that having different international universities would certainly help with the test results. Hence, for this purpose, contacts with universities in Japan and North America were established. Both the Japanese and the North American universities had different features in their education systems from Australia. These differences, to a larger extent, were also driven by their cultural backgrounds. Hence, the test subjects were perceived to be ideal for the purpose of the project. After the establishment of appropriate links, the author planned onsite presentations and tests. The Japanese university visit took place in January 2012 and it was followed by a Canadian university presentation.

In each case (Australia, Japan and Canada), a general introduction to the workshop in terms of its purpose and features was provided to the participants. It was explained that the workshop, the interactive tool and the content were based on a number of key principles and established educational concepts. It was also explained to the participants that the materials used followed the project lifecycle.

The basis of these principles was briefly outlined to the participants. It was explained that the adopted principles were related to the learning by guidance ideas and they also catered for different learning styles. It was also clarified that in terms of content, the major aspects of

Project Management were included in the interactive tool. It was explained that the logical sequence of the main aspect covered in the tool follow the phases of a typical project lifecycle. It is noteworthy to mention that many students, through their additional course notes, would be fully aware of these phases in most cases. In general, most students are aware that the main project phases cover initiation, planning, execution, control and ultimately closeout. Students also appreciate the distribution of cost/effort with respect to time for each phase. During their course at the university, students are often introduced to the idea of the S-shaped curve as having a smaller rate of change for cost/effort at the beginning and the end of the project. Hence, they are reasonably well informed that the emphasis for cost/effort with respect to time is placed on the execution and control phase.

The workshop also provides information on what is exactly meant by a project; why one needs to manage projects systematically; who should manage projects; what is meant by the project stakeholders; and the necessary skills needed by the project management team.

In all cases, after providing the necessary introductions, the interactive tool was launched and presented on the screen to the participants. The interactive tool then started explaining the main features and methods of navigation in both audio and text. The section of Work Breakdown Structure (WBS) began by depicting the WBS tree with synchronised audio simultaneously. The tool explained how to develop the WBS for making a cup of coffee as an example of simple project to which everyone can relate. It was also mentioned that the project manager can rely on some creativity as well. For instance, the choices for different branches of the WBS and their numbers could be entirely up to the Project Manager. In the case of the example used, the highest level was labelled as "Making a Cup of Coffee" and the second level branches down included Organising the Hot Water and Organising the Cups. It was suggested that another Project Manager could have had these branches with different titles and numbers. As the rest of the WBS was developed, it was demonstrated how one would end up with the final (lowest) branches representing the Work Packages. The diagrams on the screen illustrated the main details which were expected to be included under the Work Packages. In the case of the example used, the two most crucial pieces of information were pointed out. They included durations and dependencies. The author/demonstrator, at this stage, paused the interactive tool and provided appropriate additional explanation according to the needs of the audience. For instance, it was mentioned that other important pieces of information such as costs or resources could have also been included under each Work Package. It should be noted that the interactive tool allows these pauses throughout the presentation so that the presentation could be customised according to the needs of the audience.

The system then proceeded to the next stage which commenced to construct the network diagram. This stage along with the WBS development may be regarded as the formulation stages as in the OR approach. The construction of the network diagram was aided with appropriate and colourful animations to take full advantage of the Right Brain engagement. For a comparison of the left with the right brain (see Herald Sun, 2007). The combination of visuals with appropriate text and verbal explanation helped students to organise the information into coherent mental representations and integrate these newly constructed visual and verbal representations with one another (see Plass et al., 1998).

The network diagram construction included animated explanations with full audio explanation on how to conduct forward and backward passes. The calculation of the earliest and latest start and finish times were also illustrated with appropriate audio visual presentation. An interesting feature, at this stage, was the linkage between the network diagram (graphical approach) and the completed table (tabular approach) for presenting and understanding the calculated (earliest and latest start and finish) times.

In a very similar fashion, the Gantt chart development stage was presented. This section contains advanced interactive features which allow the learner to perform what-if analysis on the Gantt chart by changing the duration of the tasks. It was illustrated how the tasks depend on each other and could affect the project completion time depending on their nature (critical or non-critical activities).

At the end of the multimedia presentation and answering students' questions in all cases (Australia, Japan and Canada), students were asked to undertake a specially designed case study. This case study was designed by considering two main purposes. Firstly, the intention was to consolidate the learning session and secondly, to test the learning effectiveness of the multimedia presentation using the interactive tool.

The students were placed in teams of three and were given the option of either using the example case of the online bookstore ordering system development or choose something else. In most cases students chose other topics with some assistance and encouragement by the author. For instance, preparing typical Japanese meals such as sushi, buying a car, and planning an overseas trip were amongst some of the examples. The teams were provided with sticky notes to use for construction of their WBS by simply sticking on the table or the white board. This method allowed them the flexibility in terms of making adjustments or changes to their WBS. The team members were requested to work together within each team and not to discuss their project with other competing teams. The purpose was to manually develop the network and ultimately the Gantt chart for their chosen project. The expectations were only for a small project with eight to ten work packages. After about 45 minutes, each team was requested to

make a presentation to the class. A panel of judges made up of the author and one or two professors from each participating university's faculty observed and judged the presentation.

The students in every group were assessed according to the following criteria:

1) An appreciation all the project lifecycle and applying it to projects.
2) Demonstration of demonstration of applying the project management techniques to projects.
3) Demonstration of skills in using communication skills throughout project development phases.

It should be noted that communication is one of those important areas in developing projects. Hence it was necessary to assess students on their communication skills. The assessment of this aspect was carried out by presenting their approach and main findings to the group.

In every group marks were allocated against each category. The marks were out of five for each criterion. Therefore, the maximum mark given could have been out of 15. In final analysis, 75% of the marks were between 11 and 14; 20% of the marks were between nine and 11; and finally, a very small (5%) percentage of the marks were less than nine.

In order to make it interesting and enjoyable, a winning team was selected and was presented with some gifts. In some cases the entire class was congratulated as achieving the expected standards.

The judgment of the case study presentations given by the students, made it clear that, in general, the understanding of the concepts and applying them to a project were successfully achieved in all cases and all teams. Therefore, the predicted learning effectiveness of the interactive tool certainly materialised. It should be emphasised that as this is an ongoing research project, the author anticipates undertaking further experiments and tests. The outcome of these tests will be utilised in enhancing the features of the interactive tool.

4. Conclusions

Based on the project lifecycle approach to teaching project management, an interactive multimedia software program was developed. This multimedia system incorporated the established learning concepts and ideas such as modal preferences. One of the main objectives of this development was to simulate the classroom teaching experience based on the lifecycle approach and make it also available for the external students.

The students' performance in the formal assessments indicated that the multimedia system was quite effective for teaching purposes. In order to have a better idea about the effectiveness of the developed system, the investigation was extended to other universities. A university in Japan and another in Canada were chosen for this exercise. As a result, the investigation included students from different backgrounds who were studying project management. The investigation with every group included a specially developed workshop which consisted of a test case study. The test case study was used as an instrument to gauge the learning effectiveness. Based on the students' performance in the test case study, it was established that the interactive tool using the project lifecycle approach had potential for effectively learning of the fundamentals of project management.

Acknowledgements

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