Designing and Developing a Web-Enhanced Project Management Course for Engineering Graduating Students

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ABSTRACT

The use of web-enhanced through accelerated to teach and reinforce project management concepts based on specific learning objectives has been a positive experience for engineering students of SY 2015-2016 in the Qassim University of Buraidah City. This study describes the rapid development of a web enhanced project management course (GE 402) as a teaching with technology alternative to the traditional approach. The main theme of the study is to give a basic introduction to the design, implementation, and usage of web enhanced in teaching undergraduate project management course with adequate hands on experience in Primavera Planning and MS Project. This study aims to (i) compare the effectiveness of the web enhanced learning from a traditional learning; (ii) identify the management skills used by the engineers in the construction industries; (iii) the evaluations on learning by the engineering students of SY 2014-2015 & SY 2015-2016 (iv) the mean responses of the engineering students of SY 2014-2015 on the level of confidence of project management skills gained from traditional format learning; (v) the mean responses of the engineering students of SY 2015-2016 on the level of confidence of project management skills gained from the web enhanced format learning.

Keywords: MS Project, Primavera Planning, project management skills, student learning, traditional learning, web-enhanced, Qassim University
1. INTRODUCTION

Web-based instruction has grown exponentially, with more than a thousand universities and schools offering the courses over the web all over the world. Web-based instruction offers obvious advantages for distance and continuing education populations by making access to engineering education at any time or places feasible. This kind of flexibility is similarly advantageous for informal or professional training. However, a major use of web-based instruction is to enhance traditional, on-campus courses, where the benefit of web enhancement as a supplemental resource is less obvious. Nonetheless, universities and other schools are investing significantly in course management software, expanded networks, and training and support capabilities to introduce web enhancements to traditional courses. Faculty is embracing these tools as well and investing significant time and energy into adding web-based supplements to their traditional courses (Koch et al., 2010).

A web-enhanced course is one where instruction takes place face-to-face, but this instruction is supported by outside-of-classroom materials, activities, or both housed in an online space, like the blackboard course site provided for every course and aim organically combining with traditional teaching method to participate the whole teaching process, simultaneously, forming reasonable teaching process and structure to achieve the optimized teaching (Ucol-Ganiron Jr, 2013). Utilize web-enhanced networking to improve class efficiency, increase the active involvement of the students and cultivate their ability to use English language and project management comprehensively technology for language training through exploring, interaction, cooperation etc (Drachsler et al., 2010). Web enhanced teaching breaks the traditional teacher-centered way, which shifts the focus to the students, who could obtain the knowledge under the guidance of teacher via the interaction between them. During the period of web-enhanced learning, if all the senses can be triggered together, then enthusiasm of students is mobilized furthest (Kim et al., 2011). The students join learning activities delightfully, therefore, their motive and interest are stimulated. Network makes the students’ learning scope beyond teaching materials, which guides college learning to a direction of individuation and independency, not rigidly adhere to time and space

It is no doubt that the advantage of web-enhanced network teaching is obvious, however, there still exists misunderstandings for some teachers because of their lack of theory guidance. Teachers should spend much time on courseware using web-based teaching from the degree of teaching effectiveness. They focus their attention just on the web based but on the state of the learners, supposing the web-based teaching is modern teaching unilaterally, which leads to low efficiency of learning, which constrains their positivity and is adverse to the creation and development of their thoughts. The rampant e-books are harmful to students’ eyes from healthy percept, meanwhile, without the teacher’s guidance, the learners are likely to be addicted to it due to the abundance of network information and games, which affect their learning effect (Ganiron Jr, 2015). To improve learning interest, the teachers redundantly add animation, whose content is not available, but not to actualize the teaching according to their requirements. Though the climate turns to be active, the teaching points are not given top priority.

Traditional college teaching puts teachers at the center all the time, mainly relying on class knowledge, which emphasizes the role of teachers too much. It curbs personality and creativity of students and ignores the initiative and potential of the students, therefore, students are in a passive position. This traditional teaching method mainly has the following
disadvantages: Teaching mode is single. In the teaching process, the teacher is the center, and the teaching process emphasizes system and completion but few thinking space for students. Students are passive in the class teaching and teachers cannot take care of every student in the class who has different basis and interests. Students are listeners and put the teacher as the center. The knowledge is limited; the resource is scarce; the learning is passive but the knowledge is well-formed and departed from real life. The main experience is insufficient or lack of subjective experience, which will restrict the effectiveness of learning strategy teaching. Many students lose interest in project management course because their initiative and enthusiasm cannot be fully exerted in class (Ganiron Jr, 2014).

2. WEB-BASED ASSESSMENT ENHANCING PROJECT MANAGEMENT COURSE

Engineering students’ attitudes toward learning a subject vary based on characteristics of classroom instruction, such as types of assessment, topics, and material delivery tools. It also indicated that the flexibility in accepting students’ ways of solving engineering problems can increase students’ participation, reduce anxiety, and increase positive attitudes toward learning. Indeed, web-based practice can create different learning and assessment contexts, and produce flexible approaches to instruction and evaluation. These flexible approaches allow students to receive timely information regarding their improvement and adjustment. With this unique feature, web-based assessment carries a virtual instructional mission that traditional paper-and-pencil assessment can never accomplish.

In the SY 2009-2016, the researcher who experienced teaching the GE 402 (Project Management Course) in the College of Engineering at Qassim University had shown that engineering students who used web-based learning found that the project management course is more enjoyable. They like the freedom provided by their laptop and iPhones to do critical path analysis report, spend long hours in an iPhone to complete a task, and enjoy testing out new engineering ideas on a laptop.

There are three phases which should be considered when developing the web-enhanced course (Lee, 2011): 1) Delineation of the course in a series of lecture modules, considering overall instructional approaches 2) Decision of appropriate instructional methods/strategies to support student learning 3) Incorporation of specific web-based learning activities

In the curriculum of the College of Engineering in Qassim University, project management curriculum (SY 2009-2015), typically requires the knowledge of the project management process, project organization, the management functions, methods of planning and program development time CPM (materials, equipment, labor, sub-contractor), the network diagram, time scaled event network, estimating project time, project cash flows, negotiation & contracts, and SWOT Analysis, as well as the ability to make progress report of project in MS project and Primavera Planning (Ganiron Jr. 2015). It has been observed that engineering students have difficulty in mastering the fundamental network diagram, Gantt chart, manpower leveling, crashing and cost plan and project cash flows skills within a certain period due to English proficiency and insufficient knowledge in Engineering Economics (GE 401).

Project management is a course that requires the teacher to be more knowledgeable based on his experience in the construction industry. Thus, the teacher’s competence is an essential factor to successfully convey such skillful knowledge to engineering students.
However, without well-designed instructions, it might not be effective to transfer the knowledge into engineering students who need to learn and master the target skills through the course. The following part describes the suggested three phases for developing a web-enhanced project management course.

2.1. Delineation of the Course in a Series of Lecture Modules, Considering Overall Instructional Approaches

In the College of Engineering, Qassim University, the project management course has been taught only by the traditional lecture before the alternative delivery method (SY 2009-2015) is offered. The course is designed for engineering students of civil engineering and mechanical engineering who are on the tenth level of their engineering program. The teacher first decides what students must know to understand the general concept of project management (Lee, 2011). To effectively transfer fundamental knowledge to the students, the instructional goals and objectives are clearly clarified and learning contents are simplified and organized by lecture modules. Lecture notes are prepared, focusing on the goals and objectives of each lecture module, and are posted on a learning management system such as Blackboard or Course Website.

Upon the completion of each lecture module, the instructor assesses if the students meet the learning objective through either in-class activities or online activities (Lee, 2011). Considering how the web enhanced learning environment supports the instructional goals and objectives, constructivist-based activities is employed as a transition from the objectivistic approach to the constructivist approach as the students obtain more knowledge. Figure 1 shows the faculty member data.

![Faculty Member Data](image)

**Figure 1. Faculty Member Data**

This model course is overall designed using the objectivism-based approach, but the teacher also takes a role as a facilitator to provide the collaborative, contextual and active
learning environment. For this reason, the teacher needs to decide appropriate instructional strategies from constructivist’s view as well. As shown in Figure 2, these are uploaded files from the GE 402 course website that should be the teach by the teacher which serves as an input for the engineering students.

Moreover, the total number of hours needed to finish the GE 402 course syllabus is 56 for the whole semester. This does not include the times when faculty members are not able to attend their class because they participate in faculty development activities such as seminars and conferences.

2. 2. Phase 2: Decision of Appropriate Instructional Methods/Strategies to Support Student Learning

Among a full range of course delivery methods currently used, the teacher should select the most effective one, considering how to help students accomplish the learning objective through the web-enhanced instruction (Lee, 2011).

Moreover, the use of appropriate instructional methods can motivate student learning and assess student performance effectively. For engineering student engagement, teachers
also need to consider the feasibility and the level of difficulty in the student’s performing an assigned task.

As shown in Figures 3 and 4, a student should register in exam management system and wait for the project files to be uploaded before he could receive an email from the google confirming that he will start to take class activities or quiz.

![Figure 3. Registering in the Exam Management System by the Engineering Students](image)

In the model course, the lecture-based instruction is employed to transfer conceptual knowledge required to the students (Tsai et al., 2009), assuming that all the students are on the introductory level of project management.
Upon the completion of each lecture module, the students are asked to take a quiz to measure the level of the engineering student’s understanding of the learning module.

As shown in Figure 5, the engineering students received an email from the Google that the engineering students can start answering the class activities or quiz.

![Figure 5. Engineering Student received an email from the Google](image)

**Figure 5.** Engineering Student received an email from the Google

![Figure 6. A Sample of Online Quiz in GE 402 (Project Management)](image)

**Figure 6.** A Sample of Online Quiz in GE 402 (Project Management)

Immediate feedback is the most important issue and the strongest asset in GE 402 web-based practice. The immediate scores and feedback guide engineering student’s learning and
prepare them not only for the midterm and final exams but also for independent learning and regulations.

Thus, the teacher provides the students with simple online class activities such as Primavera planning exercise, MS project exercise, project management simulation, and quizzes. The students are required to complete the online exercise within a certain period of time individually (Wang et al., 2008).

As shown in Figure 6 and 7, these are the activities and quizzes that will develop engineering students knowledge in project management and enhanced the skills in cognitive, and interpersonal & responsibility and communication.

It is also indicated that the GE 402 web-based assessment has caught the attention of other courses in the College of Architecture, particularly because of its flexibility. This flexibility allows engineering students to play an important role in their own learning, to emphasize learning activities that are engineering student-centered, to integrate classroom learning with multiple practices and real life applications, and to deliver timely and adapted feedback. With the above features, GE 402 web-based assessment can be considered as a mind tool to drive and shape engineering student learning, achievement, interests, habits and motivation.

![Primavera Planning Activity](image)

**Figure 7.** A Sample of Online Classroom Activity in GE 402 (Project Management) using Primavera Planning.

### 2.3. Phase 3: Incorporation of Specific Web-Based Learning Activities

The web-based tools can provide an opportunity to significantly enhance face-to-face classroom learning through the web course tools environment as a major source for educational materials in a tenth level engineering course (Lee, 2011). This can be delivered quizzes to engineering students using CYBERPROF. These questions may be graded by CYBERPROF and the scores recorded in the Grade book, for use as homework assignments, quizzes, and exams.
Web-based activities in a course design can be involved both in traditional forms of instructional activities and on unique forms of interpersonal exchange (Lee, 2011). In the project management course, instruction delivery is supported by posting all course syllabus, course specifications and first-day material delivered to engineering students on the interactive website, the blackboard. The availability of these course materials will enable the engineering students to review the lecture contents anytime, anywhere.

In terms of assessing the engineering student performance, the engineering students will be required to take a quiz on the Blackboard, upon the completion of each lecture module, not only to help them self-assess but also provide feedback to the teacher (Lee, 2011). Furthermore, the engineering students will be asked to complete and submit homework through the blackboard. Figures 8 shows a sample of online homework assignment in project activities planning and scheduling using Primavera.

As homework assignments incentives, the engineering students can ask the teacher for review when it is completed before the due date. With the request, the teacher will provide quality feedback on the submitted homework (Tynjälä, 1999). The students have the opportunity to resubmit the one corrected based on the teacher’s feedback by the due date.

**Figure 8.** A Sample of Online Homework Assignment in GE 402 Project Activities Planning and Scheduling using Primavera.

From this process of completing homework, the teacher will be able to not only assess if the engineering students understand what they need to know but also to guide the students to self-motivated learning. Figure 9 shows the online homework assignment output in GE 402.
3. PROJECT MANAGEMENT SKILLS

Successful project management is essential in the construction industry. It helps to give structure to high-pressure environments, ensures the team are working to their optimum capacity and makes sure every hour is well spent (Casey, 2017).

Project management is not an easy job (Landau, 2017). In fact, it’s several not-easy jobs, including the initiation, planning, executing, controlling, and closing of a project. Even more difficult, that project is delegated to a team of individuals choosing, given specific goals to achieve over a defined timeline for a determined budget.

That’s a lot to ask of any one individual, but project managers have a variety of skills to get the job done. These include the expected technical business and management skills an individual would expect, but also a number of soft skills. Project managers aren’t only dealing with systems and processes, but also people (Al Freidi, 2014). When an individual boils it down, successful project management is built on creating and maintaining strong relationships across the organization.

Today’s project managers are expected to have specific industry knowledge, strong communication skills, and top-notch quantitative abilities, just to name a few (Bachar, 2016). With such an expansive list of necessary skills, it’s no wonder that qualified project managers are in such high demand around the globe.

Project managers have a unique skill set (Doyle, 2017). They have the responsibility of planning, procuring, and executing a project, making sure everything is on track and that everyone involved is working to their full potential. If there are any issues, delays, or problems, the project manager is the point person to work with the client or company to review how to fix it. They often are not involved in the nitty-gritty work, but instead, make sure progress is being made and keeps everyone on task. Project managers play a key role in the launch of new products, the construction of new sites, and the development of new...
programs. The role is essential in nearly every industry — a construction company will use project managers to wrangle the development of a new building, while a shampoo company may need one to launch a new product.

Figure 10. Project Management Skills

Being a project manager is tough (Scott, 2016). It requires top-notch interpersonal and organizational skills and the ability to successfully interact with team members and stakeholders alike. Project managers need to be cheerleaders and coaches, as well as leaders and team players. Almost all of the new graduates, at some point, will be part of a project – if not hundreds of projects – working with different teammates, departments, and offices. That project will have a manager, and many of them will end up managing projects themselves. Actually, when the new graduates think about it, every single day is filled with projects large and small. Some succeed, some fail. Some end up somewhere in between.

To become a good project manager, it comes down to more than just people and organizational skills. These are the skills used in every day to keep the projects on time and on budget and also, the foundation on which to build a successful career in project management.

As shown in figure 10, these skills are leadership, negotiation, scheduling, cost management, cost control, contract management, quality management, task management, communication management, risk management, and critical thinking (Harrin, 2015).
4. RESEARCH DESIGN AND INSTRUMENTATION

One of the engineering courses in Qassim University is the Project Management, a 3-unit course offered on level 10 of every semester. Project Management is the capstone course in engineering since it presents the basic principles of project management which include initiating a process, planning process, project organization, project execution process, project control & closing process. It also covers the management functions, methods of planning and program development time CPM (materials, equipment, labor, sub-contractor), the network diagram, time scaled event network, estimating project time, project cash flows, performance and payment bond and cost management, leadership, project vision and mission, delegating, motivation, constructive & positive feedbacks, decision making, team building, engineering ethics, negotiation & contracts, risk management, conflict management, stress management & anger management, SWOT Analysis, and hands-on MS Project/Primavera Planning. (Ganiron Jr, 2015). Until now, there has been no comparative study on learning in the web enhances classroom and traditional classroom in the project management.

4.1. Research Design

The researcher made use of the descriptive research method in the study. The respondent’s perception was measured on the basis of what they have experienced in the traditional and web-enhanced formats. The subjects of this study were the College of Engineering who has enrollees of 81 students in the project management course for SY 2014-2015 (traditional format) and 93 students enrolled in the same course for SY 2015-2016 web-enhanced format).

In this study, the same instructor taught project management in the traditional learning and the web-enhanced in the College of Engineering at Qassim University using the same text, the same objectives & outcomes, and the same exams (quizzes, midterm exams, and final exam).

The study compares the effectiveness of the web-enhanced learning from the traditional learning as anonymous course evaluation surveys. Both web-enhanced and traditional learning has 4 hours to lecture and interact with students in a week. The web-enhanced learning accommodates innovative teaching and learning opportunities due to two hours a day class time. Moreover, the engineering students have more time to interact with peers and work effectively together and with the teacher.

The study focuses on the evaluation of the web-enhanced and traditional learning due to the fact that colleges and universities use evaluation as one of the major components as a standard for acceptance as a teaching technique.

4.2. Instrumentation

The major tool for data gathering was the questionnaire. The questionnaire was divided into 3 parts. The first part, the students were asked to answer 5 anonymous shown in tables 3. The second part focused on the engineering students’ level of confidence by using the traditional format of the engineering students of SY 2014-2015. The third part focused on the engineering students’ level of confidence by using the web-enhanced format of the engineering students of SY 2015-2016.
The questionnaire is designed to induce the independent perception of the respondents with the use of a four (4) Likert scale response model with four (4) as the highest and one (1) of the lowest shown in Tables 1 and 2. The descriptive ratings of the mean values of the indices used are as follows:

**Table 1. Level of Confidence of the Engineering Students on Project Management Skills Gained from Different Types of Learning**

<table>
<thead>
<tr>
<th>Mean</th>
<th>Weight</th>
<th>Interpretation</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.51-4.00</td>
<td>4</td>
<td>Very high</td>
<td>VH</td>
</tr>
<tr>
<td>2.51-3.50</td>
<td>3</td>
<td>High</td>
<td>H</td>
</tr>
<tr>
<td>1.51-2.50</td>
<td>2</td>
<td>Little</td>
<td>L</td>
</tr>
<tr>
<td>1.00-1.50</td>
<td>1</td>
<td>Very Little</td>
<td>VL</td>
</tr>
</tbody>
</table>

**Table 2. Level of Agreement of the Engineering Students on Project Management Skills Gained from Different Types of Learning**

<table>
<thead>
<tr>
<th>Mean</th>
<th>Weight</th>
<th>Interpretation</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.51-4.00</td>
<td>4</td>
<td>Strongly agree</td>
<td>SA</td>
</tr>
<tr>
<td>2.51-3.50</td>
<td>3</td>
<td>Agree</td>
<td>A</td>
</tr>
<tr>
<td>1.51-2.50</td>
<td>2</td>
<td>Disagree</td>
<td>D</td>
</tr>
<tr>
<td>1.00-1.50</td>
<td>1</td>
<td>Strongly disagree</td>
<td>SD</td>
</tr>
</tbody>
</table>

In 2017, the engineering students of SY 2014-2015 and SY 2015-2016 answered the survey on the level of confidence of project management skills gained from the traditional and web-enhanced formats upon receiving their permanent status in the construction companies.

After the retrieval of the questionnaire, the data were encoded and entered into the master list. Data analysis was done using the percentage score and mean.

5. **RESULTS AND DISCUSSIONS**

5.1. **Result of the questions and interviews on learning by the engineering students**

The 5 questions in Table 1 where the engineering students answered at the end of each module or class were not as informative as the researcher hoped, even when positive (“good module” or “it was helpful”). There were a few comments about the suggested websites being
especially helpful. One engineering student wrote that he liked being able to review the lecture/PowerPoint presentations as many times as he needed. The negative comments included some about confusing content, but there were no comments specific to the modular or web-enhanced format.

Other engineering student comments were: “I wish we would have had a module similar to what we had in [the online course] rather than doing verbal case studies in class”; “I feel we needed to do the weekly assignments [in the traditional course] as we did last semester [in the online course]”; “I don't feel as though I learned a lot this semester because we only read through PowerPoint and did not do the weekly case study assignments.”

Table 3. Anonymous Questions for Traditional classroom & Web-Enhanced classroom in GE 402 Course

<table>
<thead>
<tr>
<th>Number</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How was the class/module for you?</td>
</tr>
<tr>
<td>2</td>
<td>What was the best part of the class/module?</td>
</tr>
<tr>
<td>3</td>
<td>What was the most confusing or frustrating part of the class/module?</td>
</tr>
<tr>
<td>4</td>
<td>What suggestions do you have for improving the class/module?</td>
</tr>
<tr>
<td>5</td>
<td>What are you still worried about in regards to the class/module?</td>
</tr>
</tbody>
</table>

The engineering students were asked to respond by a short answer to what they liked best about the web-enhanced format. Engineering students responded that they liked the flexibility of doing the modules when they had time; they preferred the more structured approach to the learning and believed that the online assignments prepared them better. One engineering student stated, “It forced me to sit down at the laptop, read through the material and web sites in a timelier manner, and the case studies provided me an opportunity to apply what I had just learned to a specific scenario.” Another wrote, “The modules gave me the opportunity to critically think through the material.”

The next question asked what engineering students liked least about the web-enhanced format. The majority of engineering student comments focused on the modules being a lot of work, the length of time that it took to complete the modules, and too much homework. One engineering student wrote, “I had a difficult time motivating myself to watch the modules.”

When asked what they liked best about the traditional lecture format, engineering students replied that they liked being in class and being able to discuss the material. One engineering student stated, “I am better as a visual learner, and going through the PowerPoint slides in class really helped me.” Another engineering student liked the more casual approach to the classroom discussion. He found it to be less stressful than the independent study format of online learning. A third engineering student commented, “I liked talking through the lectures and going through some case studies along the way in an interactive fashion.”
The students were then asked what they liked least about the lecture format course. The majority of the comments revealed that with the traditional course, engineering students tended to be less well prepared for class. One student wrote, “Honestly, I was not always as prepared for class as I should have been. With the web-enhanced format, I was much more prepared because I had to read the material prior to doing the assigned case study.” Another wrote, “Because there were no ‘assigned readings, I did not prepare myself as well for class...even though there was plenty of suggested readings...it was my own fault.”

5. 2. Mean Responses of the Engineering Students of SY 2014-2015 on the Level of Confidence of Project Management Skills Gained from the Traditional Format Learning

Respondents’ perception that the level of confidence to demonstrate project management skills learned from the traditional learning format has an overall mean of 2.64 which is high. As shown in table 4, each project management skills learned from the teacher has a mean between 2.23 and 3.38.

Most engineers who used traditional learning have high leadership and task management skills because of the hard work encountered in their studies, eagerness to memorized procedures and terms related to project management and conscious of their grades (Lee et al, 2011). Based on the researcher observation & experience, alumni of Qassim University who have high leadership are role models of engineers.

Table 4. Mean Responses of the Engineering Students of SY 2014-2015 on the Level of Confidence of Project Management Skills Gained from the Traditional Format Learning

<table>
<thead>
<tr>
<th>Skills</th>
<th>Outcomes</th>
<th>Mean</th>
<th>Verbal Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>My ability to lead as a team as well as manage them to show no sign of abating and inspire others.</td>
<td>3.38</td>
<td>High</td>
</tr>
<tr>
<td>Negotiation</td>
<td>I am able to resolve conflicts by finding the win-win scenarios for everyone</td>
<td>2.47</td>
<td>High</td>
</tr>
<tr>
<td>Scheduling</td>
<td>I am able to use project scheduling for the success of stakeholders</td>
<td>2.23</td>
<td>Little</td>
</tr>
<tr>
<td>Cost Management</td>
<td>I can deliver the project within the cost constraints and by managing the project finances intelligently.</td>
<td>2.36</td>
<td>Little</td>
</tr>
<tr>
<td>Cost Control</td>
<td>I am able to deliver the project within the cost constraints and by managing the project finances intelligently.</td>
<td>2.41</td>
<td>Little</td>
</tr>
<tr>
<td>Contract Management</td>
<td>I am able to actively manage suppliers and procurements</td>
<td>2.25</td>
<td>Little</td>
</tr>
<tr>
<td>Quality Management</td>
<td>I am able to deliver a product that fit for the purpose and the value that I offer to the stakeholders make them satisfied</td>
<td>2.77</td>
<td>High</td>
</tr>
</tbody>
</table>
However, respondents have a little skill in negotiation, cost control, cost management, communication management and contract management. Using the traditional format, the researcher found out the reasons of engineering students of SY 2014-2015 has a little skill in communication management, contract management, and negotiation because they are very weak in language proficiency. Majority of the teachers in Qassim University especially in the Civil Engineering Department use Arabic as a medium of instruction. Civil engineering students memorized their lectures especially the procedures and strategies in contract management and negotiation without understanding the topics just to pass their final grades.

Engineering students of SY 2014-2015 have also a little skill in cost control and cost management because Primavera planning and MS Project were not introduced in the course syllabus of Project Management. Primavera Planning and MS Project allow engineering students to break large projects into smaller, achievable projects, tasks, and activities in terms of cost control and cost management.

5.3. Mean Responses of the Engineering Students of SY 2015-2016 on the Level of Confident of Project Management Skills Gained from the Web-Enhanced Format Learning

As shown in Table 5, respondents’ perception that the level of confidence to demonstrate project management skills has an overall mean of 3.51 which is very high. Each project management skills gained from web enhanced format learning have a mean between 2.96 and 3.96.

Table 5. Mean Responses of Engineering Students of SY 2015-2016 on the Level of Confidence of Project Management Skills Gained from the Web-Enhanced Format Learning

<table>
<thead>
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<th>Outcomes</th>
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</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>My ability to lead as a team as well as manage them to show no sign of abating and inspire others.</td>
<td>3.38</td>
<td>High</td>
</tr>
</tbody>
</table>
An engineer who developed their skills in web-enhanced format learning is accurate in the following management skills such as scheduling the projects, cost control and cost management because of the technologies learned from Primavera Planning and MS Project. They are characterized such as systematic in planning and scheduling, eagerness to learn with new technology and excellent in dealing with problems through SWOT Analysis (Shea et al., 2006). The overall mean indicates that engineers are very much interested in the project management skills gained from web-enhanced format learning.

As revealed by the Engineering Students of SY 2015-2016, they are promoted from Cadet Engineer to Project Engineer and received a competitive salary in the construction industry because of the knowledge they had in Project Management.

In figure 11, most of the project management skills using web-enhanced of engineering students of SY 2015-2016 on the level of confidence of project management skills gained from the web-enhanced format learning are higher compared with the engineering students of SY 2014-2015 on the level of confidence of project management skills gained from the traditional format learning.

However, project management skills such as leadership and task management have the same amount of level of confidence in terms of learning. This means whether it is the...

<table>
<thead>
<tr>
<th>Skill</th>
<th>Description</th>
<th>Score</th>
<th>Evaluation</th>
</tr>
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<tbody>
<tr>
<td>Negotiation</td>
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<tr>
<td>Scheduling</td>
<td>I am able to use project scheduling for the success of stakeholders</td>
<td>3.96</td>
<td>Very High</td>
</tr>
<tr>
<td>Cost Management</td>
<td>I can deliver the project within the cost constraints and by managing the project finances intelligently.</td>
<td>3.84</td>
<td>Very High</td>
</tr>
<tr>
<td>Cost Control</td>
<td>I am able to deliver the project within the cost constraints and by managing the project finances intelligently.</td>
<td>3.87</td>
<td>Very High</td>
</tr>
<tr>
<td>Contract Management</td>
<td>I am able to actively manage suppliers and procurements</td>
<td>3.72</td>
<td>Very High</td>
</tr>
<tr>
<td>Quality Management</td>
<td>I am able to deliver a product that fit for the purpose and the value that I offer to the stakeholders make them satisfied</td>
<td>3.27</td>
<td>High</td>
</tr>
<tr>
<td>Task Management</td>
<td>I am able to create a task list, delegate work to others and keep on top of progress</td>
<td>2.96</td>
<td>High</td>
</tr>
<tr>
<td>Communication Management</td>
<td>I am able to meet project expectations largely because I communicate effectively.</td>
<td>3.66</td>
<td>Very High</td>
</tr>
<tr>
<td>Risk Management</td>
<td>I am able to control risk as far as I can</td>
<td>3.43</td>
<td>High</td>
</tr>
<tr>
<td>Critical Thinking</td>
<td>I am able to equip myself with tools and approaches to help the stakeholders’ structure arguments logically and see things from all angles before making the final decision.</td>
<td>3.16</td>
<td>High</td>
</tr>
<tr>
<td>Overall Mean</td>
<td></td>
<td>3.51</td>
<td>Very High</td>
</tr>
</tbody>
</table>
traditional or web-enhanced format in these skills, there is no effect in their level of confidence.

Leadership and task management are project management skills that can be learned through personal experience in life. While in the classroom, engineering students learned the theory, different approaches, process, how it influences, significance, assumptions, applications, and limitations of the basic principles of leadership and task management as they apply to their working environment.

Figure 11. Traditional vs. Web Enhanced formats

6. CONCLUSIONS AND RECOMMENDATIONS

Research such as web-enhanced format has several implications to project management skills. Because of the perceived costs savings and popularity of web courses with students, the trend of converting courses to online delivery continues. The researcher believes that training engineering faculty to adapt to the technology available may empower teachers with the tools needed to function and flourish economically in this new construct of project management course.

The result of the mean responses of engineering students of SY 2015-2016 on the level of confidence of project management skills gained from the web-enhanced format learning was significantly higher than that of the engineering students of SY 2014-2015 gained from the traditional format learning. One explanation for the higher achievement by the web-based group was the availability of immediate and adapted feedback on homework items. Engineering students taking the web-based practice were able to instantly determine whether their answers were correct or incorrect. On the practice homework, the feedback and
immediate result checking allowed engineering students to recognize their mistakes and re-attempt the problems if their answers were incorrect. This feature ultimately helped engineering students adjust their computational technique and revise incorrect procedures during the practice process. The engineering students appreciated the opportunity to reattempt items and make corrections.

For the engineering students of SY 2014-2015 using traditional format, the homework feedback was not received until the following day. By that time, the engineering students had already begun working on new material and were not highly interested in specific feedback. The randomized items with contexts changing on each assignment provided the opportunity for enriching practices.

Engineering students taking the web-based practice were able to take and reattempt each homework task as many times as they wished. Every time they retook each homework task, the wording or numbers used in the items as well as the required computational procedures were slightly different, but the mathematical content and concepts remained the same. Therefore, these engineering students experienced a greater number of different items on the same mathematical procedures in various contexts.

On the other hand, the engineering students of SY 2014-2015 perceived the alternative homework sets as additional work and were not motivated to complete them. The exposure to new and different learning tools provided a break from classroom routine. However, the engineering students of SY 2015-2016 were taken to the computer lab and tried a new method of practice. Working on the web-based practice was considered an exciting experience according to some students because they had never had an opportunity to do Primavera Planning or MS Project using computers. Besides sitting at the computer and working with the keyboard in doing Primavera Planning, engineering students of SY 2015-2016 were highly stimulated by the new features such as the help, instruction, check buttons, and immediate score on the assignment.

Furthermore, with the web-based setup, engineering students could approach each assignment as many times as they liked until they were satisfied with their performance or felt confident in their understanding. Learning how to operate the computer keyboard to input the answer in the provided box and learning how to get help and feedback and access the final score were considered exciting by the engineering students. This excitement was expressed by the number of times that engineering students checked the help button and accessed the final score.

The web-enhanced learning used in this course, lectures using LCD projector, Primavera Planning and MS Project have been high in tapping a number of skills in project management. This implies that although its use may lead to higher efficiency, the learner may find it difficult to be fully attentive, hence may not learn as much as expected. The use of the other techniques such as construction site visits, argumentation & debates, SWOT analysis and other group activities is more involving and fun to the engineering students.

The learning facilitator noted that mapping out the skills for each instruction technique allows one to be more aware of the distinctions among the engineering students with respect to their learning styles. If an instruction technique addresses most of the engineering students’ skills, then they learn much more at that span of time. Therefore, this is a practice that must be adopted by a web enhanced learning facilitator in his pursuit of higher efficiency. Without using web enhanced format, learning facilitators could still be effective as long as they are able to catch the attention of the class through humor and fun and the use of multimedia. The
learning facilitator must be open to learning from the engineering students and should retain a sense of wonder that could be passed on to the engineering students. In so doing, professional preparation becomes more thorough because it was more enjoyable than cumbersome.

It can also be concluded that engineering students in the web enhanced learning strive for excellence because the learning allows them to focus deeply on one subject in an environment which stimulates learning plenty of class time; expert instructors, peer tutors, and the stakes are high. From the findings, there is no doubt that the project management skills and English proficiency of the engineering students in the enhanced learning improve more than the students in the traditional learning. The results of this exploratory study also indicate web-based format can offer a unique opportunity to improve students’ learning skills and practices when embedded into a cohesive curriculum that will be used in their career as a mechanical engineer or civil engineer.

References


