Opening Pandora's Box: An Active Learning Approach to Teaching Project Management

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Abstract. Given the global skills requirement for competent project managers, Higher Education Institutions are forced to adapt their pedagogical practices in order to deliver "industry-ready" graduates. A number of approaches have been adopted by HEI in preparation for competent graduates such as self-directed learning, problem-based learning, collaborative work or active learning. This paper reports on an active learning approach that was taken to teach second year, information systems design (ISD) students' project management skills. This is in preparation for the capstone project, a collaborative turnkey project for a real-life client, where it was noticed that students struggle with project managing the project, their other academic commitments and life. This study adopted an active learning approach by constructing a project management tutorial in such a way as to simulate challenges students might experience when completing their capstone project. Students, in groups of five, each received a box of 20 challenges that they first had to prioritise individually, and then as a group. Students were asked to complete three tutorial questions following this activity which were thematically analysed. They were also asked to complete a short survey on the principles of active learning. The findings suggested that an active learning, simulation based approach was valuable to the students and exposed them to real-life project management challenges. Students were able to identify key activities that caused strain in setting up a common schedule. Tools/techniques that were used to compromise in setting up a common schedule are communicated. Lessons learnt by the students and reflection from the lecturers provide recommendations to ISD lecturers on teaching project management.

Keywords: Active learning · Information systems design · Undergraduate teaching · Simulation-based teaching

1 Introduction

The global skills gap is a phenomena that refers to the deficiency between the skills required by employers and the skills (or lack thereof) of young graduates [1]. This gap is estimated to grow as the skills demanded by the introduction

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of the Fourth Industrial Revolution is expected to grow [1]. Many researchers have proposed practical approaches towards addressing this problem such as self-directed learning [2], problem-based learning (also referred to as case-based learning) [3,4], collaborative or group work [3] and technology-enhanced learning [3] (to name a few). In the majority of studies the need is for tertiary education institutions to supply in demand, 'work ready' young graduates. Given the old, passive instructional approaches followed by tertiary educational institutions, this seems like a challenging demand to meet.

Constructivism is classified as a traditional learning theory that refers to learning as an active process during which learners construct their own, new ideas based on their current or past knowledge and experience [3,5]. The learner is actively involved in the learning process, as opposed to passively listening. One method often adopted by educators to actively involve learners is active learning. As a result, students engage in the classroom with fellow learners with the objective of solving practical problems. Learners often acquire new knowledge and skills without realizing it. The end result is the construction of their own knowledge.

Studies focusing on constructivism, in particular active learning approaches, are not just used in IT education. In fact, research on the topic is interdisciplinary applied in many faculties such as cognitive psychology, physiology, educational psychology, and learning sciences [3].

A major challenge for information systems design (ISD) undergraduate students is the application of their theoretical knowledge to the management of project constraints i.e. applying theory to practice. Students must learn to be able to systematically identify constraints in a project environment and be able to decisively plan how to manage and schedule the constraints. Typically the opportunity for students to develop these attributes before undertaking their third year capstone project are limited. Simulation can assist students develop the required attributes. The aim of this study was to evaluate the use of simulation-based teaching in the ISD second year undergraduate curriculum in the context of project management of constraints using active learning's decision-making activity and case based learning. In a similar study, a research project titled "Quality of Norwegian Higher Education: Pathways, Practices and Performances" highlighted the importance of simulation in the higher education sector. The study focused on how simulations are designed and used and subsequently outlined various different ways for simulation to be carried out. For example, healthcare made use of high-tech mannequins, education management made use of role playing for interviews and the simulation for law included the creation of a stage courtroom with students role playing the various officers of the court [6]. The main aim of simulations in the Norwegian study, as well as this study, was to bridge the gap be-tween theory [7] and practice which was the main aim for this research.

In this study, the active learning is adopted to expose second year learners to practical project management concepts. Project management as a discipline is known for its dynamic, agile requirements demanding more than just theoretical knowledge of the key principles of managing scope, time, budget and quality. In an attempt to provide structure to the research question, namely - how effective is

the adoption of an active learning approach (in particular case based simulation) towards bridging the gap between the project management theoretical concepts and the practical application thereof in second year students - five principles of active learning, as proposed by Michael [3] was adopted. The five principles are discussed in Sect. 3.

2 Literature Review

2.1 Active Learning

Active learning focuses on the fostering of students skills as opposed to the passive transmission of information. The student must engage on a higher level of thinking which is developed through the immersion in an activity. Students are encouraged to explore their own opinions and tenets. Active learning can range from modest class tasks like briefly stopping the class to enable students to dis-cuss with their peers to more involved tasks like immersing students into a case study [8]. Brame [9] states that providing an environment for students to think about their own learning process facilitates the linking of action and learning. Active learning has demonstrated its success in many disciplines and has proven to foster an inclusive environment for student learning. Freeman et al. [10] conducted a meta-analysis of 225 studies in STEM disciplines. The studies examined the design of class lessons with at least some active learning versus traditional lecturing. The meta-analysis compared the failure rates and student scores on examinations, concept inventories, or other assessments. The findings revealed that students in traditional lectures were 1.5 times more likely to fail than students in courses with active learning. The results were consistent across the disciplines of biology, chemistry, computer science, engineering, geology, math, physics, and psychology. Another research project involved the analysis of 166 studies by Ruiz-Primo et al. [11]. Published studies were examined to determine the effects of active learning approaches in undergraduate biology, chemistry, engineering and physics courses [11]. The finding indicated that active learning approaches improved student outcomes, although there are important limitations to deliberate.

Brame [9] collated the work of various authors to summarize the active learning techniques and activities that can be used in higher education lectures. Some of these techniques include the pause procedure, retrieval practice, demonstrations, think-pair-share, peer instruction, minute papers and strip sequence. Table 1 briefly summarizes these techniques. This study used the active learning techniques, decision-making activity and case based learning. The decision-making activity for this research required the students to imagine they are working on a project in a five member team. Each group member had to justify their decision and explain their reasoning for arriving at their prioritized set of constraints. The group then had to critically discuss and formulate a group prioritized list of constraints. This engaging technique assisted students to critically analyse a perplexing problem and encouraged them to find creative solutions. This provided students with a feel of real-world challenges and complexity

involved in resolving conflict. The research can also be categorized as the active learning technique, case-based learning. Similar to decision-making activities, case-based learning immerses students in situations from the "real" world that require students to apply their understanding to make a decision. The students were provided with a case, they had to then decide what is relevant to the case and what other information they may need. They considered what impact their decisions may have taking into account the broader implications of their decisions. The best value obtained from case-based learning is from the complexity and myriad of answers that were generated.

Table 1. Active learning techniques

Technique	Brief description
The pause procedure	Pause for two minutes every 12 to 18 min, encouraging students to discuss and rework notes, question and clarify in pairs
Retrieval practice	Pause for two or three minutes every 15 min, allow students to write everything they can remember from the 15 min of class time. This method encourages students to retrieve information from memory enabling them to digest the content before proceeding to the next level
Demonstrations	Ask students to predict the result of a demonstration, briefly discuss it with their peers. After demonstration, ask them to discuss the actual result and how it may have differed from their prediction. The lecturer can thereafter provide an explanation
Think-pair-share	Ask students a question from the application, analysis, and evaluation levels of Bloom's taxonomy. The students must write down their answer for one minute and thereafter discuss the answer with their peer for two minutes. This will ensure the students think critically about their answers
Peer instruction	This is a modification of the think-pair-share using technology (e.g., clickers). Pose a conceptually based multiple-choice question. Ask students to think about their answer and thereafter respond. They can then discuss with a peer and possibly change their answer. Following this, the lecturer shares the results and discusses with the class
Minute papers	Ask students a question that requires them to write a reflection on their learning for one minute. Lecturers can use responses to inform future classes
Strip sequence	Give students the mixed up steps of a process on pieces of paper. They must work together to reconstruct the proper sequence fostering logical thinking

2.2 Project Management

A project is a set of activities with a defined scope and resources aimed at achieving an objective. Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements [9]. Successfully realizing the project objective can be constrained by many factors,

scope, quality, budget, time, risks, customer and stakeholder expectation [10]. Many projects have under-performed by exceeding costs or not meeting expectations. The core function for project management is to manage resources within the constraints encountered in the project environment [11]. For this reason, this study chose to develop a simulation exercise on project constraints. Goldratt (1990; cited in [12]) put forward the theory of constraints which is a systems thinking approach, that a complex system at any point in time has one or more constraints that restrict it from achieving its goal. Project management which is relevant across industries and sectors use this theory extensively. More specific to project management is the theory of triple constraints which states that the triangle of time, cost and scope must be in balance in order to achieve the project goal. The trade-off includes increased scope resulting in increased time and/or budget, decreased time resulting in decreased scope and/or increased budget. The cause and effect of the triple constraints are negotiated and trade-offs made throughout the life of the project.

Project scheduling is a key management activity if not the most crucial. Scheduling specifies the timeline for project completion, the budgeting of the resources and the sequencing of the tasks to be accomplished. Project scheduling is defined as the process of ascertaining when project tasks will take place based upon circumscribed periods and industry standards. Schedule constraints involve specifying when an activity should begin or end, based on attributes such as resource accessibility, target dates or other time constraints. Project scheduling is a multifaceted and iterative process that involves determining dependencies be-tween tasks to ensure the right order is scheduled, planning realistic start and end dates and determining the tasks that are critical for successful project completion [9]. This study explored the challenges experienced by students when setting up a project schedule.

3 Theoretical Foundation

Evidence suggests that active learning can be successfully applied across disciplines [3,13]. Seminal work conducted by Michael and Modell (2003; cited in [3]) proposed generic principles towards successfully adopting an active learning approach. These principles were considered in conjunction with research on the topic of constructivism by Olusegun [5], focusing on active learning. The five principles are:

Principle 1: (a) "learning involves the active construction of meaning by the learner." This can be achieved by employing self-organizing project teams where the focus shifts to self-governing teams. In this approach, team members take psychological ownership to complete tasks [14]. This is further supported by the constructivism theory whereby the lecturer acts as facilitator rather than instructor [5]. (b) "If previous knowledge is flawed then it will take long-er to fix errors." Individual team members' personal frame of reference, which are formed by previous exposure to a project management environment, are imperative towards the successful acquisition of new knowledge [15].

Principle 2: "learning facts and learning to do something are two different processes." This is particularly true in an environment where learners are exposed to a project management environment. Many authors have acknowledged this challenge and adopted innovative approaches in an attempt to over-come the challenge, for example a game-action learning approach (GAL) whereby knowledge can be applied in different scenarios [16] and the use of simulations and real world projects [17].

Principle 3: "Some things are learned specific to the domain or context in which they are learned." From a practical project management application point of view this contributes to the challenge of exposing learners to real-world projects that can facilitate realistic real world environments. Adding to the challenge is the need for learners to apply their knowledge across disciplines, in this instance computer science, information systems or management sciences. This adds to the project complexity of managing projects in a diverse environment [18].

Principle 4: "Individuals are more likely to learn from one another than when they learn alone." Gil and Mataveli [19] support this principle and refer to peer learning as project learning.

Principle 5: "Meaningful learning is facilitated by articulating explanations by one's self, peers or teachers." This principle is related to principle 4 and supports the concept of project learning by Gil and Mataveli [19].

4 Case Study

One of the aspects that is included in the second year ISD curriculum, is project management. Theoretical concepts related to project management such as feasibility analysis, triple constraint of project management are covered in class and students are taught how to use a project management tool such as Microsoft Project. Project management is a necessary skill that students need to learn in preparation for the capstone project in their third year. In order to prepare them for the possible issues they might encounter in their capstone project, a tutorial was designed to make them aware of the issues they might have to "manage". The tutorial was designed as such:

- Obtain a list of issues that capstone project students have encountered when completing their project. The issues ranged from academic commitments such as tests (for core modules and electives) that need to be written on a specific date, an assignment submission, group meeting to work on an assignment, social commitments (meeting up with the boyfriend/girlfriend) and family commitments such as attending your grandfather's birthday. This was obtained from the assistant lecturers (fourth year students that completed the capstone project the previous year).
- Print these issues on different colours of paper and put it in the "box of challenges", as illustrated in Fig. 1.

Fig. 1. Box of challenges.

Fig. 2. Completing the activity.

- Students were encouraged to attend the class in their project groups as far as possible (so that team members can learn about one another - as an effort to improve team dynamics).
- Each group of five members (the majority of groups were the team members) each got a set of 20 commitments/challenges (a mixture of academic, personal and social) which they had to individually prioritise, as illustrated in Fig. 2.
- After individual prioritisation, the group needs to compare their priorities and work out a schedule that will work for the group.

5 Methodology

In order to assess the success of the activity the authors followed an interpretive approach, acknowledging the subjective nature of the data that was collected from the students [20]. The interpretive approach further suited the nature of Active Learning [3] where students interpreted the situation individually, discussed it as a collective group before reflecting on the process. Following this, the groups had to answer the following questions:

- What were the main areas of conflict?
- How did you as a group come to a compromise?
- What did you learn from this exercise?

Thematic Content Analysis [21] was used to analyse the tutorial answers to the above questions. One researcher read through the tutorial responses (45 in total) and identified the themes that emerged for each question. These themes are presented in Figs. 3, 4 and 5 below.

For the second part of the study, students were asked to complete a survey based on the principles of active learning [3] to measure the extent to which the exercise was successful. The questions and the results are presented in Sect. 6.4.

Inferential statistical analysis was conducted on the Principles of Active Learning survey. The survey was answered by 187 students, with 185 complete responses. Results of the analysis are presented in Sect. 6.

6 Analysis and Discussion

The aim of the paper is to report on the level of success of an active learning tutorial to teach second year students about how to manage "real-life" constraints when setting up a common project schedule. This tutorial was set up with the help of fourth year ISD students who were able to suggest common challenges they struggled with whilst working on their third year capstone project. As the objective of the second year ISD module is to prepare the students for their capstone project (which involves extensive and intense group work), the tutorial was designed to assist with that.

6.1 Main Challenges in Creating a Joint Schedule

Thematic analysis has revealed the challenges students experienced. The major challenges are illustrated in Fig. 3 below. At the core of project management teaching, is the concept of the project management triple constraints: balancing performance, cost and time [9]. The simulation exercise attempted to address the performance and time aspect. In a simulated university environment the main trade-offs existed between balancing social and academic commitments, and the extent to which that can be balanced will affect the performance of the group. The major challenges identified by the students were:

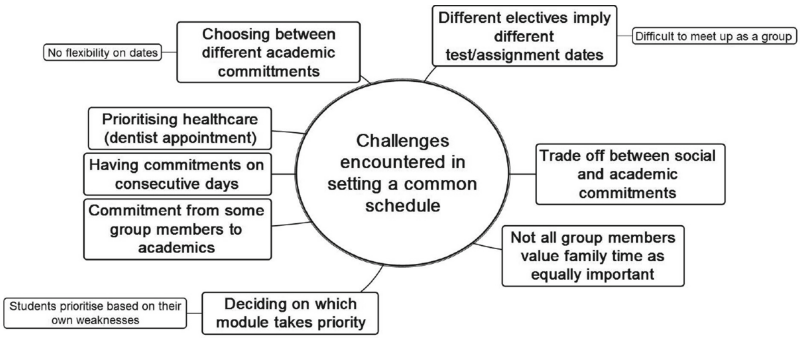

Fig. 3. Challenges encountered in setting a common schedule

Balancing Different Academic Commitments. The students struggled to compromise on different academic commitments. A group often consists of members having different electives, and that implies that each member will have different assessment dates for their respective electives. As the dates are usually very close to one another, it is difficult for the students to find common ground in choosing between the "semester test" of one module and the need to work as a group on a "group assignment" for another module.

Furthermore, students indicated that depending on what is their "problem" module, they might require to spend more time in preparing for a test, which might not be in balance with the rest of the group's capabilities.

Balancing Social and Academic Commitments. The second major challenge highlighted by students is the ability to attend to social events (one of the examples given as a challenge card was "going out with your BFF") and one response was that you could not "sideline your BFF". Other approaches to this dilemma were that it was obvious that academic work always take precedence over social commitments. Although not on a social level, students in the study by Geithner and Menzel [22] mentioned that they learned how to structure tasks and subsequently prioritize commitments.

Students Value Family Time Differently. It was evident from the responses that the fact that some students in the group valued spending time with family as more important than other group members, and this created a challenge when creating a common schedule. One of the examples given in the challenge card was "attending your elderly grandfather's birthday".

The Importance of Healthcare. One of the challenge cards indicated that you have to attend a dentist appointment. A number of the 45 groups referenced the dentist appointment challenge, indicating that healthcare should take precedence over academic/social commitments, whilst other responses focused on the discourse surrounding the nature of the dentist appointment and whether it was an emergency or not. Although the scenarios presented through the challenge cards were not exhaustive, it attempted to simulate the "real-life" aspects that will impact a group's ability to perform within a time constrained environment (something which they will experience in their capstone project).

6.2 Compromises Made in Creating a Joint Schedule

The next part of the tutorial was to learn how the students compromised given the challenges experienced, in order to create a common schedule between the group members. Thematic analysis revealed a number of ways students compromised, as displayed in Fig. 4. The most important compromises will be discussed in turn:

Priority Depends on Context/Seriousness of Condition. This aspect is related to the fact that at least one of the students in the group received a card that indicated that s/he had to attend a dental appointment. Students had a discourse on the nature of the appointment, whether it was an emergency or not, can you move it? Although the example of a "dentist appointment" is simple, the discussions surrounding the challenge that this appointment provides

to the group and their ability to perform well, are important in negotiating the group's expectation from the specific group member depending on how well they understand the nature and context of his/her challenge. Group members need to decide on the negotiation process that will be followed for the duration of the project. The choice will be between hard, soft or principled with the objective being to minimize loss for the least negative effect [23].

Make Sacrifices for the Future. One group (from 45) indicated that it helps to be "forward thinking" in realizing that the sacrifices they have to make now, will be worth it for any future rewards.

Activities with No Dedicated Time Slot Need to Be Managed Personally. A number of commitments such as "going to the gym", "going on a date with your boyfriend/girlfriend", and "babysitting your cousin's child" were included in the box of challenges. The majority of groups have demoted these commitments as less important than academic commitments. However, a discussion surrounding these types of commitments highlighted the extent to which academic and social life need to be balanced. One group suggested that "extended family" should help with "babysitting duties" which emphasized the support students might need in order to balance their commitments. In Pretorius and Hattingh [24] it was argued that students do not work in isolation and that their learning environment is both impacted by their personal and academic environment.

Develop a Hierarchy of Work. One group suggested that as a group, they need to develop a hierarchy of work. This particular group prioritized group work at the top, followed by individual assignments, then studying for any tests and then social commitments. Group members need to establish ground rules as part of their common schedule negotiation [23].

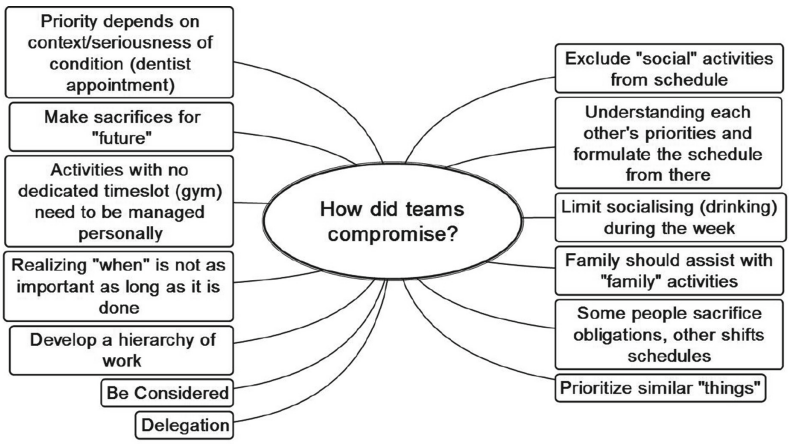

Fig. 4. Compromises made by students

Sacrifice vs Re-schedule. Groups have realized that in order to compromise, they had to either sacrifice an activity (usually social activities), or that they can/should re-schedule activities as to not to impact on the performance of the team. This is an interesting distinction made by the students and might be due to the fact that students developed a better understanding of the needs of fellow team members, similar to a study by Geithner and Menzel [22].

Prioritise Similar Things. The final strategy that was put forward by a number of groups is to prioritise similar things. This is similar to point four where a hierarchy of work needs to be developed. By prioritizing similar things, it is less likely that group members might feel that they compromise the whole time whilst other members do not have the same level of commitment. Again, this is in line with the study by Geithner and Menzel [22] where team members developed better understanding of fellow students' needs.

6.3 Lessons Learnt by the Students from the Tutorial

Although the true benefit of this active learning exercise will only be evident when the students complete their capstone project, some of the lessons learnt is transferable to other aspects of life. This will be discussed further in Sect. 6.4, principle 3. Thematic analysis revealed that the students have learnt a number of lessons by completing this tutorial. Figure 5 outlines the lessons learnt, and the most important lessons learnt will be discussed in turn:

The Need to Plan Ahead. The Core of Project Planning is to Plan Ahead. However, students often struggle with that. As the "box of commitments" included a variety of commitments, both academic and social but also a number of academic commitments within a module and across other modules (electives), students were able to see that if they want to find time to work on a group project, they will have to plan ahead.

Completing Activities on Time (Time Management). Another key aspect of project management which was recognised by the students. Students are also exposed to a project management tool, such as Asana which will allow them to see the dependencies between activities if deadlines are missed.

Consequences of Making Hard Choices. The activity allowed students to consider sacrifices and compromises they had to make in order to reach their academic goals. The activity questioned their levels of commitment in meeting those goals. This "lesson" is hopefully key in them realizing that hard work now will pay off later. The use of the simulation exercise enabled the integration of the knowledge the student gained during the theoretical lecture with the practice of constraint decision-making [8].

Individuals' Value Systems Differ and Prioritise Differently. The subjectivity of the human has transpired through this lesson learnt. Group members got to know themselves in relation to their group members and learnt that as

each of them are individuals they have different priorities, different value systems, different ways in which they handle different levels of pressure and that they have different levels of commitment in reaching their goals.

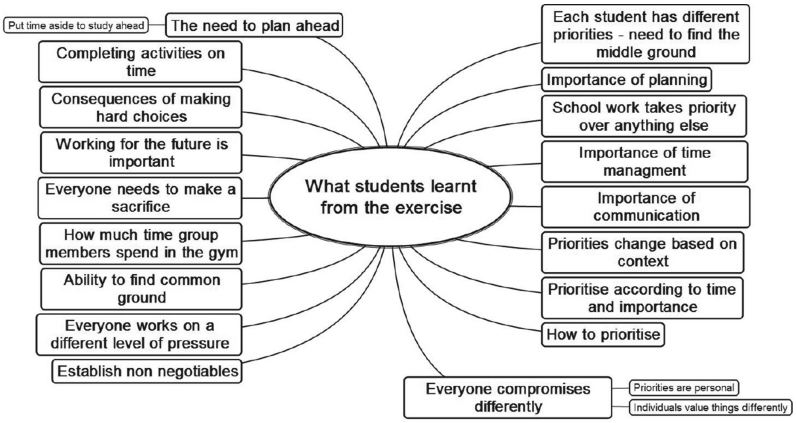

Fig. 5. Lessons learnt by students from tutorial

How Much Time Individuals Spend in the Gym. Going to the gym is a metaphor for all those "other important" commitments that group members might have.

Importance of Communication. Communication is a significant knowledge area according to PMBOK [9]. This exercise encourages communication between group members about their individual priorities. It was evident that with better communication group members might understand the context of some challenges experienced by group members and as a consequence might compromise on their contribution to the combined schedule.

6.4 Extent to Which Active Learning Principles Were Met

A survey of 13 questions was released to the students. 188 students completed the survey with 186 complete answers. The results indicated that students agree that the principles of active learning have been met: 59.8% strongly agreed/agreed that principle 1 has been met, 45.2% strongly agreed/agreed that principle 2 has been met, 71.8% strongly agreed/agreed that principle 3 has been met, 58.9% agreed that principle 4 has been met and 71.5% agreed that principle 5 has been met.

It is not surprising that principle 2's scores were lower, as students still have to practically apply these skills they have learnt through the tutorial. Table 2 provides the items against which the extent to which the principles of active learning were met. Questions 2, 3 and 11 were omitted in the correlation analysis. Question 5 was reversed scored. See Table 3 for the results of the reliability test.

Cronbach alpha values are in indication of construct reliability. The instrument questions were formulated based on the five theoretical principles of active learner and no further consideration was given to this result. One explanation for the low values might be due to the low number of questions asked and the heterogeneity of the questions due to the diversity of the five principles.

Table 2. Questionnaire for principles of active learning

Principle	Question
1	1. The class exercise assisted me in understanding the theoretical concept of managing project constraints better
1	2. Prior to the class, I had no prior knowledge of how to manage project constraints
1	3. Prior to the class, I had some knowledge of how to manage constraints in projects but it was not 100% correct
1	4. The class exercise enabled me to understand how to manage project constraints better
2	5. At the end of the theoretical explanation of project constraints, I was still a bit unsure of how to practically apply it*
2	6. At the end of the practical exercise I had a clear understanding of how to manage project constraints.
3	7. I will be able to practically apply this approach to handling constraints in my personal life
3	8. I will be able to practically apply this approach to my current, study-related IT projects
4	9. I learned a lot from my fellow students (team members)
4	10. I learned more from my fellow students than what I would have learned when studying alone
5	11. The explanation of concepts by my lecturer assisted in my understanding of project constraints
5	12. The explanation of concepts by my fellow students assisted in my understanding of project constraints
5	13. Explaining to my fellow students, the reasoning for the prioritization of my allocated constraints, assisted in my understanding of project constraints

Table 3. Reliability analysis

Principle	Chronbach alpha
Principle 1	0.63
Principle 2	0.497
Principle 3	0.659
Principle 4	0.620
Principle 5	0.554

Table 4 presents the correlation results between the principles. Due to space constraint only the most prominent correlation will be discussed. The strongest correlation existed between principles 4 and 5. Both of these principles are related to "how" learning takes place: in a group (principle 4) and through the peers

Table 4. Correlation analysis results between active learning principles

	Principle 1	Principle 2	Principle 3	Principle 4	Principle 5
Principle 1	1	0.313**	0.364**	0.285**	0.372**
Principle 2		1	0.173*		0.281**
Principle 3			1	0.146	0.255**
Principle 4				1	0.503**
Principle 5					1

(principle 5). From the previous sections it was evident that group members had to articulate how they prioritise, which allowed group members to understand their context and situations. Through this, they learnt about challenges working in a group, which are not unique to undergraduate students that are forced to work in groups [25].

Although there were significant correlations between the other principles, none of them were very strong. This might be noteworthy and can subsequently be investigated in future studies.

6.5 Reflection from the Lecturers

From a lecturing perspective, the active learning tutorial was regarded as a success. As supported by the findings discuss, the lecturers observed active class discussion, were called in to clarify given "commitments" which is important to understand the context of the potential challenge which will enable the group members to prioritise accordingly. Feedback from the students (gathered at the time of the active learning principles survey) were overwhelmingly positive. Therefore, the positive aspects from the active learning tutorial can be summarized as (1) an enjoyable activity for the students; (2) fostering group dynamics for groups that managed to attend in their project groups; (3) students came to the realization of managing available resource (them) versus time, and the potential implication for group performance.

Following the completion of the activity, the lecturers have decided that when this activity is implemented again next year the following changes will be made: (1) encourage well in advance group members to attend in their project group as the activity can be expanded to induce reflection on team dynamics; (2) Don't assign dates to all social/non-academic commitments. It was observed that in certain instances assigning a date constrains the students' planning capability.

7 Conclusion

This study determined that the adoption of active learning simulation involving a decision-making activity and case study simulation was effective in teaching project management to second year students. This study used Michael's five

principles of active learning to confirm that an active learning approach to second year project management is valuable. The exercise used for the case study was successful in highlighting the different challenges students experience with regards to balancing different academic commitment - especially if their electives differ, balancing academic work and social commitments, and the importance of family and healthcare. The exercise was further successful in identifying strategies students can employ to compromise on developing a joint schedule for the members of the team. Furthermore, an important part of the exercise was that the students could reflect about the exercise and discuss what they learnt from it. The lecturers found this exercise valuable and insightful and keeping the recommendations of the previous section in mind, will repeat this exercise in the future and compare the results with the findings of this cohort.

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