

# Redesigning the Assessment of an Entrepreneurship Course in an Information Technology Degree Program: Embedding Assessment for Learning Practices

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**Abstract**—Entrepreneurship is a novel course in the curriculum for students in the Information Technology (IT) degree program at La Trobe University, Bundoora, Australia. In comparison to other IT-related courses, the Entrepreneurship course seeks to develop business management knowledge and skills; its learning design is thus different to that of other courses in the IT program. The concept of constructive alignment for curriculum renewal suggests that there are several components of good course design. In this paper, we use the principles of constructive alignment to analyze and redesign several components of the Entrepreneurship course. The focus is on reviewing and aligning the assessment tasks to ensure an effective evaluation and the achievement of student learning outcomes. Since assessment drives student learning, we describe the innovative assessment tasks that were implemented to enhance student learning, provide the rationale for the design of these tasks as supported by the current literature, and reflect on possible future improvements. The course redesign process and the constructive alignment and innovative assessment can be applied to other courses in the field, and more broadly to curriculum, teaching, and learning in higher education.

**Index Terms**—Assessment, constructive alignment, course design, curriculum, entrepreneurship, higher education, information technology (IT), learning.

## I. INTRODUCTION

THE CONCEPT of constructive alignment, first introduced by Biggs in his seminal work “Enhancing Teaching through Constructive Alignment” [1], has been widely applied in course and curriculum renewal in tertiary education and has been adopted across the higher education sector in various disciplines. The principle of constructive alignment in course design is to ensure that all the components of a course are designed, implemented, and evaluated as an integral system. Under constructive alignment, intended learning outcomes (ILOs) drive the learning, teaching and learning activities are aligned with the ILOs to teach each capability, and the assessment tasks evaluate what students are intended to learn and what they actually did learn. Students thus experience

a cohesive learning experience that allows them to achieve the ILOs.

The assessment task is the component that has received particular interest from researchers and practitioners. The time spent on a topic and the associated assessment tasks signals its level of importance to the students and that this drives student learning. In this paper, the authors focus on designing the integrated assessment tasks for learning in the Entrepreneurship course offered to information technology (IT) students.

The Entrepreneurship course teaches students the process, knowledge and skills required for starting a new business. The skills that the students need to develop during the course are very different to those acquired in other courses in the IT program. While most IT courses focus on developing inquiry/research and problem-solving skills, the Entrepreneurship course places a strong emphasis on writing and speaking skills and aims to improve the broader business, communication, and management skills that graduates need in order to succeed in starting a business enterprise.

The Entrepreneurship course was completely redesigned with the aim of creating a cohesive course that enhances students’ learning. This paper presents the rationale for the redesign of the assessment task components, which are based on qualitative evaluation and draw upon current literature and existing practices in various institutions.

Section II provides the background to this redesign and the challenges addressed in using constructive alignment to develop the components and the course content. Sections III and IV describe the new assessment tasks and their contribution to student learning. Section V provides a reflective evaluation of the design, and Section VI concludes the paper.

## II. TEACHING ENTREPRENEURSHIP

### A. Background

In recent years, universities have taught entrepreneurship in their IT degree programs to address a gap in graduate outcomes. Having courses in entrepreneurship in IT programs is not new; traditionally, it takes the form of engineering- or business-based study around either technology commercialization or opportunity recognition [2].

IT graduates have the technical skills to create innovative products and services that have great potential for business and commerce. They follow various career paths, and some will start

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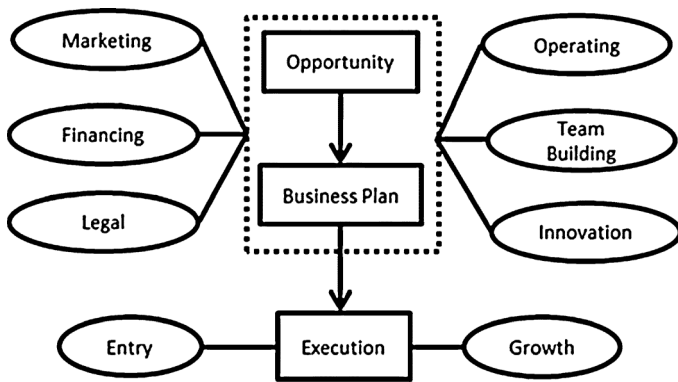


Fig. 1. Entrepreneurship course content.

their own business enterprises. Often, though, they do not have the skills and knowledge required to develop and maintain a business. This idea is supported by researchers such as [3], who have argued that the entrepreneurship curriculum does not help prospective entrepreneurs, as it does not teach the skills or content they actually need. This paper emphasizes the teaching and assessment of entrepreneurship skills and knowledge.

The need to introduce entrepreneurship in higher education has increased significantly in the last decade. Two out of three colleges and universities in the US offered entrepreneurship courses in 2004, triple the number for the previous decade [4]. There is a large amount of common content in the delivery of these courses, summarized in Fig. 1.

The Entrepreneurship course has three main content components that identify the core threshold concepts of the entrepreneurship process: *opportunity identification*, *business plan development*, and *execution strategy*. The first two of these cover marketing, operating, financing, team building, legal issues, and innovation. The third discusses entry and growth strategies of an enterprise.

It is inevitable that a course's content will depend upon the intended learning outcomes. For example, a business school offering an entrepreneurship course will place a large emphasis on marketing and financial components, whereas an engineering department will place the emphasis on the innovation and operation process. Nevertheless, all entrepreneurship courses cover the content shown in Fig. 1.

### B. Realigning Subject Design Through Constructive Alignment

Applying constructive alignment in course design ensures that students have a cohesive learning experience and achieve the learning outcomes. Biggs [1] identifies three key interrelated components in constructive alignment, shown in Fig. 2. Clear *ILOs* are the drivers of subject design. The intended learning outcomes cannot be achieved without *teaching and learning activities* (TLAs) that are structured to facilitate student learning and the achievement of the learning outcomes. *Assessment tasks* (ATs) give students the opportunity to demonstrate what they have learned and how well they have achieved the intended learning outcomes.

TLAs and ATs are crucial to the constructivist theory because it is in carrying out the TLAs and ATs that students construct their own knowledge and thus achieve the ILOs [5]. For this to

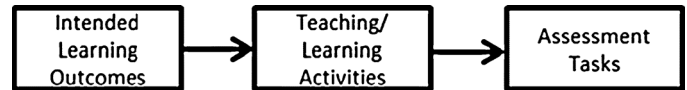


Fig. 2. Constructive Alignment Components.

happen, there must be close alignment between the goal (ILOs), the means (TLAs), and the indicators (ATs).

1) *ILOs*: Intended learning outcomes in higher education can be identified at four separate levels, namely: 1) institutional; 2) degree program; 3) course; and 4) topic. Each level contributes to students' capabilities upon graduation. This paper focuses on ILOs at the course level.

ILOs identify what students should be able to do upon completion of a course. In the constructive alignment concept, ILOs must be defined carefully to make sure that students know what they are expected to learn. Inaccurate or inappropriate identification of ILOs may result in the design of ineffective TLAs and ATs.

To identify ILOs, teaching staff must determine the kinds of knowledge that they expect students to achieve; these, according to [5], can be categorized into declarative and functioning knowledge. Declarative knowledge refers to the knowledge of content. Functioning knowledge refers to the application of content knowledge to solve problems. Obviously, it is difficult to expect students to achieve functional knowledge if they have not mastered declarative knowledge.

As many IT students do not have declarative knowledge of entrepreneurship, Fig. 1, it is unreasonable to expect them to demonstrate functional knowledge in this area. However, it is not feasible to have them master the declarative knowledge by conventional approaches, for example, by asking them to learn the concepts of marketing, finance, and the like. These students are IT majors, so the curriculum needs to center predominantly on IT skills.

The Entrepreneurship students are expected to demonstrate a higher level of knowledge according to Bloom's Taxonomy [6]. The ILOs for the course are that a student should be able to do the following:

- explain the process for developing an entrepreneurial venture;
- explain entrepreneurship case studies following a given criteria;
- apply effective strategies in entrepreneurship cases;
- develop and present a business plan that will be ready for investors' review;
- reflect on your own personal entrepreneurial capacity.

The students are expected to achieve a high level of learning or functioning knowledge while at the same time acquiring content knowledge. To facilitate this, academics have to design teaching and learning activities and assessment tasks that are highly aligned with these intended learning outcomes.

2) *TLAs*: Teaching and learning activities are the means by which students achieve the ILOs. Their design must therefore consider the type of knowledge and skills that the students need to learn. Whiddett *et al.* [7] reported an ideal example that demonstrates students' utilization and application of declarative and functioning knowledge within a subject. Before taking

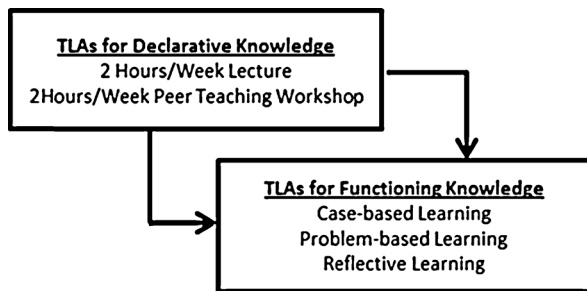


Fig. 3. TLAs for entrepreneurship subject.

a project-based course on information systems management, the students had to pass a prerequisite course that taught, and presumably assessed, declarative knowledge. The dilemma faced in the Entrepreneurship course is that the students need to learn both types of knowledge in one semester through the one course.

Fig. 3 shows the TLAs for the Entrepreneurship course offered at La Trobe University, Bundoora, Australia. Declarative knowledge is imparted through a weekly 2-h lecture and a 2-h peer-teaching workshop. In the lectures, the teaching staff delivers the content knowledge shown in Fig. 1. In the workshops, the students present case studies applied to the theories learned from the lectures. Note that the workshops serve for students to acquire functioning knowledge because they must apply theory to real-life case studies in them.

Functioning knowledge is acquired through three types of learning. The first is case-based learning through the workshops. The second is problem-based learning (PBL), which, according to [8], starts with a problem that students need to solve and then seeks the appropriate knowledge to solve the problems. In this course, the “problem” to solve is the business opportunity that faces the students. The students need to select content knowledge to shape this business opportunity and to think and act like real entrepreneurs and demonstrate this through a business plan; see Fig. 1. The third is reflective learning, which is facilitated through an opportunity journal. Throughout the semester, the students are given several worksheets that encourage them to apply the content knowledge according to their own personal ideas.

3) *ATs*: Assessment tasks are the indicators by which students can tell whether they have achieved the ILOs. Students should be able to see clearly how each assessment task aligns with the ILOs. As with the TLAs, ATs for declarative and functioning knowledge are usually different. For the Entrepreneurship course, the ATs are more focused on how the students transform the content knowledge they have been taught into functioning knowledge.

### III. REALIGNED ASSESSMENT STRATEGIES

The current course design has four ATs. The first two tasks require the students to select two case studies and present them to the group. The third AT requires the students to create and present a business plan document that will attract investment. The last AT is a final examination. While the last task is aimed at

summative grading, the first three tasks are aimed both at summative grading at the end of the course and formative feedback throughout the semester.

The ATs, the rationale behind them, and the actual mechanism of each assessment are thoroughly explained to students at the beginning of the semester.

Fig. 4 depicts the sequence of the ATs used in the current offering of the course. The first AT starts in Week 3 of the semester, and the last task ends in Week 12 or after, depending on the exam schedule. It is important to note that the first three assessments are taken by students in groups.

The assessment components are as follows.

- In Case Study Set 1 (CS<sub>1</sub>), several groups of students are given a topic that was previously discussed in lectures. The students are required to apply the topic to real-life examples and to present these to the class during a workshop. The students who are not presenting provide peer assessment of the presenting teams. Clear peer-assessment guidelines are provided to the students prior to the presentation of the case studies. Their feedback consists of lessons learned, constructive improvement suggestions, and a rating score. The presenting teams receive a summative grading worth up to 10% from their peers, while the nonpresenting teams receive summative grading scores of up to 5% from the teaching staff depending on the quality of their feedback.

It is important to mention that the presenting teams receive formative feedback from the teaching staff prior to presenting their case studies. This ensures the accuracy of the presentation as other students will learn from this group’s presentation. A 1-h consultation time is scheduled for each presenting team, where the teaching staff gives feedback on the topic, the case study selection, the quality, the scope, and so on. By the end of Week 6, all groups will have presented their case studies, and the first assessment task will have been completed.

- In CS<sub>2</sub>, the teaching staff applies the same concepts and practices as in CS<sub>1</sub>, the only difference being that the students need to consider and incorporate the feedback given by their peers after the first presentation and show how they have done this.

This process is completed by the end of Week 10. At the end of CS<sub>2</sub>, the students have completed 30% of the summative grading assessment.

- In the Business Plan AT, all students prepare the formal business plan documentation for a new enterprise. In groups, they conduct research on their business idea, identify their strategies, write up a formal document using a standard template [9], and present their business pitch to a group of investors.

The business plan is to include all the Entrepreneurship course components shown in Fig. 1, applied in a novel case study. The business plan document is assessed by the teaching staff and contributes up to 25% of the students’ summative grade. The depth of research underlying the business plan and the applicability of the strategies are the two main components used to grade the business plan document.

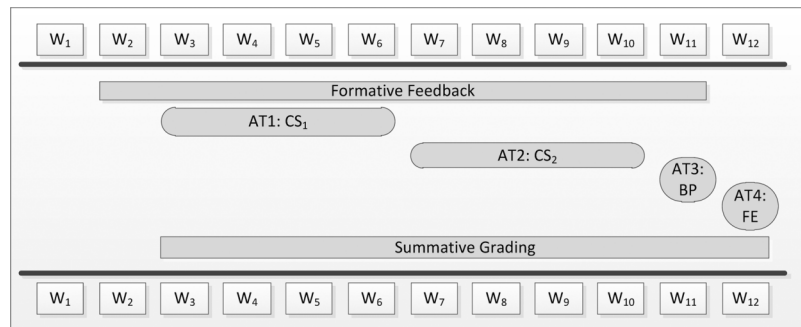


Fig. 4. Assessment task timeline.

In Week 11, the groups present their pitch, with the goal of attracting as much investment as possible. This is done as a role-playing exercise, with the nonpresenting groups acting as investors with a limited amount of money to invest in the business presentation that is most convincing to them. The amount of investment gathered contributes to 5% of the summative grading for the assessment.

- In the final exam, all students sit a closed-book 2-h written examination where they answer short essay questions. These are reflective and metacognitive questions that require students to apply and transfer their learning (knowledge and skills) into real-life contexts. Examples include “What interests do you have that could be shaped into a viable business opportunity?” and “How could you shape this idea to refine your opportunities, so that they have a greater chance of success?” The exam is the final summative assessment of the subject.

IV. SUPPORTING ASSESSMENTS REDESIGN

A. Rationale for Change

The course ATs were designed in accordance with constructivist theory [10]. The first AT has students begin to build their knowledge and skills by applying components of the entrepreneurship process to case studies. The discipline knowledge and skills, together with broader graduate capabilities, are further developed in the following ATs. The assessment process ensures that students engage with the feedback they receive to enhance their learning. While completing the ATs, students are building their knowledge and skills and achieving their learning outcomes through their own activities, rather than relying on what the teachers do [11]. The ATs provide a scaffold on which new knowledge can build on existing knowledge and allow students to demonstrate their attainment of concepts and capabilities as the complexity of the ATs increases, as shown in Fig. 5. For example, the business plan is built on an ability to learn and apply a concept to various small case studies.

The case study assessments offer opportunities to students to demonstrate teamwork, peer teaching, and learning. The benefits of students teaching other students are widely accepted [12]. It is the students themselves who select the case study they will work on, choose the approach they will use to apply the content knowledge to that case study, and work together to complete it. The interactions with other students results in applied knowledge being taught from a different perspective, by people

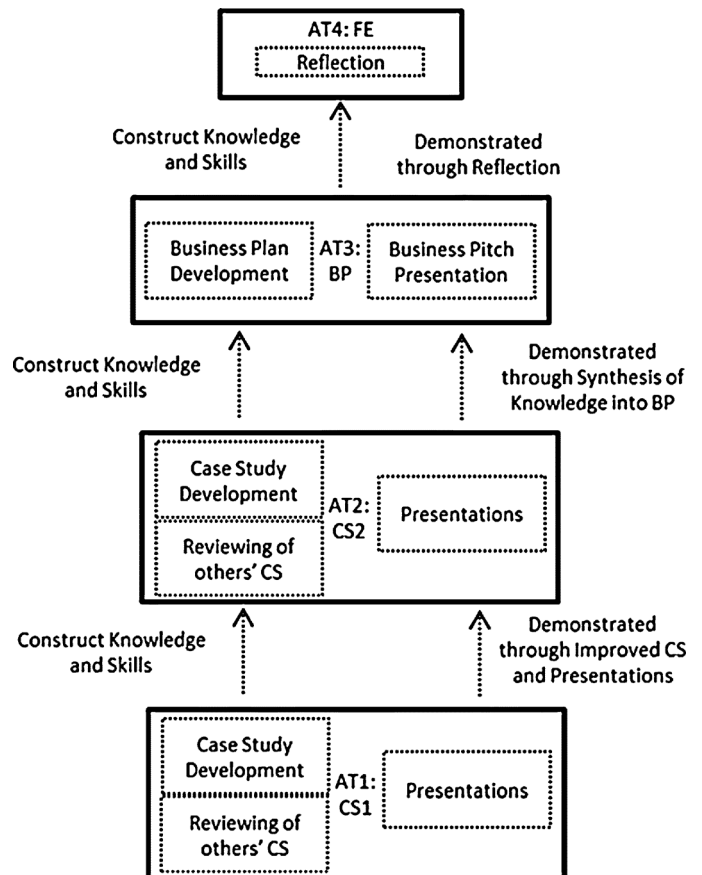


Fig. 5. Constructivism practice through assessments.

(peers) with a different depth of understanding than the teaching staff; this can trigger constructive discussion between students during the presentations. This learning process is also guided by the teaching staff by weekly monitoring and formative feedback as well as timely feedback of the presentations.

Presentations are a major assessment component. Throughout the semester, each team will perform three peer-reviewed group presentations. The skill of public speaking is one of the graduate capabilities that this course aims to develop. To be able to start an entrepreneurial enterprise, the businessperson needs to enhance his/her networks, by applying professional communication skills that can include the ability to negotiate, persuade, resolve conflicts, and build teams. He/she must also be able to articulate his/her ideas to a large group of people. Unfortunately,

few IT program curricula offer students opportunities to improve their public communication and teamwork skills. In capstone courses requiring demonstration of functioning rather than declarative knowledge, presentations are highly recommended and have been incorporated by many institutions [5].

The use of group-based activities and assessment in the Entrepreneurship course is largely related to the need for teamwork and collaborative skills in the entrepreneurial process itself. Currently, the course ILOs do not explicitly express this outcome, but this will be incorporated as the course is revised in a continuous improvement cycle.

The formation and management of the groups is handled by the teaching staff through weekly monitoring and formative feedback [5]. This reduces the probability of ineffective group work due to problems such as difficult group dynamics or poor-quality outcomes. Based on studies such as [13] and [14], a benefit of group-based work can be to enrich the known content since students will hear different and new interpretations of knowledge. It is important to emphasize that the peer feedback reviews are also given in groups, with the nonpresenting groups having a short discussion after each presentation about what they learned from the presentations. In this way, they communicate their new knowledge, hear what others gained from the knowledge, and synthesize it as feedback.

Peer-review assessment is often foreign to IT students. During the first week of semester, while the course guidelines are being discussed, many students are often unsure about how the peer-review assessment process is carried out and how it is useful for their learning. Leach *et al.* [15] describe the underlying reason for peer-review assessment, which is to empower learners.

Currently, the students are only involved in judging how the work of others (in terms of their case studies) meets the criteria set by the teaching staff. A more empowering practice, planned for future implementation, is to allow the students to choose the criteria for assessment in consultation with the teaching staff [16].

When the students judge the work of other students, they are reflecting on other approaches to content knowledge and are comparing it to their own. A student can thus achieve the learning outcomes even though she/he did not prepare that case study.

The group discussions held while providing feedback are an opportunity for students to enhance their collaborative learning, as they compare what they and others have learned from the same information. To ensure learning, the student peer feedback is structured using three feedback questions: 1) Where am I going? 2) How am I going? and 3) Where to next? [17].

When the students ask for formative feedback from the teaching staff, they are asked to show the teaching staff their draft case studies and business plan. The quality of their draft is then discussed taking into consideration the set criteria and content knowledge, and then recommendations for improvement are given.

The peer feedback on the case studies is given on a form that poses three questions: What did the students know about the material before the presentation, what did they learn from the

presentation given by their peers, and what constructive suggestions can they make to improve the case study and the presentation? The presenting groups can then associate the answers to these questions with the three feedback questions in [17].

The feedback is typically provided within a week of the AT being performed. While this is challenging, considering the limited resources, timely feedback is the most useful, especially if it is about processing knowledge such as in the case studies [18]. In addition, timely feedback gives students time with which to engage, study and reflect upon the feedback, and demonstrate improvement. The feedback from the first case study is used to improve their second case study. The feedback from both case studies is used to improve their business plan. It is widely accepted that feedback is most useful if the students can have opportunities to be responsive to the feedback [19].

The last AT is a final exam, which contains reflective questions and whose aim is not to assess the students on content knowledge, but rather on the application of that knowledge. Here, they are applying their content knowledge not to case studies, but to their personal situation. This practice is used in professional studies such as in nursing [20]. Becoming an entrepreneur is also a professional career and thus the ability to make personal judgments based on content knowledge and to undertake lifelong learning is an important element for assessment.

## B. Assessment Literature

Entrepreneurship courses are offered by many universities worldwide as part of IT degree programs, indicating an awareness that entrepreneurial knowledge and skills are useful for IT graduates' success. The structure and embedding of assessment tasks in learning is not often discussed in IT literature; an exception is [21], which required students to perform research on a critical aspect of IT entrepreneurship, to study a set of mini cases, write a business plan, and take a final exam. All the assessments were summative with weightings of 25%, 15%, 40%, and 20% respectively. The rationale behind these tasks is not given, nor is it clear how they were carried out.

Venesaar [22] divides the assessments tasks into a business plan and the final exam, with 50% equal weighting. The business plan also acted as a hurdle that students had to clear before being allowed to sit the final examination. In addition, students' contributions in class were counted toward the business plan assessment. As before, the rationale behind the assessment design is not clear. The use of class participation for formal grading, for example, is supported by [22] and criticized by others such as [23], who argues that evaluation, marking, and grading have to be based the work presented by students for assessment, and not on their presence or participation in class as these do not demonstrate learning outcomes. The authors found no evidence of a direct correlation between student participation with achievement of the learning outcomes.

Many universities introduce entrepreneurial knowledge and skills in practical ways that do not involve formal courses taken for credit. Entrepreneurship can be demonstrated in practice by incubator centers inside the university [24], by the career and training office [25], and by government-funded programs [26].

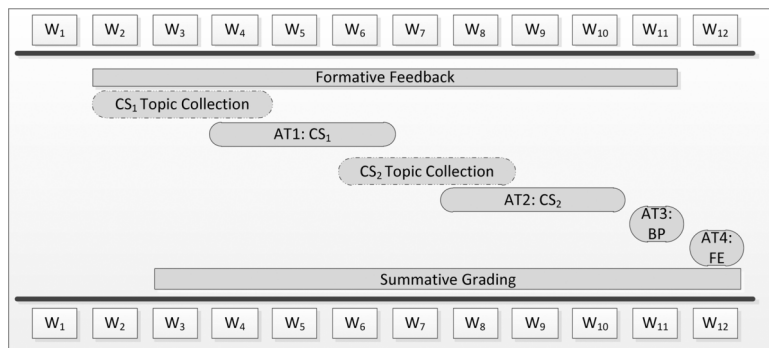


Fig. 6. Assessment tasks timeline—Revised.

Since the participants in these programs are involved on a voluntary basis, it would appear that there were no formal assessment tasks for them to carry out.

This paper is believed to be unique in providing a thorough review of assessment tasks for an entrepreneurship course tailored to IT students.

#### V. EVALUATION OF ASSESSMENT TASKS AND FUTURE IMPROVEMENT

Integrated case studies and projects have been used widely in the IT field. One such study [7] reports using two major assessments in a course to teach management skills to information systems students. The first assessment involves selecting an external company, identifying their IT problem, and proposing solutions. The outcome of this first assessment is a clear report presented to the class. In the second assessment, the students need to apply their newly gained knowledge (and prior theoretical knowledge) on distributed case studies to create an integrated case study report. The outcomes of this practice are claimed to be very effective.

The ATs reported here have a close association with those reported in [7]. Both include the analysis of case studies related to content knowledge, the difference being that students in [7] are required to write a report, whereas in the La Trobe University course described here, students are asked to present their findings to their peers. Also, the La Trobe students must write a business plan for their own startup, while in [7] the students communicate and analyze problems in external companies. While the course outcomes are not available of the time of writing, some students have indicated they can see the value of learning through case studies and applying these to their own situation.

Students are initially skeptical about the course ATs, and in particular the peer-review process. According to phenomenography theory [27], it is the job of the teaching staff to clearly explain the process and the rationale behind the activities and to bring the students on board. It is encouraging that very few students remained unconvinced at the end of the semester.

For improvement, in the future, the teaching staff plan to involve students in the creation of AT topics and the criteria for assessing the ATs. Currently, the students are given topics by the teaching staff and have to find case studies related to that topic. Some student feedback indicates that since some of the case studies discuss issues already addressed in previous courses, these case studies do not contribute to improving their

learning. The teaching staff therefore plan to allow students to identify their expectations and to select the topic about which they want to learn from their peers (under guidance from the teaching staff).

This practice has been demonstrated in various institutions, for example [28], in which the authors propose constructive evaluation in course design applied to computer science students. This method takes peer-review student assessment to a higher level, where students not only share and receive knowledge, but also produce knowledge. Student *A* creates assessment questions and his/her solutions. This set of questions will be answered by his/her student peers, and student *A* will then review and evaluate these answers. Student *A*'s questions and solutions will also be reviewed by other students. This practice was shown to improve not only content knowledge, but also the ability to organize and communicate knowledge, judge quality of information, give and receive feedback, and improve self-assessment skills.

The ATs shown in Fig. 4 will be changed to those shown in Fig. 6. Constructive evaluation as used in [28] may also be adopted in the future. Instead of students finding case studies on the topic set by the teaching staff, their peers will decide specific topics on which they want to improve their learning. The teaching staff will use the Learning Management System (LMS) for topic suggestions two weeks before the first teaching case presentation. To accommodate this process, the case study cycles will be shortened from four to three weeks.

Students were asked to comment on the course ATs. Some 2% of students were not totally happy with the workload of the subject, 6% of students were not yet convinced of the benefits of peer-review assessments, and 15% of students would like some adjustment to the group formation and case study delivery. On a positive note, most responses were positive toward the ATs.

The course was taken by 63 students, 87% of whom received 70% or above for their final mark. In addition, 76% of the students improved their performance from the first AT to the last, indicating that students used the feedback they received to improve their handling of the next task. This is quite an encouraging improvement in students' learning outcomes.

#### VI. CONCLUSION

This paper has presented a redesign of an Entrepreneurship course for IT students, with an emphasis on assessment tasks.

The course allows the student to achieve and demonstrate functioning knowledge, but also has to contain declarative knowledge, some of which is new to the students; this in itself posed a unique challenge to the teaching staff. It also develops and assesses the broader faculty graduate capabilities of teamwork and speaking skills.

Based on the experience of the 2011 semester, students have engaged well in the assessment tasks, as evidenced by the well-presented case studies, thorough peer-based feedback, and high-quality business plans. While the assessment tasks differ from assessment tasks in other courses in the IT degree program, the students have shown enthusiasm in fully participating in each assessment task, if given clear guidelines. It is expected that the assessment tasks will have enhanced the students' learning experiences and outcomes.

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