

## The use of modern pedagogical techniques when introducing information technology students to entrepreneurship

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This paper describes the design of teaching and learning activities (TLAs) in an entrepreneurship subject offered to Information Technology (IT) students. We describe the challenges that we have encountered. Within one teaching semester, the students are expected to achieve a high level of applied knowledge in an area where they have little theoretical knowledge. We introduce TLAs that are not common in an IT curriculum. These TLAs use experience as the basis of knowledge, collaboration as the focus of learning and a reflective approach to structuring knowledge. We identify our rationale for using these new TLAs to achieve the intended learning outcomes for the subject based on the existing literature. To evaluate the effectiveness of our design, we conducted an annual survey. The results of the survey support our design. Student feedback surveys and end of course assessment results indicate that the new TLAs have enhanced the students' learning.

**Keywords:** subject design; teaching and learning activities; intended learning outcomes; entrepreneurship; teaching practice reviews

### Introduction

The popularity of entrepreneurship subjects in higher education has increased significantly in recent years. There is an awareness in universities that many graduates will not rely on employment in large corporations upon their graduation. Many graduates require skills to start-up and manage ventures, which are the common learning outcomes of entrepreneurship subjects in various universities. Based on statistics, two-thirds of universities in the USA offer entrepreneurship subjects, which are triple the number in the previous decade (Gates et al. 2011). Until the early 1990s, entrepreneurship education in Europe lagged behind, but the number has increased significantly since (EFMD 2004). In the UK alone, based on a report by Watkins and Stone (1999), 68% of universities in the country offer at least one entrepreneurship subject and there is a trend of continual growth. In our recent investigation, from Australian universities' handbooks, of the 39 universities in Australia, 34 universities offer entrepreneurship subjects. There were at least 21 undergraduate and postgraduate courses in entrepreneurship being offered by Australian universities in 2013.

While the majority of entrepreneurship subjects are offered to business and management students, there is a growing occurrence of a similar subject being offered

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to non-business students, such as Information Technology (IT) and engineering students (Schaper and Casimir 2007). Brand, Wakkee, and van der Veen (2007) explain this tendency of European universities, based on the findings of several studies and the existing literature. A study by Cockx et al. (2000) found that of all the entrepreneurship subjects offered by European universities, a third of them are particularly targeted at non-business students. The proportion is not reflected in Australia. Currently, in Australian universities, there are around 14 subjects offered on entrepreneurship to IT students, compared to 123 subjects on entrepreneurship for other disciplines, mainly for business and management students.

IT students increasingly need entrepreneurial skills as one of their graduate attributes. While the software industry, which is traditionally the potential employer of IT graduates, is led by giant players, the industry is underpinned and supported by a vast number of small- to medium-sized companies, most of them being start-up companies initiated by fresh IT graduates. This fact highlights the need for IT students to understand the concepts and practices of entrepreneurship.

There are challenges to teaching entrepreneurship to IT students. At the beginning of the subject, most students do not have the background that is required to achieve the ultimate outcome of an entrepreneurship subject, which is a solid business plan for new ventures. As a result, teaching and learning activities (TLAs) for entrepreneurship subjects for IT students have to be designed carefully so that they not only achieve the subject learning outcomes, but also introduce the requisite knowledge in the subject in an accelerated manner. While a large amount of research has been conducted to investigate the entrepreneurship curriculum for business majors, there is scant research on the same curriculum offered to IT and engineering students (Standish-Kuon and Rice 2002).

In this paper, we present the design of the TLAs for an entrepreneurship subject for IT students, offered since 2011 by La Trobe University in Melbourne, Australia. We present a combination of traditional and modern TLAs and how they are used to help students to achieve intended learning outcomes for the subject (ILOS). The rationale of the selected activities is provided by findings from the relevant research literature. We also present the outcome of the new activities in terms of the students' satisfaction rate and the subject results.

## **Background**

### ***Entrepreneurship subject: an overview***

Shane and Venkataraman (2000) identify entrepreneurship as a complex set of activities concerned with the identification, evaluation and development of business opportunities. They involve a wide range of knowledge, behaviours and motivation. Due to the nature of the domain, the entrepreneurship subjects must include a multidimensional and cross-disciplinary approach. The same opinion is expressed by Duane Ireland and Webb (2007) who state that entrepreneurship education is complex due to it being a widely dispersed and loosely connected domain of issues.

Klofsten (2000) divides the content of entrepreneurship education based on the type of knowledge it wants to deliver into static (theory) and dynamic content (applied knowledge). These two types of knowledge are also referred to as declarative and functioning knowledge by Biggs and Tang (2007). While teaching the content knowledge of entrepreneurship is necessary as the cornerstone of education, it is rarely sufficient to encapsulate all the learning objectives of entrepreneurship education.

Brand, Wakkee, and Van Der Veen (2007) classify the content of entrepreneurship education based on the entrepreneurial process phases. The phases are the pursue of an opportunity, the start-up of a new business and the management of the growth of an existing business. Linan (2007) argues that another phase prior to the opportunity recognition phase must be included in modern entrepreneurship education. This new phase is the teaching of entrepreneurship awareness. Most entrepreneurship subjects are offered with an assumption that the students already have the intention of starting up a business when they complete their course or degree. Unfortunately, there are many instances where students enrol in an entrepreneurship subject with no such intention.

As entrepreneurship subjects involve a multidisciplinary approach, a large proportion of the literature classifies the content of entrepreneurship subjects based on the discipline-specific skills that it wants to deliver to the students. Hisrich, Peters, and Shepherds (1998) broadly divide the content of entrepreneurship subjects into the development of business management, technical and personal entrepreneurial skills.

There is a large variety in the duration, structure and, to some extent, the content in the entrepreneurship subjects. Based on a survey of various entrepreneurship programmes, textbooks and subject guidelines, we summarise the common content in Figure 1. This model covers the different views on the entrepreneurship subject content discussed earlier.

The centre of the model represents entrepreneurial subject content, based on the entrepreneurial process (Brand, Wakkee, and Van Der Veen 2007; Linan 2007). During the

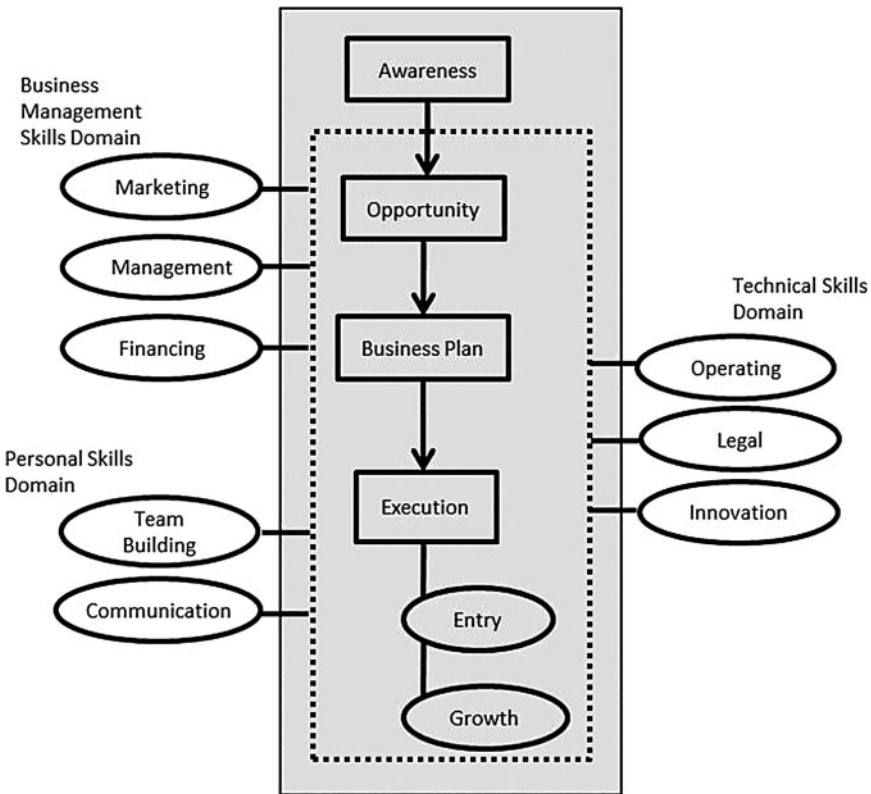


Figure 1. Entrepreneurship subject content.

process, several aspects are covered which can be categorised into three main skill domains to follow the entrepreneurship subject content, based on the discipline-specific skills (Hisrich, Peters, and Shepherds 1998). These skills are normally presented as theoretical knowledge before they are applied through the entrepreneurial process.

### *Entrepreneurship subject for IT students*

As mentioned earlier, an increasing number of entrepreneurship subjects are being offered to IT students. IT students have specific knowledge of their domain and it actually shapes the way they perceive opportunities and innovative ideas for new technology-based businesses. This is an opportunity on which teachers of entrepreneurship for IT students can capitalise.

On the other hand, entrepreneurship teachers acknowledge the challenges of designing classes for IT students. According to Paffen (2004), most IT students have no or limited business management knowledge. Also, IT students have to develop the knowledge and skills for organisational management, including teamwork, negotiation, communication, etc. In addition, IT students have little knowledge of the availability of networking opportunities, such as business incubators and business angels' groups, which are very important in the entrepreneurship process.

Many IT students do not have the sufficient declarative knowledge required for the entrepreneurship subjects, thus it is unreasonable to expect them to demonstrate a functioning knowledge in this area upon commencement of this subject.

To overcome this limitation, most universities introduce declarative knowledge before the students start any entrepreneurship subject. A report on a study conducted in the Netherlands shows that non-business students who take entrepreneurship subjects also take an introductory course with the foundation of business management as the main content (Brand, Wakkee, and van der Veen 2007). In another institution, non-business students take a larger study load in the entrepreneurship subject in comparison to the study load in other subjects, presumably due to the need for extra effort to catch up on the prerequisite knowledge.

Unfortunately, some institutions can only offer a single entrepreneurship subject to IT students. They are expected to achieve a high level of learning or functioning knowledge, whilst at the same time, acquiring content knowledge. This expectation is challenging, especially with such a strict constraint on subject duration. Entrepreneurship teachers have to design TLAs carefully so that the broad learning objectives of the subject can be achieved by the students.

### *Intended learning outcomes*

Prior to designing subject content and planning the subject delivery mode, a subject designer needs to identify the ILOS. According to the constructive alignment concept (Biggs 1996), ILOS identify what the students should be able to do once they complete the subject. Figure 2 shows the ILOS with two other components of the constructive alignment concept.

The ILOS cannot be achieved without the TLAs that are structured to facilitate the students' learning and the achievement of the learning outcomes. Assessment tasks (ATs) give students the opportunity to demonstrate what they have learnt and how well they have achieved the ILOS. TLAs and ATs are crucial to the constructivist theory because it

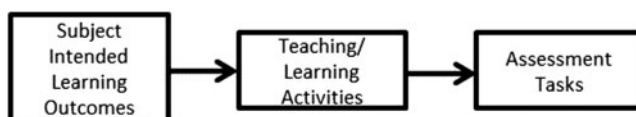


Figure 2. Constructive alignment components.

is in carrying out the TLAs and ATs that students construct their own knowledge, and thus achieve the ILOS (Biggs and Tang 2007). For this to happen, there must be close alignment between the goals (ILOS), the means (TLAs) and the indicators (ATs).

The concept of constructive alignment in subject design follows the shift from a teaching perspective to a learning perspective in higher education. According to Kickul and Fayolle (2007), from a teaching perspective, teachers actively arrange the material and the focus is on what is inputted into the TLAs. From this perspective, teachers identify TLAs and ATs without having a clear direction for the learning outcomes. A learning perspective is more output-oriented, which is predicated on what it is expected that students will have accomplished at the end of the subject. As a result, identifying the ILOS is the first task in a subject design.

Bechard and Gregoire (2007) follow the same perspective. They emphasise the importance of identifying the pedagogical objectives of a subject at the start of a subject design process. Once the objectives are known, teachers can identify various pedagogical activities to achieve the objectives.

We use the same perspective as Bechard and Gregoire (2007) for our subject design, identifying the ILOS first before defining the TLAs. For the entrepreneurship subject we have offered to IT students since 2011, our ILOS clearly identify that upon the completion of the subject, the students should be able to do the following:

- (1) explain the process for developing an entrepreneurial venture,
- (2) apply effective strategies in entrepreneurship cases,
- (3) develop and present a business plan that will be ready for investors' review and
- (4) reflect on one's own personal entrepreneurial capacity.

The students are expected to demonstrate a higher level of knowledge according to Bloom's Taxonomy (Bloom, Hastings, and Madaus 1971). Students are expected to achieve a high level of learning or functioning knowledge, whilst at the same time, acquiring content knowledge. To facilitate this, we need to design TLAs that are highly aligned with these ILOS and meet the timing constraints of the subject.

### Traditional and modern TLAs

There is a vast array of research and literature on innovative TLAs in the general field of education and in entrepreneurship education. Carrier (2007) provides a summary of less traditional approaches used in entrepreneurship education. It provides entrepreneurship teachers with interesting options for making their subject richer and more engaging. Gibb (2007) proposes a set of TLAs to achieve the entrepreneurial traits such as behaviours, attributes and skills in entrepreneurship education.

In this section, we classify TLAs into several comparisons as shown in Figure 3. In one group, we have more traditional activities, while in the other, we have more modern

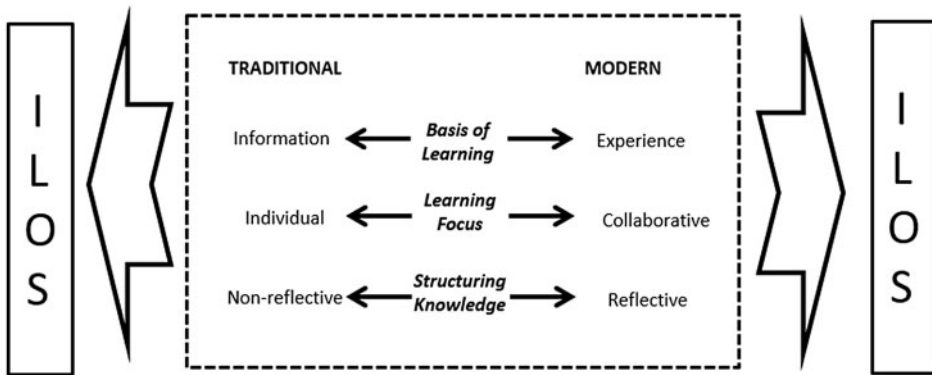


Figure 3. TLA classification.

ones. The determination of whether an activity is considered traditional or modern is based on the perspective of the teachers and students. In this context, we talk about IT teachers and students.

### *Basis of learning: information and experience*

In terms of the basis of learning, the TLAs involve traditional lectures to teach theoretical information and practitioner involvement to teach real entrepreneurship experience. Both learnings are crucial to cover the two components of entrepreneurship education – the static and dynamic components – as stated by Klostfen (2000). Hindle (2007) differentiates between teaching entrepreneurship and teaching about entrepreneurship. The former involves teaching all practical or vocational components of the entrepreneurship body of knowledge, while the latter, on the other hand, involves teaching the skills of entrepreneurs.

IT teachers and students are familiar with traditional lectures for delivering IT-based material, such as programming concepts, systems analysis and design, database theory, etc. Similarly, the theoretical part of entrepreneurship education can be delivered in lectures.

On the other hand, applied knowledge will be most effectively taught by people who have practiced the entrepreneurial process. The use of practitioners in teaching professional courses is not new. Learned (1991) reports the use of learning cases, in which students have to examine real business case studies and are then mentored by practising managers and entrepreneurs. Based on the findings by Rae and Carswell (2000), there is also evidence that entrepreneurial behaviours can be learned through life stories. Life stories will give more impact if they are told by the people who experienced them rather than from the literature or from teaching staff.

According to the ILOS outlined in the previous section, students must be able to explain the entrepreneurial process as well as to apply strategies in certain entrepreneurial situations. Learning from academics and subject material alone is often not sufficient to achieve these ILOS. Practitioners, such as entrepreneurs, investors and business mentors who have undergone the entrepreneurial journey, will have experience that can be imparted to students. Their involvement in entrepreneurship education, from the guest lecturer to the business plan assessor, will contribute to students' learning.

***Learning focus: individual and collaborative***

In terms of the learning focus, the TLAs in a subject design can include learning as an individual and learning in collaboration. In the majority of subjects offered in the IT field, a student masters the subject material through individual learning. However, the popularity of peer-based learning has become pervasive. There is much evidence showing that the involvement of peers is a significant factor in student learning (Jarvis, Holford, and Griffin 2005).

Two widely used types of collaborative learning are group-based work and peer-review assessment. Given the fact that entrepreneurship in real life involves team effort, it is natural that the TLAs for entrepreneurship education should foster group work. For example, in many entrepreneurship workshops, students discuss various real-life case studies within group settings (Zapalska and Perry 2002). In another study, students in groups prepare teaching cases that have to be presented to their peers, who then provide feedback (Pardede and Lyons 2012).

In some cases, collaborative learning can also be applied to determine assessment criteria. The importance of involving students in determining assessment criteria has been reported in several studies. Singh and Collins (2007) allow students to determine the assessment criteria which are applied to them when undertaking small group computing projects. The criteria included the group size, workload and peer learning process. The findings were that the students appreciated the adoption of the democratic process and they acknowledged that their learning had been enhanced, especially in terms of teamwork and communication skills. In entrepreneurship education, Suonpää (2013) recently proposed a framework that emphasises a collaborative learning model that includes collaborative actions in identifying opportunities for business plans and collective execution so the opportunity is realised.

***Structuring knowledge: non-reflective and reflective***

In terms of structuring knowledge, the TLAs for entrepreneurship education involve non-reflective learning and reflective learning, both of which can occur simultaneously.

According to Jarvis, Holford, and Griffin (2005), non-reflective learning involves three learning types, namely memorisation, skills learning and preconscious learning. In non-reflective learning, individuals learn and memorise the material delivered by someone else. Memories are stored away, ready to be used for future planning. Some of the material consists of specific prescribed skills. However, simply memorising concepts and acquiring skills does not ensure that these are transformed into conscious knowledge, unless this is accompanied by reflective learning activities.

In entrepreneurship education, like any professional education, non-reflective learning remains an important type of learning. Skills and concepts need to be understood and committed to memory by students before they can become true entrepreneurs. However, Beck (1992) states that any professional education is not complete without reflective activities. With reflective learning, individuals obtain knowledge through contemplation (Jarvis, Holford, and Griffin 2005). Dee Fink (2007) states that when students have time to reflect on the information or the experience they are undertaking, they will achieve active deep learning.

One of the ILOS of the entrepreneurship subject described in the previous section is for the students to reflect upon their entrepreneurial potential. The ILOS can be achieved with reflective learning, which in this subject is undertaken in the form of a weekly

opportunity journal. Journal writing can be very useful for subjects that contain a high level of functioning knowledge or in professional studies. Cho and Tang (2007) report on the use of reflective journals by nursing students during clinical placement. Hoefflin and Allal (2007) report on the use of portfolios to record the self-reflections of student teachers in the education department. Reflective practice, in terms of journal writing, is complex and a large amount of resources is required to provide quality feedback. However, this practice is considered to be an effective way to engage in reflective learning. Yinger and Clark (1981) report that written reflection is far more effective than oral discussion, and it also provides a record for later reference.

### Aligning TLAs with ILOS in the entrepreneurship subject

#### *TLAs' structure in the entrepreneurship subject*

In this section, we describe the range of TLAs that we have designed for this subject since 2011. Figure 4 shows the flow of the activities on a weekly basis, grouped into three parts namely: lectures, workshops and non-lecture/workshop learning activities.

The lectures run for 12 weeks in one semester and are conducted by teaching staff. We emphasise that traditional lecture sessions are still necessary, particularly to teach the theoretical knowledge of entrepreneurship. In addition to lectures by teaching staff, we practise learning by experience by having several entrepreneurship practitioners as guest lecturers. When choosing the practitioners, we ensure that their expertise and experience complement the theoretical knowledge that the teaching staff have imparted prior to the guest lectures. In our subject, we have invited practising entrepreneurs, mentors, business angels, professional investors and business coaches as guest lecturers.

The workshops run for nine weeks and are conducted by teaching staff. During the workshops, the students undertake two types of activities. In the first type of activity, the teaching staff provide real entrepreneurial problems and facilitate discussions among the students. The students work in groups before offering their solutions to the problems to the whole class. This activity is very useful in improving students' teamwork skills. It is also useful for improving their analytical skills because they have to apply the theory they learn in the lectures to real entrepreneurial problems. The second type of activity carried out during the workshops is peer-teaching case studies. Every group is given one week to prepare a case study presentation. During the workshop, they present their

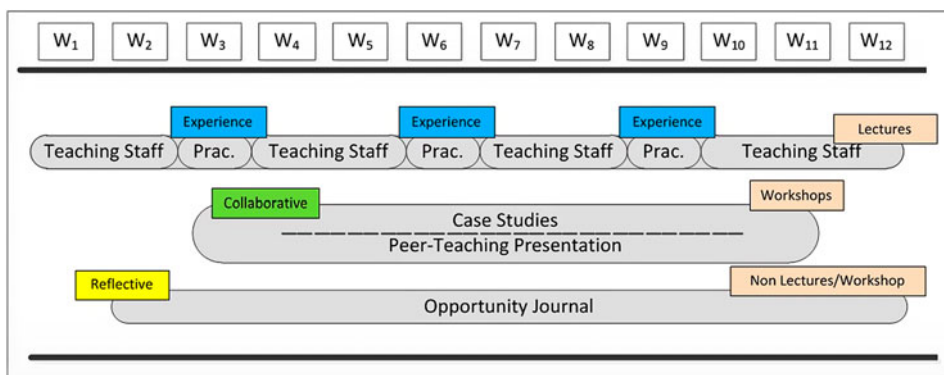


Figure 4. Weekly TLAs in the entrepreneurship subject.



findings to their peers. The peers are expected to give formative feedback and hence, foster active discussions among students. For the students making the presentation, the activity requires them to revisit the theoretical knowledge they gained from the lectures and it also improves their analytical skills as they must apply theory to a real problem. Both workshop activities enforce collaborative learning as opposed to traditional individual learning which occurs in many other IT subjects.

The final activity is reflective learning through opportunity journals. Throughout the semester, students download several journal worksheets through the Learning Management Systems. We ask students to relate the content knowledge presented to their own experience. This individual activity is done on a weekly basis outside the lecture and workshop schedule. The students must submit their completed journals within a week of the journal release. Following their submission, a teaching staff member provides feedback, based on the assessment as to whether the student has demonstrated not only knowledge of the material but also personally reflected on the knowledge.

It can be seen that the activities in this subject cover both sides of TLAs as described in [Figure 3](#). While in most IT subjects, students are familiar with traditional types of activities: information delivery through lectures, individual learning and non-reflective practice, in this subject we adopt more modern activities to complement traditional activities. The TLAs include learning by experience through practitioners' lectures, collaborative learning through group work and peer-teaching case studies and reflection through opportunity journals.

It is important to mention that we evaluate the TLAs on a yearly basis by considering the feedback from students, peers and practitioners. We also evaluate the TLAs based on our reflection on our success and failure from the previous years. This is a continuous process and the TLAs might still be altered in the future.

### ***Designing TLAs to achieve ILOS***

The rationale for arranging different types of TLAs in the entrepreneurship subject for IT students is to ensure that the students can achieve the ILOS. As mentioned in an earlier section, the ILOS require students to demonstrate their functioning knowledge as well as acquire theoretical knowledge within a short time span. The challenge lies in the fact that the student cohort in this subject has very little business knowledge. The traditional TLAs for entrepreneurship courses, which are weekly lectures and business plan development (Jones and Penaluna 2013), will not be sufficient for this cohort and hence we need flexible approaches.

Previously, we described the ILOS for the entrepreneurship subject that we have taught since 2011. [Table 1](#) summarises how the TLAs in this subject can assist students in achieving the ILOS. In this section, we provide our rationale supported by literature.

Note that even though the first three ILOS can be achieved by traditional TLAs, we argue that they might not be sufficient. McMullan and Long (1987) argue that for entrepreneurship education to be successful, the content and the way it is delivered must be extended beyond the traditional university setting. While the theoretical content might be delivered through lectures, the students will not be able to fully apply that knowledge without exposure to real practitioners.

Blenker and Christensen (2010) highlight the importance of real entrepreneurs' expertise in entrepreneurship education. They identify five roles of a practitioner: *a professional* that has real entrepreneurial experience, *a problem owner* that has

Table 1. Addressing ILOS with TLAs.

ILOS	Traditional TLAs			Modern TLAs		
	Information	Individual	Non-reflective	Experience	Collaborative	Reflective
1 Explain the process of developing an entrepreneurial venture	X	X	X	X	X	X
2 Apply effective strategies in entrepreneurship cases	X	X	X	X	X	X
3 Develop and present a business plan that will be ready for investors' review	X			X	X	X
4 Reflect on one's own personal entrepreneurial capacity				X	X	X

entrepreneurial tasks to solve, *a reality checker* that provides a realistic solution to entrepreneurial problems, *a co-worker* who pursues opportunities together with students and *a role model* to whom students can look up to for inspiration. The first role assists students to achieve the first ILOS (see Table 1), the second, third and fourth roles assist students to achieve the second and third ILOS and the fifth role assists students to achieve the fourth ILOS. It is obvious that the five roles cannot be undertaken by one practitioner. Hence, in the subject, we have three practitioners throughout the semester whom we believe can cover the five roles identified.

In many IT subjects, students learn from the lectures, reinforce their learning in laboratory classes and demonstrate their learning in the assessments. All of these activities are done individually. Activities based on individual effort are not really suitable for this subject, because the students have limited knowledge of the theoretical aspects of entrepreneurship and yet need to demonstrate the application of the theory in a bigger context within short time span. As shown in Table 1, individual learning styles can only facilitate the achievement of the first and second ILOS. Moreover, the achievements of these two ILOS might not be very effective since they are based on an individual understanding of the subject material. Hindle (2010) mentions that an entrepreneurship programme should not rely on one source of knowledge; instead, it should have a high proportion of team learning, including from peers.

With activities that enforce collaborative learning (such as the workshop activities in this subject), all four ILOS become more manageable because the students will see how other students approach entrepreneurship problems, learn from them and also reflect on

their own approach. Fayolle (2010) reinforces this fact by saying that learning from different approaches to solve a problem is crucial in entrepreneurship education.

Finally, traditional learning activities do not provide opportunities for students relate the subject content to their own experience. By writing weekly journals, the students assess their knowledge and apply it in a more structured and personal way. Due to constraints, throughout the semester, each student will receive probably no more than one detailed piece of feedback on their journal. For the remainder of the journal, the students will receive a grade on a simple grading matrix. This weekly activity will improve the students' achievement of the first three ILOS. If the students have demonstrated a higher level of functioning knowledge in a smaller personal context, they will become more capable of applying the knowledge in a bigger context.

To sum up, traditional TLAs are still applicable for this subject. In fact, the total removal of such activities is not practical. Not only will the move be considered too radical in comparison to the traditional delivery modes of other subjects in the discipline, traditional TLAs are still necessary, especially to teach theoretical content. This is necessary given our student cohort. According to Todorovic (2007), successful entrepreneurship education can be achieved in a more flexible learning environment, a view that supports our practice of introducing more modern TLAs.

### Evaluation

We conduct a survey at the end of the semester to collect students' opinions on the modern TLAs we discussed earlier. We want students to inform us as to whether the TLAs have helped them to achieve the ILOS throughout the semester. We need to emphasise that the goal of the survey is to assess how the students perceive new types of TLAs. Therefore, we do not include traditional TLAs in the survey.

We divide the survey form into three sections. Each section has one or two questions followed by a table. The table lists the ILOS with five possible responses from which the students can choose to express their opinions, ranging from *strongly disagree* to *strongly agree*. The survey form extract is shown in Figure 5.

We encourage students to complete the survey only if they participate in the TLAs actively. We apply purposeful or criterion sampling (Miles and Huberman 1994; Punch 2009) because we believe that only those who engaged in the activities can give an objective opinion as to whether the activities have an impact on their learning. The criteria used to determine eligibility is based on our personal judgement. Question 1 should only be answered by students who attend at least two practitioner lectures during the semester. Question 2a and 2b should only be answered by students who attend more than 50% of the workshops. Question 3 should only be answered by students who submitted more than 50% of the journals. Since this is a blind survey, we do not currently apply a mechanism to check that the sampling conditions mentioned are fulfilled.

Table 2 shows the average results of the surveys carried out since the subject was offered in 2011. On average, there are 175 students enrolled in the subject annually and the survey response rate is around 50%. Many students strongly agree that by learning from practitioners with real experience, they are more confident in explaining the process of developing an entrepreneurial venture in a real situation. Many students also strongly agree that by completing opportunity journals, they are able to reflect on their own entrepreneurial capacities. Overall, the students give positive responses, showing that all three TLAs have helped them to achieve the four ILOS.

## Teaching and Learning Activities for Improving Student Learning Survey

**Q1. Do you think lectures by practitioners can help you to achieve these following learning outcomes?**

Learning Outcomes	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Explain the process for developing an entrepreneurial venture					
Apply effective strategies in entrepreneurship cases					
Develop and present a business plan that will be ready for investors' review					
Reflect on one's own personal entrepreneurial capacity					

**Q2a. Do you think involvement in workshop case studies can help you to achieve these following learning outcomes?**

Learning Outcomes	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Explain the process for developing an entrepreneurial venture					
Apply effective strategies in entrepreneurship cases					
Develop and present a business plan that will be ready for investors' review					
Reflect on one's own personal entrepreneurial capacity					

**Q2b. Do you think involvement in peer-teaching on case studies/group presentation can help you to achieve these following learning outcomes?**

Learning Outcomes	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Explain the process for developing an entrepreneurial venture					
Apply effective strategies in entrepreneurship cases					
Develop and present a business plan that will be ready for investors' review					
Reflect on one's own personal entrepreneurial capacity					

**Q3. Do you think by doing opportunity journal, you achieve these following learning outcomes?**

Learning Outcomes	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Explain the process for developing an entrepreneurial venture					
Apply effective strategies in entrepreneurship cases					
Develop and present a business plan that will be ready for investors' review					
Reflect on one's own personal entrepreneurial capacity					

Figure 5. TLA survey form extract.

Table 2. Average TLA survey results (2011–2014).

ILOS	Survey result (out of five)		
	Experience (Lecture by practitioners)	Collaborative (Workshop activities and group presentation)	Reflective (Opportunity journals)
1 Explain the process of developing an entrepreneurial venture	4.4	4.3	4.3
2 Apply effective strategies in entrepreneurship cases	4.2	4.1	4.2
3 Develop and present a business plan that will be ready for investors' review	4.3	4.2	4.3
4 Reflect on one's own personal entrepreneurial capacity	4.3	4.3	4.5

Table 3. Average Grade Distribution (2011–2014).

Grade	Class percentage
A (80–100)	20%
B (70–79)	27%
C (60–69)	19%
D (50–59)	21%
E (<50)	13%

In terms of the final grades, the subject has higher pass rates than other subjects offered by the department. Table 3 shows the average grade distribution of the students over the four years that the subject has been offered. The pass grade for the subject is 50 and only 13% of students, on average, failed to pass the subject. This shows that most students undertaking the subject have demonstrated the skills required to achieve the ILOS. In addition, on average, almost 50% of students enrolled in the subject receive a grade of either A or B, which indicates a high level of competency in the ILOS.

The surveys' results and students' final grades give us a good indication that the use of different TLAs is suitable for this subject. In a context where students have little background knowledge, but they have to demonstrate a high level of functioning knowledge, traditional lectures by academics along with a business plan assignment is not sufficient. With additional factors to consider, which in this case is the short teaching period and the large student cohort, the additional TLAs have to be designed carefully so as to not overwhelm the students and to remain manageable for the teaching staff. The combination of traditional and modern TLAs seems to be a good solution for the design and delivery of this subject.

## Conclusion

In this paper, we have reported our experience of designing the TLAs for a subject that requires students to demonstrate high levels of functioning knowledge. The constraint is

that the students have very little prior knowledge of the theoretical components upon which they are required to build further applied knowledge. The subject is an entrepreneurship subject offered for IT students.

With the short time span to teach theoretical knowledge, we identified a set of modern TLAs that complement traditional lectures. The TLAs are considered novel for IT students because the TLAs use experience as the basis of knowledge, collaboration as a focus of learning and a reflective approach to structuring knowledge.

We explained our rationale of how the TLAs address the ILOS by using the existing literature. We summarised the result of the students' surveys on how they perceive the new TLAs affect their achievement of the ILOS. In addition, we provided the grade distribution of the student cohort since the time the subject was first offered. The surveys indicate that students agree that their learning is helped by the new TLAs and the majority of students passed the subject with a high level of competency.

### Disclosure statement

No potential conflict of interest was reported by the author.

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