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## Improving Project Management Curricula to Increase Student Employability: A Case Study

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### Abstract:

There is a growing need for qualified project managers who have skill sets that include leadership, people management, technical and business knowledge. As a result, formal project management (PM) education is increasingly important in many educational institutions. However, the prevailing industry judgment regarding the approaches taken by most institutions is that they are not adequate to meet the needs of the industry due to lack of exposure to "real" situations, lack of critical thinking and not knowing how to properly deal with conflicts. We present a case study of a novel teaching approach that combines face-to-face and/or online interactions in part to adapt to COVID-19 while increasing student employability through six complementary practices. They are a) blended learning environment, b) learn by doing, c) multidisciplinary pedagogical practices, d) continuous improvement, e) integration of teaching and research, and f) delivery by former / current project managers.

**Keywords:** Project Management, Education, Blended Learning, WIL, Employability

### I. Introduction

The literature highlights the importance of project managers in the realisation of outputs (products or services) and outcomes (benefits provided by products or services) (Zwikael and Smyrk, 2019). Project managers have an eclectic identity that enables the integration of multidisciplinary domains in dynamic (Akkermans et al., 2020; McKevitt et al., 2017) and uncertain environments (Svejvig and Andersen, 2015). This identity includes leadership skills (PMI, 2017; Hanna et al., 2016) as well as technical skills and business knowledge (Jena, 2020; Hodgson and Paton, 2016) that are applied to manage projects from inception to completion. However, because project managers operate in different industries (e.g. IS, construction, defence, government, and manufacture), their experiences will be distinct (McKevitt et al., 2017; Sanchez et al., 2017).

There is a growing need for qualified professionals (Kim et al., 2020; Nguyen et al., 2017; PMI, 2021). The Project Management Institute (PMI), the world's leading association in this field, foresees that organisations will need to fill approximately 2.2 million new project-based roles each year by 2027 (PMI, 2017). Specific to the construction sector, recent research by Kim et al. (2020) identified that one of the four main causes of skilled labour shortages is the lack of training and education. This need for qualified professionals makes formal project management (PM) education increasingly important in many universities and business schools (Nguyen et al., 2017). Tertiary educational institutions are now offering a wide range of programs, including undergraduate, postgraduate, executive education and Doctor of Philosophy (PhD) (Ramazani and Jergeas, 2015). There are also institutions that provided accredited certifications (Blomquist et al., 2018) that complement the formal education, including the Project Management Professional (<https://www.pmi.org/certifications>), widely accepted by organisations, and Six Sigma Black Belt (<https://asq.org/cert/six-sigma-black-belt>) that focuses on process improvement.

However, the predominant industry judgement concerning the traditional PM education is that it is not preparing students to deal with the complexities of the business environment (e.g. Jena, 2020; McManus and Rook, 2019). Among other factors, students are not exposure to real situations (Sharma et al., 2020; C rdoba and Piki, 2012), they are not encouraged to critical thinking and are not properly prepared to deal with conflicts (McManus and Rook, 2019). Actually, the approach adopted by most educational institutions remains largely unchanged over time (Nguyen et al., 2017). To complicate matters, universities are being forced to adopt a new set of behaviours to deal with an established business model that was disrupted by the advent of COVID-19 (EY, 2021). There are also attempts to fill this shortage by devaluating the need for qualified of project managers. For example, Loufrani-Fedida and Missonier (2015) claimed that academics and practitioners should stop looking for a "perfect PM" because well-structured organisational environments can mitigate skills shortages. Palm and Lindahl (2015) and Akkermans et al. (2020) reported that technical specialists can become a project manager due to good performance in a previous project; they can learn PM by doing.

The fact is that, until now, neither the traditional educational approach nor the attempts to overcome it through shortcuts have produced the desired effects. A recent survey by PMI showed that about a third of the projects developed on the five continents across different types of industries (among others, IT, Telecom, and financial services) failed (PMI, 2021). This poor project performance is consistent with what has been identified by the literature over time (e.g., Avots, 1969; Pinto and Mantel, 1990; Doloi, 2013) and shows that educational approaches are not able to prepare current and future project managers to avoid significant loss of productivity in the industry (Lechler and Dvir, 2010).

Instead, the professionalisation of PM (McKevitt et al., 2017; Hodgson and Paton, 2016) requires an ongoing dialogue between educational institutions and industry (Jackson, 2015) that benefits everyone involved. Universities should provide knowledge aligned with industry needs that in turn increase student's employability. The qualification earned by them will contribute to increase the organisation's competitiveness (Ramazani and Jergeas, 2015). There is however a substantial mismatch between desirable and actual education (e.g. Sharma et al., 2020; Cicmil and Gaggiotti, 2018) that necessitates a genuine rethink of PM education in a way that is flexible, adaptable, and allows students to apply their technical skills to real-world situations (Universities Australia, 2019; PwC, 2016).

Therefore the following research question that drives this study is: *How can we better design and deliver a project management program that foster competencies that support real-life problem solving, so students will better be prepared to work in the industry and succeed in the future?* Our contribution is a novel teaching approach that combines face-to-face and/or online interactions aimed at increase student employability through six complementary practices. They are a) blended learning environment, b) learn by doing, c) a myriad of multidisciplinary pedagogical practices, d) continuous improvement, e) integration of teaching and research, and f) to be delivered by former / current project managers.

The remainder of this paper is structured as follows. We start by reviewing the relevant literature on challenges in PM education. This is followed by the description of the teaching approach developed at University of Wollongong (UOW). Then we present the methodology, discussion, conclusions, limitations, and future work.

## II. Challenges in PM education

### Curricula design and pedagogy approach

Although the design of most PM programs is based on textbooks or standards promoted by PM associations (Cicmil and Gaggiotti, 2018), these seem to not be adequately preparing students to effectively manage real-life projects. For example: 1) The book "Project Management: Achieving Competitive Advantage" presents an incomplete concept for *project success* (Pinto, 2019; pp.37-38), because it does not consider detriments (Zwikael and Smyrk, 2019) (e.g., the issue of polluting of a river as a result of the project), effectiveness (the extent of benefits that the project brought to its client) and business results (the perceived value of the project for the organisation) (Lechler and Dvir, 2010). 2) The book "Project Management – The Managerial Process" features an extremely detailed way to calculate the duration and slack of each task to be performed (Larson and Clifford, 2020; pp.258-265), but practitioners often do not plan at this level of detail because any unforeseen event will undermine the calculations and introduce rework. 3) Most of standards assume similarity across projects (Steinfort, 2017), but the fundamental uniqueness of projects suggests that they should be managed according to their characteristics (Shenhar and Dvir, 2007). Although it took a long time, some standards shifted to a more agile and flexible approach, for example, the latest version of PMBOK (<https://www.pmi.org/pmbok-guide-standards/foundational/pmbok>) that incorporated the traditional and agile approaches and allow the tailoring in their processes. What is missing with these approaches is how to apply tools and techniques in practice (Cicmil and Gaggiotti, 2018), foster reflective thinking (Calma and Davies, 2020), how to use of methods to mimic complex realities of actual projects (Ashleigh et al., 2012) and the acceptance that *one-size-fits-all* approach as not viable (Ojiako et al., 2011).

### Today's student body

Today's student body is very diverse, including domestic and international students, students with and without work experience, among other characteristics. Students have their own level of interest and aptitude in the program (Bredillet et al., 2013; Ashleigh et al., 2012) and this causes the standard PM educational approach to be challenged (Jackson, 2015). For example, many students expect their education to focus on raising their employability levels (PwC, 2016); and those who have previous work experience use it to booster their marks (Sharma et al., 2020). These kinds of students want to make the most of the academic inputs provided in classroom and understand how to apply knowledge, tools, and techniques in practice (Sharma et al., 2020). Many international students are also looking for professional advice on job applications and potential employers (Bordia et al., 2018). There are other students that are less likely to focus or put energy into their studies (McManus and Rook, 2019) because their priority is the opportunity to migrate to another country (Abbott and Silles, 2016). Many students are from the Gen Z (born between 1997 and 2013), a group that has been characterised as having the "highest rate of diagnosed depression followed by anxiety" when compared with all other generations (Schroth, 2019). Students with low-performance tend to ignore the importance of concrete feedback and are more reluctant to seek self-improvement. Conversely, those who get better marks indicate a stronger desire to improve even more their performance (Sheldon et al., 2014).

In summary, the current approach for PM education adopted by most institutions requires a significant change in the approach adopted by most of educational institutions and should consider the understanding of a diverse group of students. What the extant literature has overlooked is how to overcome these issues in an integrated approach to better prepare students to effectively manage projects in the industry. So, *how can we better design and deliver a project management program that foster competencies that support real-life problem solving, so students will better be prepared to work in the industry and succeed in the future?*

### III. PM approach adopted at UOW

#### Case study

The case study is a research strategy used to contribute to knowledge through intensive investigation of a contemporary phenomenon within its real-life context (Eisenhardt 1989). Given that the boundaries between the phenomenon and context are not evident (Benbasat et al. 1987), case studies are expected to rely on a variety of techniques and multiple sources of evidence, such as archival records, observations, and surveys, (Yin, 2003) to obtain significant qualitative data (e.g., participant opinions), quantitative data (e.g., indicators) or both (Eisenhardt 1989). However, there are some limitations and criticisms, such as lack of construct validity due to subjectivity (Gummesson, 2006; Miles 1979) that may lead to false or premature conclusions (Eisenhardt 1989), and a lack of theoretical rigor (internal validity) because there are no concise measures such as coefficients or correlations, lack of replication (external validity) and time-consuming data analysis (Miles 1979). In this study, we describe the PM approach adopted at UOW, underpinned by the philosophers John Dewey who considers that individuals learning by doing, and Herbert Spencer who advocated incremental improvement (Zebrowski, 2008). This approach was designed to overcome the issues identified by the literature discussed previously and directed at improving the quality of PM teaching. The main goal is to enhance students' employability by educating them for project management, that is, to increase the set of competences and to facilitate the understanding of the practice of project management (Lucas and Milford, 2009).

#### PM subjects

Learning by doing and incremental improvement was implemented in five subjects of the Master in PM: 1) *OPS 935 – Project Management* provides the basics concepts in project management and is focused on planning. This subject presents four PM approaches able to cover different project types, as one size does not fit all (Shenhar and Dvir, 2007) and more than 20 PM tools used by industry. 2) *OPS 939 – Project Management in Practice* consolidates the knowledge acquired in OPS 935 by focusing on slightly more complicated projects to plan and teamwork. 3) *OPS 936 – Advanced Project Management* focus on planning of complex projects in construction, supply chain, industrial automation, new product development (NPD) or software development. 4) *OPS 937 – Managing and Leading Project Teams* focus on leadership. 5) *OPS 938 – Negotiation Theory and Practice for Project Management* focus on negotiation techniques to be applied with team members (e.g., negotiation of a task hours using a consensus-based technique), suppliers (negotiation of a service) and customers (e.g., negotiation of a project proposal). In addition, the basic concepts of engineering PM were introduced in the *ECTE350 – Engineering Design and Management*, from the Bachelor of Engineering. The implementation of this approach was made through six complementary practices

#### Blended learning environment

The first version of the new OPS 935 was launched in 2018 and had the support of senior managers who helped to overcome the inertia of few academics who were pressing for nothing to be changed. The positive results encouraged the redesign of OPS 939 and OPS 936, launched in the 2019. These subjects have shifted from face-to-face teaching to online delivery in 2020 due to restrictions imposed by COVID. It was a substantial change that worked thanks to the introduction of homework in most of weeks (so, students can apply the concepts acquired in class into practice). After a period of stabilisation, the redesigned of OPS 937 was launched in the third trimester of 2021 and OPS 938 is planned to be launched in 2020 T1. As a result, these subjects have delivery modes (i.e., blended learning environment – Pye et al., 2018) aimed at meeting wide variations in student profiles and their individual learning preferences (PwC, 2016) and allowing them to learn from anywhere (EY, 2021) even in the face of lockdowns during pandemic periods. Students can attend lectures on campus or online (synchronous learning) and access the material and recorded lectures later (asynchronous learning). In addition, they have weekly consultations, which is a complementary way of transferring knowledge by clarifying any doubts about homework and assessments (ACEN, 2020) or even to talk about PM as a career and challenges in their workplace (Havermans et al., 2019; Crawford et al., 2013).

#### Learn by doing

Project-based learning (PBL) (Brewer et al., 2020; Amaral F ris et al., 2020) plays a major role, as students learn by doing. It is a systematic teaching method widely used in management, engineering, architecture, and information technology (Universities Australia, 2019) that encourages students to interact with their lectures, reflect on the outputs produced by their work (Calma and Davies, 2020) and become proactive problem solvers (Ojiako et al., 2011) identified as one of the most important skills for the job market (PMI, 2021).

## Multidisciplinary pedagogical practices

The literature highlights that a myriad of multidisciplinary pedagogical practices (Jena, 2020) motivate students for a better understanding of current work practices (Svejvig and Andersen, 2015) and create an environment that allows them to become knowledge creators, rather than simply recipients of knowledge (Ojiako et al., 2011). These practices combine theory and practice (Sharma et al., 2020) and are applied at group and individual levels. In groups, students develop artefacts, such as project proposals and project management plans (PMP) that make them deal with a myriad of expected and unexpected project situations (Córdoba and Piki, 2012) created gradually from homework that are delivered in most of weeks, like Lego blocks (Ahern et al., 2014). This constant pace of delivery is grounded on behaviour theory of timing (Killeen and Fetterman 1988) suggesting that a moderate level of pressure stimulates the execution of tasks in the time available (Rattat et al., 2018, Gómez-Pablos et al., 2017). Lecturers provided written feedback on the homework delivered, revealing the failures made by each group in a detailed way.

Finally, group activities also assists in developing social skills, such as cooperativeness, cohesiveness, and discussion about the expected quality of the work to be delivered (Mora et al., 2020; Bravo et al., 2019). However, relationship conflicts between group members may arise during the preparation of assignments. As a result, project quality is negatively impacted and as a consequence marks may end up falling. Conflict management is one of the most underdeveloped skills among students and requires effort from academics to help them in this matter (Jackson, 2015). Instead of trying to find someone to blame for the mistakes made, lecturers seek to make students start looking to the future (Goldsmith, 2015). Asking “what could be done different next time?” promotes an understanding of the issues without assigning blame to anyone.

At the end of PMP development, students can use a digital artefact (Walton et al., 2019; Gómez-Pablos et al., 2017) named QPLAN that evaluates the quality of planning through two complementary measures (Amaral Féris et al., 2017). The use of QPLAN helps students in improving the quality of the PMP before delivering it as a formal assessment.

Students are also randomly assigned to groups, so they learn how to work with colleagues from different backgrounds, ages, and maturities; oral presentations, peer-review to promote critical thinking and reflection activities on the outcomes of their decisions (Calma and Davies, 2020). They also study relevant academic papers like those about factors that impact teamwork (e.g., trust, time pressure, organisational environment, and cultural differences); relevant topics to the profession (e.g., SAFe [Scaled Agile Framework] and PPAP [Production Part Approval Process]; and they use the software tools adopted by the industry (e.g., Jira and Minitab). The final assessment is an individual work and aims to identify who has achieved the learning objectives that may have been hidden by the marks obtained by the group work (Córdoba and Piki, 2012).

## Continuous improvement

There has been a continuous improvement process implemented in these subjects from their inception. This process involved bug fixes, new tools, software, and adjustments in the approach to continue to meet the business environment changes in the business environment (Svejvig and Andersen, 2015; Ramazani and Jergeas, 2015). Without monitoring, updating and continuous improvement, the subject contents lose relevance (age) and students will no longer be prepared for the job market. The continuous improvement process is grounded by double-loop learning theory, which recognises that the way a problem is defined and solved can be a source of the problem (Argyris, 2002). The first learning loop checks whether the content selected is aligned with the industry needs, PM knowledge and technological changes, while the second learning loop checks whether PBL activities are being applied effectively in real work situations. Figure 1 illustrates the continuous improvement model applied to teach project management.

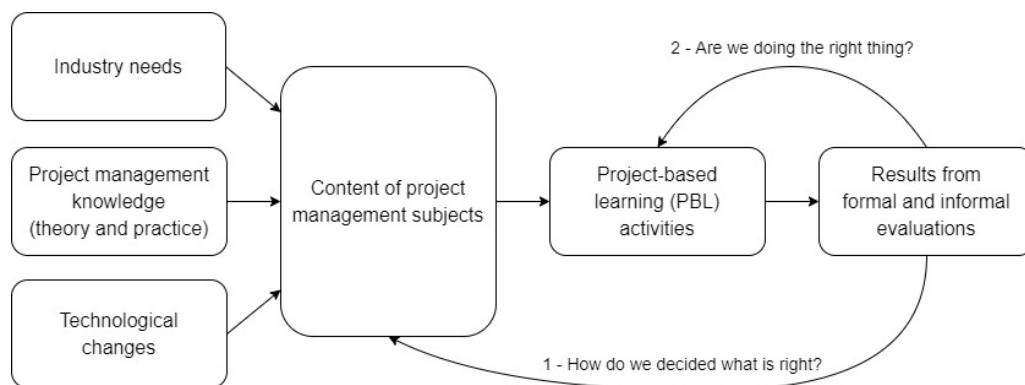


Figure 1: Continuous improvement

## Integration of teaching and research

The integration of teaching and research has become an important issue in higher education, particularly around achieving an adequate balance between them. On the one hand, academics are pressured to meet increasing research goals, because research funds brings prestige to universities, helps with career advancement and contributes to the body of knowledge. On the other hand, carrying a significant teaching load brings in tuition fees (Xia et al., 2015). In our project management context, the synergy between teaching and research is part of the continuous improvement process. We analysed the frequency of issues identified by QPLAN in 65 projects between 2019 and 2021 and we found that without a minimum of technical knowledge, students are not able to develop a proper plan. Moreover, scope, time, risks, communications, and integration are the areas to be emphasised in classroom. Armed with this knowledge, the teaching materials could be improved accordingly.

## Delivery by former / current project managers

If the quality of the course increases by teaching how to manage projects in practice, this requires that the lecturer know PM in depth (Gómez-Pablos et al., 2017) to be an effective mentor for students (ACEN, 2020; Crawford et al., 2013) and highlight the importance of work-ready skills attainment to students (McManus and Rook, 2019).

## IV. Discussion and Conclusions

The current study was motivated by the need of rethinking PM education, as there is a substantial mismatch between desirable and actual education. This is a relevant and contemporaneous topic aimed at preparing students to meet industry needs. However, no matter how good the quality of education offered by an institution, the same needs that drove the changes in the approach described in this paper apply to each individual's career. That is, project managers must have the ability to identify and address their own educational needs over the time (Sangrà et al., 2019; Kruchten, 2015). This constant lifelong learning, paved with formal and informal experiences (Savelsbergh et al., 2016), combined with a good citizen behaviour (Aronson and Lechler, 2009), hard work and know how to manage people (Ballesteros-Pérez et al., 2019; Lee and Park, 2020), creates the conditions to remain competitive as a professional in a long term.

We shared the characteristics of a PM program that has attracted and retained a significant number of students. While accepting the limitations of the study, this novel approach have been the result of the combination of a) blended learning environment to meet wide variations in student profiles and their individual learning preferences (e.g., to attend an online course, due to changes in behaviour caused by COVID), b) learning by doing to apply theories, concepts and tools in practice, complemented by a c) applying multidisciplinary pedagogical practices that motivate student learning and create an environment that allows them to become knowledge creators, d) continuous improvement because of the inherent to changes in the business environment, e) integration of teaching and research, and g) be delivered by former / current project managers that act as mentors for students.

Recent research indicates that the PM education provided by most educational institutions are not preparing students for the job marked. Going against this trend, our case study indicates that the incorporation in the design of a PM program focused on quality of teaching that incorporates six complementary practices to meet students and industry demands. Because the data available from the old approach concerns only the marks obtained by students (and they were generally higher because the subjects had no practical content), our success indicators are three: a) the number of students, which did not decrease even during the COVID period; b) the participation in lectures and consultations (e.g., the average of the attendance rate is 85%); and c) the feedbacks received from students. For example, three students without work experience commented that a) *"I am very thankful for your immense support and guidance during the trimester. It would not have been possible without your support"*; b) *"...your teaching approach help me to understand the exact concept of the subject"*; and c) *"... Another highlight is the industrial and the academic experience you shared with us in each lecture which is in-line to the topic was going to be truly beneficial to our future career"*. Four other students with work experience said a) *"Thank you so much for today's consultation. It really help me related to my work at <organisation 1 name>"*; b) *"The interesting aspect of your methodology I liked most was blend of relevant theories and putting it into practice"*; c) *"Firstly I wanted to thank you for opening my eyes to the broader aspects of PM ... I also was exposed to many of the different aspects, but I have never done a complete project planning due to shuffling on other projects in <organisation 2 name>. It's only now after having a couple of days after the exam that I have been able to see all the moving parts in action thanks to your homework, teaching and making us be concise... Personally it's a genius way of gaining firsthand exposure to what the real world will offer."*; d) *"I am currently focused on arranging finance for projects (so only one component of the project management process). I the last few weeks I have experienced many "aha" moments when working through the funding proposals on upcoming projects! The subject matter you are teaching is relevant to industry and I'm looking forward to further application in my day to day work."*

A positive factor caused by COVID is that, with the closing of country's borders, the university attracted more domestic students who have work experience. This ended up raising the level of discussions in the classroom, as these students understand how project management can help them in overcoming the challenges presented in their work environment.

Further research may address a number of limitations presented in this study. Firstly, replicate the six complementary practices in a different population to assess the extent to which results are generalisable. Secondly, part of the continuous improvement process, continue the development of the new content to OPS 938 to integrate it better with other PMs subjects. Thirdly, develop a new feature in QPLAN to assist in marking project proposals, project management plans, and other assessments of project management disciplines. In addition to decreasing the time spent on marking them, this will provide better quality feedback and will identify the content to be emphasised where students have the most learning difficulties. Finally, present the findings of a complementary study to this one by showing how to reduce overconfidence in newly learning skills, an issue identified in classroom, which may deprive students of carrying out real projects and therefore compromise their future careers (Sanchez et al., 2018).

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