

Implementation of Team Teaching in Construction Management Education

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Abstract—Evidence suggests that team teaching is linked to significant tangible and intangible benefits to students, academic staff, and institutions. Partnering with industry participants is an emerging trend of team teaching in the higher education sector. Partnering with industry participants in curriculum design and unit delivery will ensure that students learn about important industry developments and help students improve their employability. It also will be helpful for academic staff to engage with the industry. Team teaching has been piloted at the School that the Authors are working at and the outcomes were very positive. In 2020, team teaching is required to be implemented in another core unit of Construction Management Undergraduate Program. By addressing the lessons learnt in implementing team teaching in the Authors' units and being guided by previous research, a plan to implement Team Teaching in this core unit is presented in this paper. This plan will be evaluated and improved after each semester and it will be redeveloped with the industry partner every 3 years.

Index Terms—team teaching, self-reflection, co-design, co-delivery

I. INTRODUCTION

Teaching is considered as “a lonely profession”, as it is lack of “formal structure” and opportunities for teachers to share their successes in teaching or discuss the “day-to-day concerns of the classroom” [1]. The profession is one in which you “plan your lessons, close your classroom door, go about your business with your students, mark your papers, and go home” [2]. The high value placed on autonomy makes close collaboration “less likely to occur in schools” [3]. Team teaching could help to create community and promote collaboration [4], and deal with the two main causes for dissatisfaction among teachers, including, the lack of support and the feeling of loneliness [5].

This paper will introduce the theatrical background of team teaching first. The development and implementation in different sectors/areas and the benefits and concerns for both students and academics are discussed. Next, the lessons learnt from implementing team teaching in the Authors' units will be provided. Finally, a plan to implement Team Teaching in a core unit of Construction Management Undergraduate Program will be presented.

II. THEATRICAL BACKGROUND

Team teaching was first introduced to middle school by William Anderson in the 1960s [6]. Since then, team teaching has been used in all levels of education, including higher education and professional continuing education.

The implementation of team teaching in the higher education sector has been studied by various scholars in different areas, for example, Music [7], Geology and Sociology [8], Social Work [9], Pathophysiology [10], Language Education [11], Sensitive Content [12] Biochemistry [13], History [14], etc. However, the research and implementation in the construction management area is still rare.

Although team teaching has been defined in different ways [15], there is an agreement that it “is an instructional approach where two or more teachers cooperate and share the responsibilities for course planning, content delivery, assessment and evaluation” [16].

In a team teaching setting, the decisions should be made as a group, however, each team member may be responsible for different tasks and team members should be complementary and support each other to achieve the common goal [17]-[19].

Industry professionals have been involved in developing integrated courses at the higher education level. The most common activities are guest lectures and class visits. For example, nearly half of the marketing departments in the United States were incorporating industry professionals into courses [20]. This approach can provide students with a greater depth of knowledge and a richer experience [21]. However, industry professionals should not be considered as team members in a team teaching environment, if they are only involved as an instructor for a day.

Federation University provided three principles to help academics implement team teaching successfully [22], including;

- Formulate clear teaching team roles and responsibilities;
- Develop effective communication strategies to maximise teaching; and
- Identify complexities and variable in managing team teaching workflows.

Team teaching can be carried out in many ways, including;

- Interdisciplinary courses - where different teachers are responsible for the course content of their respective disciplines [16], [23];
- Grouping courses - letting a team of faculty members be in charge of a set of courses to increase the alignment between course objectives [24], [25]; and
- Co-teaching or pair lecturing - having two teachers co-lecture a single course [26]–[28].

Western Sydney University Foundations of University Learning & Teaching Program instructors recommended [29]’s three approaches to be used at Western, including;

- Co-teaching with 2 academics in the room during each session, sharing content,
- Staff rotation – taking turns, and
- Hybrid of the 2 above

A number of benefits and concerns of team teaching for both students and academics have been identified by various researchers. Example benefits for students are;

- Students can get more than one explanation of complex concepts [26], [30].
- Students also can benefit from the diversity of perspectives and expertise and that the setting can provide an opportunity for innovation and growth [7].
- Team teaching can positively affect student learning outcomes by increasing critical thinking skills [31]–[33].

Example benefits for academics are;

- Promoting teacher development through mutual reflection on action, and a more insightful bouncing of ideas during the planning of education [26], [27].
- Less isolation and provision of moral support [5].
- Increased knowledge-base and efficiency and effectiveness of teaching [26].
- Learn from each other [34].

The concerns of team teaching could be summarised as;

- Team teaching is commonly associated with high costs [16], [21], [23].
- Lack of continuity in content, possible poor communication between team teachers, reduced rapport with students, and the difference in teaching styles [35]
- Increasing workload, and the fear of being observed [36]
- Faculty transitions [37] and the need for teachers to agree on the purpose of team teaching [7].

III. SELF-REFLECTION

In 2020, the School which the authors are working at (the School) plans to implement team teaching in all the disciplines within the School. Under this arrangement, two or more academic staff will design and develop teaching material and unit delivery in collaboration with industry partners. Preparations for such partnerships are already in place, as the School has already signed four

Memorandum of Understanding (MoUs) with industry partners – Tier 1 and Tier 2 construction companies in Australia, and two are pending. Partnering with industry participants in curriculum design and unit delivery will ensure that students learn about important industry developments such as required skills, cutting edge concepts/technologies and future trends, which will help improve their employability. At the same time, students will still benefit from theoretical and conceptual rigor introduced by academic staff. It also will be helpful for academic staff to engage with industry and for the School to build strategic partnerships with industry leaders. Co-design and Co-deliver with industry underpin the Western Sydney University 21C Curriculum Reform program and it is an exemplar of implementation of Partnership Pedagogy generated by 21C program. The implementation of team teaching is also aligned with the Western Sydney University Securing Success 2018-2020 strategic plan (SSSP), including;

- A Distinctively Student - Centred University - Utilise research and data analytics to inform, test and optimise experiences leading to improved student outcomes;
- A Research-Informed Learning Experience - Offer innovative courses that respond to changing global employment markets and industry and community needs;
- An Anchor Institution and Leading Advocate and Champion for Greater Western Sydney and its People - Develop and disseminate best practice in community-engaged teaching and research with a range of partners from diverse communities; and
- A Dynamic and Innovative Culture that Secures Success - Deliver a range of relevant career development opportunities and training, particularly for early and mid-career staff, in the capabilities and skills required for the University to succeed in a competitive sector.

Team teaching was piloted on a limited scale at the School in 2019 and all the authors’ units were included. The outcomes are very positive. For example, 3 units of Author 1 have implemented team teaching. Unit 1 achieved 96% overall satisfaction rate on Student Feedback on Units (SFU) Survey, which was much higher than School (88%) and the University averages (91%). Unit 2 achieved 100% overall satisfaction rate on Student Feedback on Teaching (SFT) Survey and Unit 3 achieved 100% overall satisfaction rate on SFU.

The Authors have gained rich experiences in the implementation of team teaching through the activities they have been involved in their units in 2019, for example,

- Redeveloping lecture and tutorial contents,
- Reorganising/redesigning weekly topics,
- Redesigning the learning guide, assignments and marking criteria,
- Managing teaching team, and
- Moving to online delivery.

The lessons learnt (LL) from implementing team teaching in their units could be summarized as Table I.

TABLE I. LESSONS LEARNT FROM IMPLEMENTING TEAM TEACHING

No.	Lessons Learnt	Remark
1	Contents should keep up with industry needs	<ul style="list-style-type: none"> • Contents should cover the knowledge and skills which are currently required in the industry. • Advancing with the times - updating the contents speedily is essential
2	Have more opportunity to interact with industry participants	One of Author 1 units held two public lectures/events in 2019, including 1) Guest lecture – Australian Institute of Building Address and 2) Pizza with Boss event. This kind of events/lectures provides the students with the great opportunity to know the development and future of the industry, the knowledge/skills required by the industry participants, potential internship opportunities, job search tips, etc.
3	Utilise the School’s industry partners	Universities may have signed a lot of MoUs with partner organisations. However, many of them may have been ‘inactive’ for years. It is meaningless to just sign a piece of paper (MoU) without doing anything with industry partners. As the School has already signed a couple of MoUs with industry partners, the partnerships should be utilised by co-designing and co-delivering units and/or programs.
4	Utilise the expertise of the academics in the School	The unit which this paper is going to develop team teaching implementation plan for is a core unit for the fourth year construction management students. This unit consists of 5 key areas, including, <ul style="list-style-type: none"> • Individual responsibilities under Professional Codes of Conduct; • Characteristics of modern construction procurement system; • Innovation delivery in the construction industry context; • Risk management and risk wrapping in project delivery; and • The future of an industrialised, digitalised and globalised construction industry. The contents of this unit are broad and it requires the instructor/s to have extensive knowledge and rich experiences in each area. The School has academics expertised in each area. They could be invited to give a guest lecture or produce a video or other teaching materials for a particular area/topic.
5	Take COVID -19 into consideration	<ul style="list-style-type: none"> • Tight casual budget • Transfer to online delivery • Tutors may lack relevant online teaching skills • Workload (academics overloaded) • More consultation hours (ie difficulties, special consideration, assignments, exam, etc.)
6	Lecture topics aligned with academic expertise	The lecture for this unit will be delivered by two academics. Lecture topics should be aligned with academic expertise. Sometimes, the lectures were divided based on campus, which means one lecturer delivers all the topics at Campus 1 and the other one delivers all the topics at Campus 2. But it is difficult to ensure consistency across lecture delivery.

IV. PLAN DEVELOPMENT

By addressing the lessons learnt from the implementation of team teaching in the Authors’ units, and being guided by [29]’s three approaches and [22]’s three principles, a implementation plan of Team Teaching in a core unit of Construction Management

Undergraduate Program (CU) has been developed (refer to Table II), which has 7 items, including 1) team structure; 2) Co-development of contents; 3) Co-delivery of Lecture; 4) Co-delivery of Tutorial; 5) Co-development of assessment; 6) Major collaboration mechanisms; and 7) Plan Evaluation.

TABLE II. IMPLEMENTATION PLAN OF TEAM TEACHING IN CU

Items	Details	Remark	Alignment
Team structure	1 x Unit coordinator (UC) 1 x Deputy Unit Coordinator 2 x Lecturers (UC + Deputy UC) 4 x Tutors	Deputy UC has extensive experience with industry. At least two tutors should come from industry and have profound industry experiences. Industry partners may help.	<ul style="list-style-type: none"> • LL3 • SSSP • 21C program
Co-development of contents	UC and Deputy UC to check, update and re-develop the lecture and tutorial materials, such as weekly topics, slides, etc. Next, send to tutors and industry partners for comments Co-develop case study (examples) used in class with tutors and industry partners.	To make sure the contents <ul style="list-style-type: none"> • up-to-date • advancing with the times • meet the industry need • make contents more interesting and make classes more active 	<ul style="list-style-type: none"> • LL1 • LL3 • 21C program • SSSP
Co-delivery of Lecture	<ul style="list-style-type: none"> • Lectures – 1 hour per week (Online Delivery) • Two lecturers take turns delivering the lecture based on expertise • Work with professional organisation, ie AIB, CIOB, AIQS and industry partner/s to deliver at least two guest lectures and/or public events each semester 	<ul style="list-style-type: none"> • UC: Expertise in ethics, innovation, digitisation, globalisation. • Deputy UC: Expertise in project delivery, risk management. • Instead of delivery at two campuses, each lecture topic will only be delivered once (online) 	<ul style="list-style-type: none"> • LL2 • LL4 • LL6 • Money and Coughlin (2016): Staff rotation – taking turns • SSSP

Items	Details	Remark	Alignment
	<ul style="list-style-type: none"> Invite academic staff at the School with expertise in Public-Private Partnership, Digital Construction and BlockChain to deliver a guest lecture or produce a video and/or other teaching materials. 		
Co-delivery of Tutorial	<ul style="list-style-type: none"> Tutorials – 1 hour per week (Online Delivery) Tutors follow a focused but loosely structured plan each week, centering on a focal question which each tutorial class can address through open-ended discussions. Tutorials are structured as follows: <ul style="list-style-type: none"> Introduction; focal question Discussion in groups; Student presentations. 	<p>Some casuals may not be familiar with online delivery, such as Zoom and Blackboard Collaborate Ultra. A mini-workshop re online delivery for tutors will be organised before the semester start.</p> <p>UC conducts quality assessments of tutorials by viewing the online session and can take over if a tutor is struggling</p> <p>Pre-recorded assessments instructions videos will be produced by UC and Deputy UC</p>	<ul style="list-style-type: none"> LL5 LL3 Federation University’s three principles 21C program SSSP
Co-development of assessment	UC and Deputy UC to create a draft. Tutors and industry partners to give feedback and UC to finalise.	<p>New assessments should be taken COVID -19 into consideration, for example,</p> <ul style="list-style-type: none"> students presentation may be held online or ask them to submit presentation video via online platform; to provide training to students for online presentation; to consider changing group assignment to individual assignment as students may have difficulties to conduct group activities under the COVID -19 situation. But it needs to be discussed with teaching team and seek guidance from Directors of Academic Programs and Deputy Dean. 	<ul style="list-style-type: none"> LL3 LL1 Federation University’s three principles 21C program SSSP
Major collaboration mechanisms	<ul style="list-style-type: none"> Whole team Zoom meeting before the start of the semester Weekly email for tutorial plan (outline) Zoom meeting regarding co-development of contents Mini Zoom workshop regarding online delivery Regular feedback after each tutorial Self-reflection by teaching team at the end of the semester 	<ul style="list-style-type: none"> Use Zoom, phone calls, emails to replace face to face meetings 	<ul style="list-style-type: none"> LL5 Federation University’s three principles 21C program SSSP
Plan Evaluation	<ul style="list-style-type: none"> This implementation plan will be evaluated after each semester and get improved and redeveloped with industry partner every 3 years. 	<ul style="list-style-type: none"> Peer review and students interview may be conducted 	<ul style="list-style-type: none"> LL3 21C program SSSP

V. CONCLUSION

Team teaching is not a new concept and it has been implemented in the higher education section in the last two decades. Team teaching could benefit both students and academics in many ways, however, its concerns also need attention. Scholars from various areas have studied and implemented this approaching in their organisations. However, the research and implementation in the construction management area is still rare.

The School plans to implement team teaching in all the disciplines within the School. Strong, positive and effective partnerships with industry partners are one of the School’s strengths. Team teaching could strengthen the partnerships and benefit our students and academics at the School. Co-design and Co-deliver with industry underpin the 21C Curriculum Reform program and it is an exemplar of implementation of Partnership Pedagogy generated by 21C program. The implementation of team

teaching is also aligned with the Western Sydney University Securing Success 2018-2020 strategic plan.

Based on the lessons learnt from the implementation of team teaching in the Authors’ units, and being guided by [29]’s three approaches and [22]’s three principles, a practicable implementation plan of team teaching in one of the core unit of Construction Management Undergraduate Program was developed in this paper.

Due to the timeframe, budget issues and COVID-19 situation, not all the activities included in the plan could be implemented in 2020 immediately. However, the plan will be gradually implemented in the next semesters. Also, this plan will be evaluated after each semester and get improved and redeveloped with industry partner every 3 years.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

PZ conceived and designed the study. PZ and YF collected and analyzed the data. PZ wrote the paper. YF contributed to revising the paper. All authors read and approved the final manuscript.

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