Incorporating Effective Teaching Pedagogies to Improve Learning and Teaching Approaches Globally

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Introduction

Teaching in all formats from primary to tertiary is a challenging and an insightful journey, with a definitive goal of creating a student-centered learning that must functional and effective to all learnings globally. A variety of teaching elements were delivered to practice in the classes, all these teaching elements are referred as "Pedagogy", this is a contested term, but involves activities that evoke changes in the learners.

Teaching is a transformative process for both learners and teachers, it builds effectively by means of collaboration and sharing each other's experiences. Being a teacher is an utmost profession that not only provide teaching and assistance in classrooms, but also strive towards acknowledging the students' behaviour. We also show them, that we are interested to deliver them necessary support to succeed in their careers. From several decades, we have addressed the significant issue of learners being taught with old style/traditional teaching model, which mainly provide passive knowledge in one direction (Teacher to Learner). We as teachers, it is our responsibility to bring transformation, and act as role models to construct and blend well-established and research-informed learnings for our students. We invested significant time towards researching effective teaching pedagogies to always maintain a student-centered learning environment (Alrubail, 2015).

This paper covers a range of effective teaching pedagogies supported with widely known adult learning theories. This paper supports in the development of teachers as facilitators striving towards applying different teaching strategies to ultimately create efficient and qualitative learning in the sessions for learners. This paper makes significant contributions to research on innovative learning and teaching by applying different pedagogies and strategies across the Civil, Mechanical and Electrical (CME) Engineering Programmes. This paper is the key to open the lock and fill the gap by exploring the experiences, applying teaching pedagogies for students to identify all possible ways for increasing productivity, interests, and equity in engineering. This paper provides an overview of each teaching pedagogy such as flipped classroom, inquiry-based learning, active learning and reflective learning. In addition, we demonstrate the approaches in practice by giving details of the assessments and learner centered activities, and lastly demonstrate the results & feedback obtained from learner's performances and overall grades. Also, it is supported by the literature of Adult Learning theories to justify the teaching approaches.

An Overview of Teaching Pedagogies

Innovative and proactive academics always investigate into new teaching elements to implement in classes. In our classes, we deliver a range of teaching elements that involves the aspects of blended learning such as, flipped classroom, active learning, inquiry-based learning, differentiated learning and reflective teaching.

Flipped Classroom

The Flipped Classroom model is based on the idea that the traditional teaching order has been completely switched, in the sense that what is normally done in class is now flipped. Now every session is structured with the students working on teaching content out of class. Putting the out-of-class teaching content on Moodle Site (online teaching portal) with students watching videos, PowerPoints, and graphics at home, allowed more engaging classroom experiences that focused on teacher-guided problem-solving, analysis and discussions in class.

In reference into Bloom's revised taxonomy (2001), learners perform the lower levels of cognitive work (knowledge acquisition) outside of class freeing them up to, focus on higher forms of cognitive work (analysis, synthesis, and/or evaluation) in class. Outside of class gives time, where they have the support of their peers and teacher (Brame, 2013). The flipped approach delivers authentic learning to learners, it gives freedom and opportunities to allow students to learn at their own pace. Flipped learning encourages students to actively engage with lecture material prior to the session, it delivers allowance to teachers to free actual class time for more active, inquiry-based and creative learner centered activities (Gilboy, Heinerichs, & Pazzaglia, 2015).

Active Learning

For an effective flipped classroom approach, the pedagogy of active learning is highly significant, it creates the foundation on interactive, creative, engaging and instructional activities for students. In active learning environment, the goal is to involve students in performing tasks and apply critical thinking on what they are doing (Bonwell & Eison, 1991). This approach promotes the development of learners' skills and ability to learn more effectively, it also emphasises on learners' exploration and attitude to move forward.

Inquiry-Based Learning

Critical thinking is a highly required attribute, employers need in engineers. Inquiry-based learning (IQBL) is a significant pedagogical approach to develop the need of critical thinking in an individual. IQBL emphasises and signifies the learner's role in the learning process, it gives learners the freedom to research and develop their own learning by laying the foundation of curiosity in them**.** Inquiry-based learning provides opportunities to apply critical thinking and develop employability skills (Guido, 2017). As facilitators, it also brings in the aspects to create educational relationships with your learners, as you can encourage them to ask questions and provide them support during the investigation process (Friesen and Scott, 2013).

Differentiated Learning

Like how everyone has a unique fingerprint, every learner has an individual way on attaining information and learning styles. Every individual grasps a subject in a slightly different manner or share at a different ability. Learning and teaching spaces are formed with learners that come from different backgrounds and educational capabilities, which means they require different pathways for learning to achieve one common goal. Therefore, differentiated learning is a substantial teaching pedagogy to serve for every learners' learning goals (Weselby, 2014).

Reflective Teaching

Questioning yourself, observing yourself and finding all possible ways to challenge yourself in teaching, is a picture-perfect example to be an effective student-centered teacher or facilitator. Reflective teaching methodology consists of many questions, a teacher should ask such as, *Am I proposing an effective teaching pedagogy? How flexible my teaching pedagogies are? How well is it working?* By adopting reflective teaching pedagogy teacher imparts inspiration among teacher trainees and make students feel respected and heard (Navaneedhan Girija, 2011). Reflection is a pedagogical approach and an essential ingredient for sustainable education and attaining feedback from learners on their educational experience defines the power of lifelong learning.

Methodology

To progress effectively and actively create spaces for learners to gain knowledge, we as teachers must gain a deeper understanding of the ways in which all the sessions should experience learner centered approaches, at different levels of tertiary education. Therefore, we are conducting and applying wide range of tools that delivers the innovative teaching pedagogies.

The first approach is to implement flipped model in the classroom. This is conducted by an assignment termed *teaching practice* (worth 10% towards the final grade). In this assignment all the learners work in pairs or groups depending on class size, they need to do four tasks throughout. One: Delivery of the teaching content, two: explaining the worked examples, three: facilitate the class by communication and activities, and four: handout worksheets and help other learners in class.

By doing a teaching practice assignment, learners undertake the responsibility of being a teacher and facilitate a session on their own. In doing this, it brings learners closer to the subject matter. It can help learners to assess the degree to which teacher's understand the course content and deliver teaching with effectiveness for all the other learners.

The second approach is to create an active learning environment, where learners are formed in groups (affinity grouping). Each group conducts research and develops information on the topic allocated. From all the collected information, each group designs an interactive poster to showcase their information. To promote active learning and be engaged, teachers go around to check their progress and ask them to create their own question formulation technique (QFT), as it shows that learners take more control in their tasks, if they know all the possible questions around their designs (Experiencing the Question Formulation Technique, n.d.). From QFT, in the end it builds up an array of questions that are productive and worthwhile.

The third approach is to create laboratory assessments with the focus being towards adding investigation or research elements into the assessments such as, it encompasses inquiry questions. In this procedure, the learners conduct their labs around the set learning outcomes, from which inquiry questions are created by the teachers. All learners are required to collaboratively work in a group of three to four, choose one of the inquiry questions and, as a team, investigate ways they could create a design of experiment to solve or prove the question. Lastly, all the groups let the teacher know one week prior to arrange the lab equipment.

Another example of IQBL Pedagogy is Double-Entry Journal (DE) activity, given to emphasise and make learners' profound critical thinkers. DE activity enables learners to record their views or understanding to a given text as they read. Learners are given a range of journal articles of their disciplines (Civil, Mechanical and Electrical), which they read and write down sentences and own reactions to their interpretation. Everyone makes two columns on a blank page for each journal article, in the left-hand column, the learners write sentences that was particularly meaningful and clear to them, along with the page number for reference. The right-hand column consists of personal response to the research approach such as, comments, critique and questions (All About Adolescent Literacy: Double-Entry Journals, n.d.). Lastly, learners can collaboratively share their responses within the class for discussions.

The fourth approach is to create open forums for any of the learners' queries on Moodle (online teaching portal) and conduct weekly 1-hour drop-ins for learners to do one-on-one sessions. Most of the learners demonstrate mixed abilities, which requires differentiated learning by providing individualised support and learnings. The agenda for one-on-one sessions are created by the learners with their learning queries. The outline of the one-on-one sessions is as follows: Learners facilitate the session with all their queries around the course content, then teachers would support and provide solutions. Afterwards, teachers would check on their progress on achieving the learning outcomes (Funnell, 2015).

The fifth approach is using the “Ticket out of Class” strategy, which is an efficient reflective approach. This strategy collects the written feedback about this session from learners. It is an important tool that identifies learners’ opinions/views in classroom. Just before finishing, I will hand out “Exit Slip 3-2-1” to everyone, and ask three questions: Name three things you learned? List two things you want to learn more about? Ask one question about today’s lesson? All the students to write the comments/feedback on the post it notes given and put it on the white board.

Results & Discussion

The five innovative teaching pedagogies came into action from 2018 onwards. It has resulted in substantial learners’ involvement and increased the overall passing rates effectively for the modules across the whole of CME disciplines.

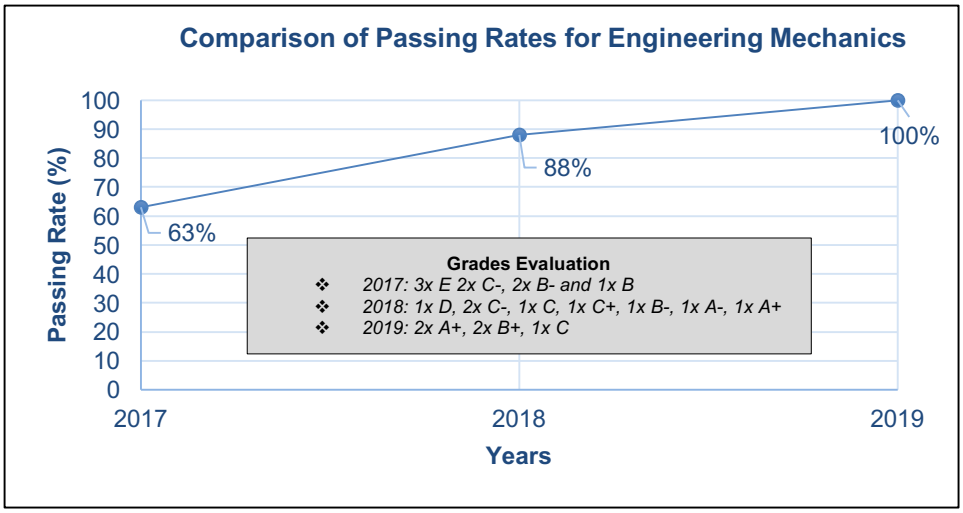

Figure 1: Passing Rates with Grades for Engineering Mechanics Course in Semester 1

As an evidence of acceptance by the learners of all the innovative learning and teaching pedagogies, figure 1 demonstrates comparison of passing rates with grades for only one of the courses called Engineering Mechanics, for semester 1 delivered in Wintec. With a passing rate of 63% and no A grades, it has significantly increased to 88% in 2018 with 1x A- and 1x A+. Lastly, hitting the target of 100% (as only 6 Students Enrolled) by 2019 with 2x A+ and 4x B+. From this result, it showed that approach of teaching pedagogies captured the dynamic role of teachers drifting from traditional/old style teaching to more authentic learner centered teaching.

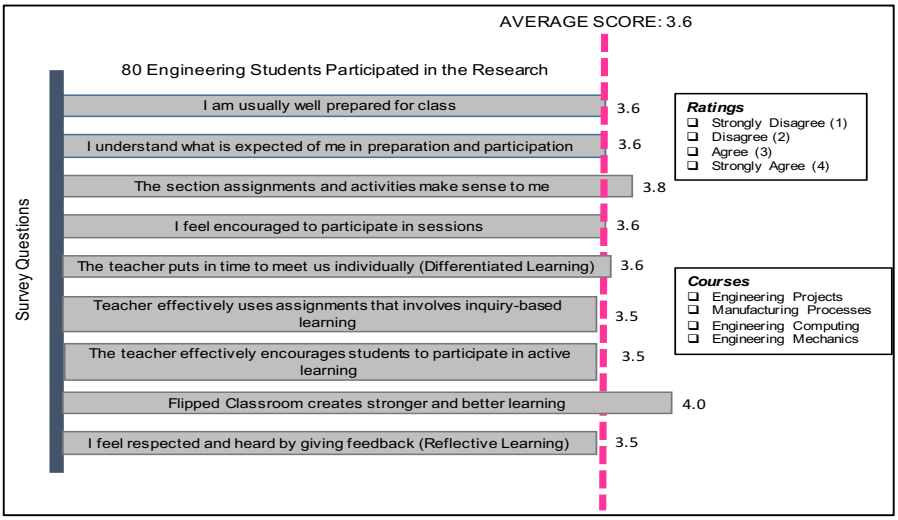

Figure 2: Learners’ Feedback on adapting to Innovative Teaching Pedagogies in 2019

In Figure 2, learners' feedback across 80 engineering students in CME is presented. From this feedback, it can be analysed that effective learnings have taken place across all the students studying in different courses. It can be interpreted that in each survey question, the response rate was above 3.0 (Agree) with an overall score of 3.6 (Between Agree & Strongly Agree). The average score defines that each learner had a positive and engaging experience with all the innovative teaching pedagogies.

From the questionnaire, some of the learners' constructive feedback/recommendations has shown positive acceptance to the modernised learning environment, whereas some learners' nature demands traditional style teaching, as they felt this change to be overwhelming and would consider guided instructions throughout.

"*I really enjoy being in class because it is so much practical now and teaches employability skills that prepares me for workforce"*

"The best thing about my course is the student lead teaching assignment using flipped model, gives me a chance to prepare prior to the class from online resources and teach all the class. It gives me confidence and I learn the topics better"

"*This new teaching style is not great for my learning, as I am new to the country, I prefer teachers to lead and help us in every session and guide us on each assignment"*

From literature, ALTs are used to justify the approach of using teaching pedagogies. Social and situated learning theory is complemented in this research, as it has the elements of contact and engagement through activities. Social Constructivism by Vygotsky is clearly shown, which focuses on teachers as key providers of support for extended and potential learning for the students or "Zone of Proximal Development". Also, as teachers we must observe behavioural changes of the learners', which covers the theory of being a behaviourist. Implying this theory has enhanced the pedagogy and emphasised our role as teachers. We also use lesson plans to manage and control time and to have an appropriate structured class (Hunt & Chalmers, 2012). In terms of all these interventions of pedagogies, they can be transferable and adapted with effective planning to a broader context and to different discipline of studies. Our research on applying student centered learning has potential for further development in the pedagogical approaches for innovative learning and teaching spaces. Context-Based Learning (CBL) and Project-Based Learning (PBL) pedagogies can be explored further, as incorporating these approaches in future will bring extensive knowledge from real world applications, and experiences to develop graduate attributes.

Conclusion

Innovative learning and teaching not only expands learners' understanding and establish problem solving mindsets, but also sets a benchmark for upcoming generations to strive for better and inclusive engineering education. An overall improved summative grades and increased learners' participation in formative assessments has shown the significant effect of innovative teaching styles. The authors of this research have also found benefits of students leading the sessions, becoming problem solvers and developing professional skills. All four pedagogies throughout this paper serves as initiation points for future wellbeing of learners. As stated above, further research is required to explore and implement CBL and PBL teaching pedagogy to shape and refine the professional attributes, which will supplement to extreme educational sustainability.

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