Evaluating student perceptions in peer to peer learning and assessment practices in design based learning environment

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ABSTRACT

Considering the past decade, the changes involved in learning and teaching have been in terms of strategies, methods and practices to learning and teaching; assessment method; interface between a teacher and student; communication and feedback; self-reflective practices and designing pro-industry curriculum. For all the stakeholders involved, it becomes vital to know the student perception about the learning and teaching. The purpose of the paper is to evaluate the perception of the student experience on peer to peer learning and assessment. Issues related peer to peer learning has been identified based on the student response to a survey conducted at the end of the unit. The purpose of the paper is also to serve as a medium to contribute to the existing knowledge base on peer to peer learning and assessment in design/project based learning. The outcome of the paper is to review the existing literature, innovate a new approach and suggest a mutually acceptable solution to the issues related to peer to peer learning and assessment.

KEYWORDS

INTRODUCTION

Education has been a rapidly changing field during the last decade. The changes have been in terms of strategies, methods and practices to learning and teaching; assessment method; interface between a teacher and student; communication and feedback; self-reflective practices and designing pro-industry curriculums. According to Struyven et. al, constructivist learning theories are driving these changes where the onus lies on the student to play an active role in making sure the changes are implemented for the betterment of learning and teaching (Struyven, Dochy, & Janssens, 2003). For all the stakeholders involved, it becomes vital to know the student perception about the learning and teaching approach. Some of the questions which might arise are: how effective is the methodology, how efficient is the knowledge transfer, how reliable is the assessment technique and how assured a pedagogue is about the self-reflective practice or the feedback? The answer to some of the question will lead to innovation in learning and teaching, identifying the area for improvement and implementing better practices of

learning and teaching. Teaching methodologies in relation with the context, tools, delivery and learning environment play an important role for success of a unit delivery. The learning environment can vary depending on the delivery style like the traditional way of teaching is more of a class room based, old style teaching, individual and involves written assessment- examinations; whereas a modern learning environments like Project Based Learning (PBL) and Design Based Learning (DBL) characterised by team learning, self-motivation, online tools and research based assessments.

There is always a constructive debate across the university sector on use of traditional, class room based, assessment by exam, type of learning and teaching approach; and non-traditional, student driven learning, design based learning and teaching approach. The universities are putting in their best efforts in offering programme with a hope of producing graduates with employability skills (Polishetty et al., 2014). These efforts to remain a leader in engineering education has led to the School of Engineering, Deakin University to go for a modified learning and teaching practice known as Project Oriented Design Based Learning (PODBL) (Chandrasekaran, 2014). The advantage with PODBL is its constant engagement with industry from designing the curriculum to providing internships. PODBL implementation is at an early stage to comment on its pros and cons. Instead, the author would like to consider and speak about the relevant DBL practice in the current paper. The relationship between a DBL practice and engineering education has been explained using a case study in an article written by the author for AAEE 2014. Engineering education is a combination or integration of solid knowledge on the basis of natural sciences and a good knowledge in some aspect of technology (Polishetty et al., 2014).

Design Based Learning (DBL) is a one of the modern and constantly evolving learning and teaching practice. As the definition says design forms the core of the practice where the student with his cognitive skills set and theoretical knowledge (from seminars) has to successfully demonstrate his ability to bring an innovative solution to a design problem. DBL has its root from a similar approach adopted in a research environments known as design based research (Wang & Hannafin, 2005). Peer to peer learning and assessment is an integral part of DBL. Creative arts and design based unit assessment are some of the successful case studies using peer to peer assessment. The paper written by Mike Searby et. al. has illustrated how successful peer to peer assessment has been in a creative arts programme such as B.A-Music at Kingston University (Searby & Ewers, 1997).

Assessment is an important phase of the learning and teaching process. The definition of assessment varies from a student and academic point of view. The common view among the students is that assessment is grading their intellectual abilities in one particular subject area. From a teacher point view, assessment can be defined as making sure the learning outcomes have been met and also to evaluate the ability of the student towards gaining the learning outcome/expertise. According to Nancy Falchikov and Judy Goldfinch, teacher and student (peer) assessment can arrive on a common platform provided the judgement is based on a global criteria which is easy to understand rather than marking based on numerous individual criteria (Falchikov & Boud, 1989). According to Ronald Barnett, the need for assessment arises in order to judge and evaluate the student worthiness in terms of academic development. Worthiness is based on a set of complex considerations such as academic virtue, intellectual ability and issues with relative weighting (Barnett, 2007). In modern learning and teaching practices, the involvement of students in assessment practices has shown an increasing trend. Assessment itself as process depends on a person ability to self-reflect and judge a performance against a pre-defined assessment criteria (Falchikov & Goldfinch, 2000). The quality of assessment in education especially engineering education has always been a subject of debate. According to an article written by Frans et. al, the quality of assessment is based on the intrinsic values of education such as pursuit of knowledge and extrinsic values of education such as service to society (Van Vught & Westerheijden, 1994). The ubiquitous need to rethink on the relationship between learning and its assessment in order to improve the quality of assessment involving reflective practices has led to three type of assessment practices, self, peer and co-assessment practices (Dochy, Segers, & Sluijsmans, 1999). The world has witnessed a change from era of testing to the era of assessment

(Birenbaum, 1996). The era of testing is characterised by clearly distinction between the instructions and assessment practices and assessing decontextualized subject knowledge completely away from the student experiences (Wolf, Bixby, Glenn, & Gardner, 1991). Contrary, the era of assessment is characterised by integration of instruction and assessment practices based on onus, reflective ability, collaboration style of working and maintains a continuous channel of communication with the teacher (Segers, 1996). The evolution of modern assessment practices is based on assessing not just the subject knowledge in a quantitative form (marks) but also on core competencies of cognitive skills such as problem solving, formulating questions, ability to make informed judgements, conduct investigation, analyse data, communicating the outcome with good oral presentation and report writing skills (Birenbaum, 1996). Peer to peer assessment can be defined as a practice in which a student assesses and rates the work of other students. The assessment often in terms of a qualitative feedback.

PURPOSE

The purpose of the paper is to evaluate the perception of the student experience on peer to peer learning and assessment. Issues related peer to peer learning has been identified based on the student response to a survey conducted at the end of the unit.

The purpose of the paper is also to serve as a medium to contribute to the existing knowledge base on peer to peer learning and assessment in design/project based learning.

APPROACH

The unit under consideration in this paper is product design and development, which involves a considerable amount of peer to peer learning and assessment. The learning and teaching practice adopted in this paper is based on Design Based Learning. The approach to the paper is based on a survey conducted at the end of the unit. The key areas of focus in this survey was peer to peer learning environment, task division and scheduling, team management and assessment. Some of the questions asked in the survey are: How comfortable do you feel practicing peer-peer learning in your unit? Are you satisfied with the following assessment categories (assignment 2) being considered for teamwork? Was the assessment (2 individual and 1 group) criteria for the entire unit satisfactory? Do you want any changes to the assessment criteria? (Refer to the Appendix for the complete questionnaire). This survey had ethics approval from relevant authority at Deakin before being put in use. The participants were instructed and consent was taken before conducting the survey. The author did ensure that the data obtained from survey was not identifiable through any primary and secondary links. The cohort selected for the survey consist of an on campus and off campus/cloud based learning students. The cohort size is roughly around 32. The survey consists of 10 multiple choice questions based on what students think of peer to peer learning and assessment practices in the unit. The peer to peer learning and assessment under consideration in this unit is an oral presentation. The task provided to create a peer to peer learning environment consists of transforming a creative idea in to a physical product using the principles/methodology of product design and development. The assessment weighs 25% of the total assessment for the unit. At the end of the assessment, a qualitative - presentation feedback and quantitative – marks based on a rubric are provided.

RESULTS AND ANALYSIS

The students' responses obtained in relation to the survey questions have been tabulated in Table 1. As said, each question was provided with four options of a, b, c and d. The student response for/ against a context related to a question was summated. The response numbers were used to graphically represent the variation in student views as shown in Figure 1.

Table 1. Survey results

Question	a	b	c	d
How comfortable do you feel practicing peer-peer learning in your unit?	6	15	3	
Are you satisfied with the following assessment categories (assignment 2) being considered for teamwork?	5	16	4	
Is Belbin test extracting the right person for the right role?	3	15	6	
Are you satisfied with the team selection?	14	13		
Which of these options do you prefer for team selection?	10	4	2	9
Was the assessment (2 individual and 1 group) criteria for the entire unit satisfactory?	13	9	1	
Do you want any changes to the assessment criteria?	5	6	2	11
Was peer-peer learning advantageous? If so how?	9	14	4	7
Was peer-peer learning disadvantageous? If so how?	7	11	2	3
Overall, how effective is peer-peer learning in this unit? on a scale of 1-4, 1 being excellent and 4 being worst?	2	17	3	2

Figure 1. Survey results analysis
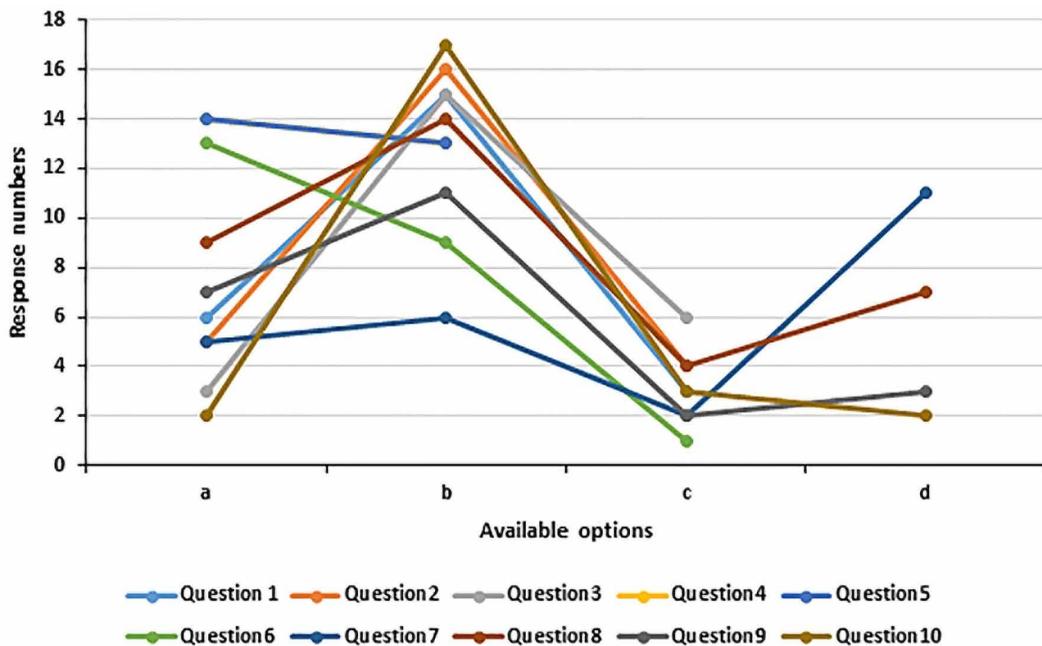
DISCUSSION

Question 1: How Comfortable Do You Feel Practicing Peer-Peer Learning in Your Unit?

The survey results point out that most of the students have chosen partial satisfaction regards to peer-peer learning in the unit. This shows there are issues regards to implementation of peer-peer learning which needs to be identified and corrected to try get closer to the full student satisfaction. The issues

might be due to difference in social, cultural, adaptability and learning approach as most of the student are international who have been through a completely different learning approach during their graduate studies. To summarise, the reason for the answer to this question can be hypothetically assigned to exposing unfamiliar students to a peer-peer learning in a collaborative learning environment.

Question 2: Are You Satisfied with the Following Assessment Categories (Assignment 2) Being Considered for Teamwork?

The survey results show that most of the students have opted for an option where they would like to have 80% team work and 20% individual work for completion of assignment 2. This shows that there are some students even though willing to share work load and exchange knowledge would prefer to have a recognition for their work on an individual basis.

It can be considered that they believe a small component of individual work will make them distinct and competent from their peers when they are assessed against a group criteria. Another good finding from the response is none of the students want to see this assignment as a 100% individual assignment. This may be due to the reason that they are open to the idea of peer-peer learning and want to adopt an approach which is has a surprise element in it and different to the usual traditional style approach.

Question 3: Is Belbin Test Extracting the Right Person for the Right Role?

Belbin test is a personality test which was taken at the start of the unit in order to rank and categorise individual in to different roles required by the project such as leadership, resource investigator, implementer etc. Most of the student agree that Belbin test was the useful in extracting right person for the right role. The response also suggests that in peer-peer learning evaluating, prioritising and matching personalities with project roles make a difference in smooth and efficient functioning of the team without any issues. This also avoids students with similar personalities being in the same team leading to a disadvantage as there are no diverse skills which are required to complete the project.

Question 4: Are you Satisfied with the Team Selection?

The motivation behind conducting the test and team formation is to make the students move away from their usual social circles (friendship), comfort zone and to adopt an out of box thinking in bringing innovative solutions. The survey results point out that all the students are satisfied with the team selection.

It is surprising to see none of the students opting for unsatisfied as this indicates that the students are ready to accept the social challenge and eager share and exchange their knowledge and expertise.

Question 5: Which of These Options Do You Prefer for Team Selection?

The question was framed to find the preference of the students in team selection. If they would like to select the team on their own or they need the facilitators help in a team selection. The survey shows students were equally responsive to the idea of selecting team on their own or 50% involvement of the facilitator. This implies that students would like to have their say in team formation which might be driven by the social and cultural factors e.g. a group of friends/classmates from graduate studies trying to be in the same team. Accordingly, this sounds like an inertial problem where the students are reluctant to move from their social circles or comfort zones which needs to be overcome in order to inculcate team learning, behaviour and management.

Question 6: Was the Assessment (2 Individual and 1 Group) Criteria for the Entire Unit Satisfactory?

The assessment criteria for the unit consisted of two individual assessment and one group assessment. The question looks at student view of selecting assignment 2 (oral presentation) was the right choice to be a group assessment or not. The survey implies most of the students are fully satisfied with the

assessment criteria for the unit. This suggested no changes are required in the assessment criteria for the unit.

Question 7: Do You Want Any Changes to the Assessment Criteria?

The questions give choices to the students regards to the assessment approach and criteria for the unit. The result obtained for this question corroborate with the results from the earlier question 6 which suggests no changes to the assessment criteria. This shows that the survey results are predictive and reliable does not involve out of interest and random answering by the students. This means the confidence and quality of the survey process was good.

Question 8: Was Peer-Peer Learning Advantageous? If so, How?

The primary motivation behind the question was to find out why and how peer-peer learning is advantageous. The survey results show that most students felt the advantageous part of peer-peer learning was knowledge sharing.

The next best advantageous option from peer-peer learning was communication. This shows that peer-peer learning initially problematic during the first weeks of learning turns out to be successful as the students realise the potential to upgrade and learn new skills/knowledge.

Question 9: Was Peer-Peer Learning Disadvantageous? If so, How?

The primary motivation behind the question was to find out why and how peer-peer learning is disadvantageous. The students were given options of being disadvantageous in terms of work division, time constraints, ethical issues and reliability issues. Most of the student thought peer-peer learning is disadvantageous due to the time constraints related to the group work. The time constraints under consideration are limitations in task completion, team meeting, decision making, implementation and delivery.

The survey results infer that connectivity, coordination, work commitments outside the university and physical distance which are typical of international students is the primary reason for the response.

Question 10: Overall, How Effective is Peer-Peer Learning in this Unit? On a Scale of 1-4, 1 Being Excellent and 4 Being Worst?

The students were asked to give a feedback on the effectiveness of peer-peer learning in this unit. The available options were to select from a scale of 1-4 where 1 being excellent and 4 being worst. Most of the student have opted for scale 2 which means the peer-peer learning is acceptable but some issues need to be sorted to be excellent (scale 1).

SURVEY REFLECTION ON PEER-PEER LEARNING

As said in the context of this paper, peer-peer learning is advantageous when the unit being taught is a creativity based involving ideation, design, development and realisation. Some reflections can be drawn from the survey results related to peer-peer learning. The efficiency of peer-peer learning lies in spreading the awareness through workshop before being implemented especially to student cohort who are novice to the learning practice. An instruction manual (define rules of the game) needs to be written for anytime online or on campus accessibility during the learning process. A demo class/ practice needs to be conducted in order check and resolve implementation and unit specific validity issues. The approach should be flexible and time bound regards to student adaptability as reflected from the survey, students have different perspective about peer-peer learning. Team selection is an important phase in peer-peer learning. It should be based on alignment between an individual's personality and role in the team. A systematic personality test like Belbin test need to be conducted in order to get an overview and prioritise/rank student personalities such as leadership, resource

investigator, coordinator, implementer, etc. Based on the personalities, team selection should be made to ensure skill diversity and better ways to share and exchange knowledge. The survey suggests student should have an equal say in the team selection but sometimes this might lead to issues in team work and overall, effect the progress of the project. The author is of the view that each team would end up with individuals having same skill set leading to disadvantage in working towards the goal. Moreover, the author based on the survey results would also like to convey that team selection to ensure an efficient peer-peer learning should encourage/expose students to new learning practices and help students to overcome the problems of inertia or reluctant to move away from comfort zone/ traditional learning practice.

Most of the students feel that peer-peer learning is advantageous in terms of exchange/sharing of knowledge and experiences, develop new and enhance existing technical and communication skills. According to the survey, some of the disadvantages with peer-peer learning lies in issues with division of workload, peer reliability issues, work ethics and no time bound delivery of the peer allotted tasks leading to project delays.

PROPOSED GROUP ASSESSMENT TOOL

Taking into consideration the survey results and student perception about peer-peer learning, a group assessment tool can be proposed. The major requirements to build a group assessment tool would be setting up the assessment criteria for group and individual category, assessment approach/practice, realistic assumptions and physical infrastructure required to carry out the assessment. The tool also needs to cater both on campus and online/cloud based students. There are few group assessment tools created by pioneers in engineering education such as Spark plus from University of Technology Sydney.

Spark plus also being a group assessment tool available at Deakin has provided the author with an advantage of knowing the factors responsible for design, approach and implementation (Beamish, Kizil, Willey, & Gardner, 2009). Spark plus is a group assessment tool which takes into account the individual contributions to the team success and overall, group efforts and abilities towards the project success (Willey & Gardner, 2010). Quin, Willey et.al speak about the dependency of an assessment tool for effective and efficient group assessment on technology especially involving software/algorithm design and development and online/internet services (Quinn, Shurville, Willey, & Gardner, 2009). Spark Plus even though popular has got its own share of problems especially with respect to the quality, reliability and authenticity of feedback. Spark Plus does assessment based on two components- individual feedback and group feedback of each team member.

The author is of the belief that as it is a group assessment tool, majority of the assessment (quantitative) should be done based on a group assessment criteria and a minor assessment component, qualitative if possible (less than 5%) should be allotted to individual feedback. The rationale behind the allocation of marks between a group assessment and individual feedback is not clearly defined as students can arbitrarily downgrade fellow team member for unknown reasons. There is no clear boundary between the algorithm mode and the manual mode - how much of interference by a teacher is allowed/justified.

As the survey results point out that the majority student want to have group and individual assessment in the ratio of 80:20. Therefore, a need to design an assessment criteria/rubric which caters to an individual's contribution to the team is required and also brings in a factor of recognition and competition in the team. The most important alignment required over here is between the assessment criteria and the learning outcome of the unit. Considering the case of group assessment for the unit which is product development in this paper, where oral presentation was selected for group assessment and contributes 25% to the overall unit assessment. The assessment weightage can be further divided into assessment weightage based on team work (20%) and individual's work (5%). The assessment rubric for awarding the team work (20%) can be based on a group assessment criteria- team dynamics, work ethics, team responsibility and project management. The assessment

rubric for awarding individual's work (5%) towards group assessment can be based on knowledge and expertise sharing, communication abilities, assigned role accomplishment, skill recognition and extra ordinary performance.

The assessment is based on certain assumptions that students are honest, positive, constructive, systematic, tech savvy and understand internet based tools to give a confidential and qualitative feedback of their peers. The selected assumptions have to be realistic and attainable as it often leads to unanticipated results due to misuse of the tool. There are certain precautionary measures to be taken for efficient and effective working of the assessment tool. Some of these include events/ workshops on awareness, demonstration, flexibility, approach/practice of the peer-peer assessment tool for students especially from international background and who are novice to the idea of peer-peer learning and assessment.

CONCLUSION

The paper attempts to innovate a new approach and suggest a mutually acceptable solution to the issues related to peer to peer learning and assessment by review of existing literature and considering students perceptions about peer-peer learning obtained from the survey.

The outcomes from this paper based on the survey results can be divided into two sections:

Key Reflections on Peer-Peer Learning

Peer-peer learning is a modern and advantageous learning practice for a design/creativity based provided there are certain measures taken during design, adapt, develop and delivery of the unit. The survey results reflect some problems regards to peer-peer learning which need to be resolved for efficient use of peer-peer learning practice.

Proposed Group Assessment Tool

Based on the survey results and existing on group assessment tools, a new tool was proposed. Issues related to existing tools were analysed and an attempt was made get a mutually acceptable solution in the form of the new tool.

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APPENDIX

Survey Questionnaire

Instructions

Please put a tick mark (✓) your choice in the boxes provided
You can choose more than one option

1. How comfortable do you feel practicing peer-peer learning in your unit?
   a. Fully satisfied ☐
   b. Partially satisfied ☐
   c. Normal ☐
   d. Below ☐
2. Are you satisfied with the following assessment categories (assignment 2) being considered for teamwork?
   a. 100% group assessment ☐
   b. 80% group assessment/20% individual assessment ☐
   c. 20% individual assessment /80% group assessment ☐
   d. 100% individual assessment ☐
3. Is Belbin test extracting the right person for the right role?
   a. Strongly agree ☐
   b. Agree ☐
   c. Disagree ☐
   d. Strongly disagree ☐
4. Are you satisfied with the team selection?
   a. Fully satisfied ☐
   b. Partially satisfied ☐
   c. Partially unsatisfied ☐
   d. Unsatisfied ☐
5. Which of these options do you prefer for team selection?
   a. Team selected by your own ☐
   b. Team selected by the lecturer ☐
   c. Team selected randomly ☐
   d. Team selected 50/50 lecturer and your own ☐
6. Was the assessment (2 individual and 1 group) criteria for the entire unit satisfactory?
   a. Fully satisfied ☐
   b. Partially satisfied ☐
   c. Partially unsatisfied ☐
   d. Unsatisfied ☐
7. Do you want any changes to the assessment criteria?
   a. Changes in marks allocation for each assignment ☐
   b. Changes in assessment structure ☐
   c. Changes in questions/tasks ☐
   d. No changes required ☐
8. Was peer-peer learning advantageous? If so how?
   a. Communication ☐
   b. Knowledge sharing ☐
   c. Developing skills ☐
   d. Project management ☐

9. Was peer-peer learning disadvantageous? If so how?
    a. Work division ☐
    b. Time constraints ☐
    c. Ethical issues ☐
    d. Reliability issues ☐
10. Overall, how effective is peer-peer learning in this unit? on a scale of 1-4, 1 being excellent and 4 being worst?
    a. 1 ☐
    b. 2 ☐
    c. 3 ☐
    d. 4 ☐

Ashwin Polishetty is a mid career researcher and academic in Manufacturing Engineering. Apart from his regular field of practice, Dr. Polishetty would like to research and present his views on different approaches to learning and teaching.

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