

Practicing Peer Assessment: An Approach to Develop 21st century Skills

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Abstract: The past decade has been witnessing robust changes in Engineering Education (EE), especially in India in terms of students' learning outcomes, assessment strategies, evaluation pattern, students' success and their failures supported with evidences. The present paper examines the effectiveness of peer review as an important assessment tool for enhancing the engagement of the learner in the learning process focusing on the inculcation of 21st century skills, making him/her responsible and self-motivated learner. A 'three layered model' has been formulated to have active involvement of the expert, the mentor and the learner (student) via interactions, instructions and guidance. As a result, the learner reflects upon the peer review done by him/her and discusses it with his/her peers by highlighting its vital role in real-life situations which enhances learner's involvement in the next peer review. It has evidently improved the quality of feedback, internalizing the feedback leading to perception and acquisition of essential required 21st century skills.

Keywords- 21st Century Skill, Peer review, Assessment

1. Introduction:

The past decade has been witnessing robust changes in engineering education, especially in India in terms of students' learning outcomes, assessment strategies, evaluation pattern, students' success and their failures supported with evidences. More emphasis in engineering education is on all three domains viz. cognitive, psychomotor and affective; dealing with real life needs and living experiences to implement outcome based education (OBE). With the flood of information and technology and the realization of the varied learning styles of the digital natives,[1] the emerging trends in engineering education across the globe are more towards individual attention and personal assessment yielding to 'success for all', one of the four principles of OBE[2]. The paradigm shift ascertains the emphasis on student-centered teaching learning process rather than teacher-centered. The number of students taking admission in engineering in India has also increased significantly, adversely affecting the quality of teaching-learning process, especially the assessments. To enhance the participation of student in the teaching learning process, his more and more active involvement is essential. It also implies the increasing role of the student in his assessment and evaluation. Student-oriented assessment plies students to be involved actively in their assessment process along with the teacher. Peer review and peer feedback are the elements of assessment process that transfers the responsibilities from teacher to students[3]. In a large classroom, peer assessment is

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certainly advantageous as it not only involves the learner actively in the process but also provides him a chance to review and compare his own learning along with a diversified feedback from his peers contrary to his teacher who may provide general or insufficient feedback due to more number of students.

2. Advantages Of Peer Review:

Peer review is an evaluation of a person's work or performance by a group of people in the same occupation, profession or industry[4]. Peer review is used in education to achieve certain learning objectives, particularly as a tool to reach higher order thinking skills in the affective and cognitive domain as defined by Bloom's taxonomy[5][6]. Providing peer feedback is an activity which supports the receiver of the feedback in his own learning process, it is also helpful for those who provides it as he has to critically analyze the work or performance of colleagues[7]. As compared to the teacher feedback, the quantity and diversity of the peer feedback is an added advantage.

The student providing feedback also gets acquainted with certain essential processes or skills like learning from other's mistakes, self- evaluation, comparing, reflecting on his learning and excogitating to write the feedback effectively. The student who is receiving feedback is also benefitted if the feedback is given by more than one peer or a group due to the diversity of the feedback[8]. Gielen[9] highlights five main goals of peer assessment: (i) as a tool to enhance the active involvement of the students in the teaching learning process (ii) as an assessment tool to replace or assist the faculty. (iii) as a learning tool, to acknowledge the impact of assessment on learning (iv) as a precautionary tool to stop the students from getting lazy (v) as a learning-to-assess tool. Till now peer assessment tool has been more frequently used for assessing the products like tests, reports, presentations, assignments than assessing the processes or behaviours catering to the affective domain like empathy, flexibility, adaptability, team work, leadership skills, confidence etc. To review these behaviours of every individual of a class , a teacher requires more time, energy and effort whereas if the students are assigned to assess specific traits of a group of peers, he will be able to have a comprehensive view of the peers of his group . With the instructions, interactions and discussions, gradually, he may construct an effective and authentic feedback for his peers, which is more reliable and helpful for the peers to improve. Moreover, student

feedback is more open to discussion than teacher feedback[10]. Hence, peer review is an integral instrument of assessment process that can necessarily enhance the engagement of the learners along with making them equipped with some life-sustaining and substantial skills.

3. Conceptual Framework/context:

The authors have designed and developed a program named Wonder Working Engineers (WWE), especially for the first year entrants to foster 21st century skills. WWE is a concept to showcase one hour technical group performance in the form of a hybrid of role play and drama. It comprises of two sessions per week. An activity based learning (ABL) session aimed at developing communication skills, collaboration skills, language nuances, peer and group discussions on real-life problems ending with feedback highlighting 'my learning'. Another two hours session catered to the development of confidence, public speaking, removing stage fear, people management, time management, flexibility, empathy, contributor ship, team work etc. As these skills or innate qualities are developed over a period of time and not at once, after first semester, the set of 17 skills was formulated as a result of an elaborative interactive session with the students w.r.t the World Bank Report conducted by Blom and Saeki[11]. They categorized 25 skills into three factors: Core Employability Skills, Technical skills and Communication Skills. The table 1 below shows importance level by three factor skills reflecting that the employers rated Professional skills the lowest among the three factor skills.

Table 1: Importance Level by Three Factor Skill[11]

Core Employability Mean		Professional Skills Mean		Communication Skills Mean	
Integrity	4.48	Use of modern tools	4.08	Communication in English	4.26
Reliability	4.42	Apply Math/Sci Engineering knowledge	4.07	Written Communication	4.07
Teamwork	4.41	Creativity	4.07	Reading	4.04
Willingness to learn	4.40	Problem solving	3.93	Technical Skills	4.02
Entrepreneurship	4.35	System design to needs	3.84	Experiments/ data analysis	4.01
Self-discipline	4.26	Contemporary issues	3.83	Verbal Communication	4.00
Self-motivated	4.22	Customer Service	3.51	Basic computer	3.95
Flexibility	4.15			Advanced computer	3.71
Understand take directions	4.14				
Empathy	3.92				
Average	4.27	Average	3.91	Average	4.01

4. Execution:

WWE aims to inculcate 21st century skills i.e. core employability and communication skills among the first year students. This approach primarily focuses on the students' higher order competencies, such as effective communication, collaboration, technological applications and attitudinal, affective and motivational orientations along with the inherent core values like integrity, honesty, empathy, flexibility etc. Thus, a Peer Review form was designed using google docs with 17 skills as shown in the Annexure 1, facilitating 24 hours access, catering to develop digital literacy. The peer assessment was done at regular intervals. The groups of 10 to 14 students with one student co-ordinator and one teacher-mentor were formed. The peer review was attempted once in a month, thus, 4 times in a semester by each member of a group. Each peer was to be graded on the scale of 1 to 4 where 1 stands for needs improvement and 4 for excellence for all the 17 skills by all 10 to 14 peers in the group. Over and above this, all peers had to give appropriate remarks to justify their assessment. In this way each student received at least a set of 40 statements by the peers as shown below in Fig. 1, supported by some expert comments from the mentor and the expert panel for one student.

Peer remarks	Mentor remarks
She is the best leader as all the tasks are accomplished in time.	She needs to be outspoken and more confident.
She is 100% unbiased and a good leader	She should be strict and must report to the mentor or the expert if someone in the group is misbehaving.
She is not aware of her hidden potential	She manages the group excellently and her group supports her.
She needs to work on her communication and confidence level	Because of her, the entire group wants to be the best performer group.
She is a strict leader but gives everyone equal respect.	She has been a wonderful leader and she needs to work on her speaking skills in future. She must anchor some event.

Fig.1 : Remarks by Mentor and Peer

A. At the Onset:

It is significant to note that the initial stage of peer review was accompanied by plenary discussion on the vital traits to contrive it. The explanation incorporated real life examples and experiences to make the idea of exhibition of these skills easy to be emulated and

judged. A specific session for making google form, managing group online by the co-ordinator, giving and taking feedback was also arranged. This peer review, conducted with the help of Google form, helped to enhance the involvement of the learner facilitating 24*7 accessibility.

B. Validation:

To validate this peer review, a three layer model had been adopted to enhance the interaction among learner, mentor and expert as shown in Fig. 2.

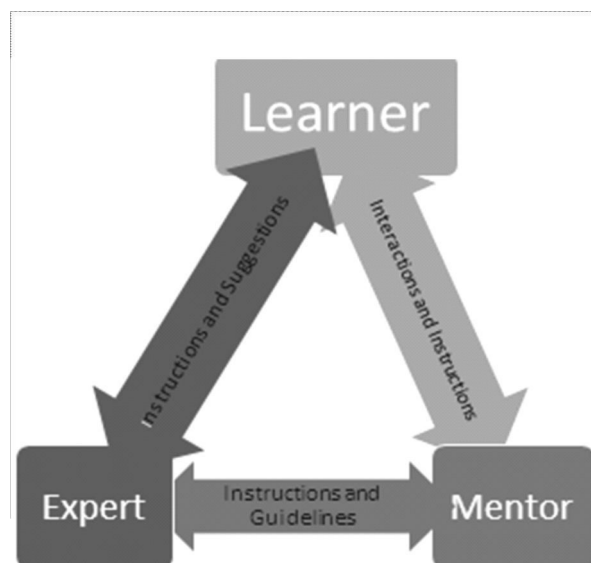


Fig.2: Three layered peer review

First layer catered to the entire group i.e. the peer had to review other peers 4 times in a semester as shown in Fig 3. The second layer corresponded to the assessment of each student of each group by a mentor, specifically assigned to one group, which is shown in Fig 4.

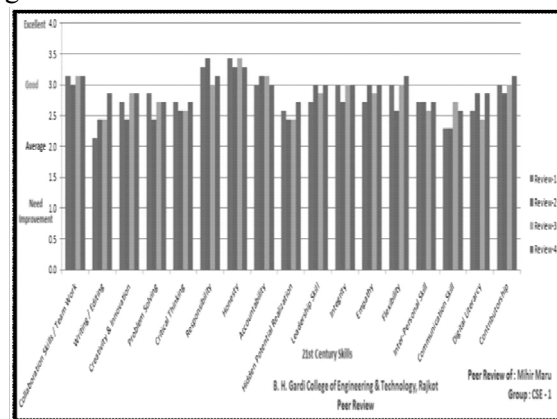


Fig.3: Peer review of one group

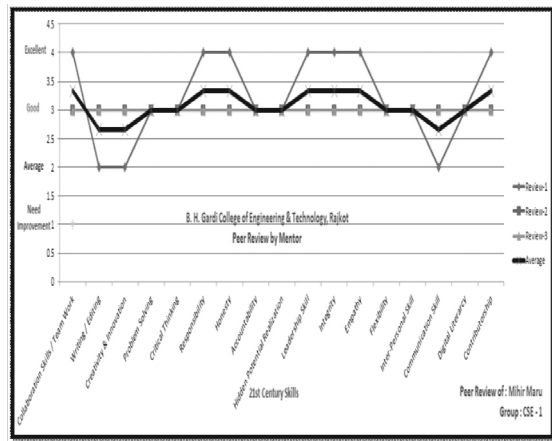


Fig.4: Mentor review of one group

Similarly, the expert review was also taken which was almost matching to the mentor review. To find the outcome of the peer review process and know the learners' perspective, a survey was conducted. The important questions of the survey and their results are presented in the Fig. 5 below:

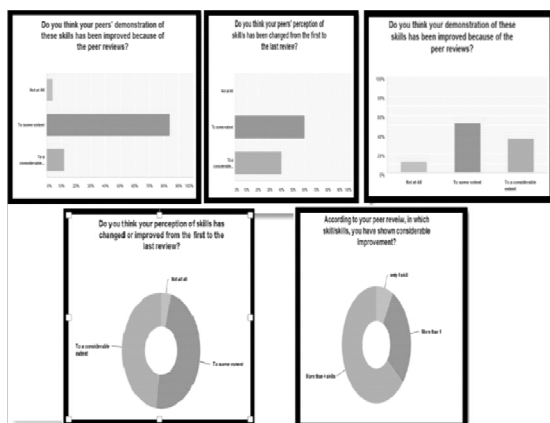


Fig.5: Analysis of the Survey

5. Discussions And Implications:

WWE centered assessment process through peer review, peer feedback and self-review as a tool to inculcate 21st century skills driven by a clear concept of the graduate, i.e. an employable engineer. In the initial phase, the learners did find it as a complex process but the regular discussions in the weekly sessions contented and comforted them to continue the peer review. Some students were reluctant to give negative comments for their peer friends but after realizing the vital role of their remarks, fruitful changes were noticed in the remarks. As assessing certain skills like empathy, integrity, accountability in

one go is unjustified, hence the assessment was based on the varied chances of demonstrating these traits in group interactions in the presence or absence of the mentor and faculty. Every group had 1 to 4 such interactions every week for sharing the ideas and execution of WWE. Some laggard students did become a problem for their entire group in the beginning but after observing others and motivational guidance from the mentors, they also started supporting. Collaborative contributors, self-directed achievers, involved learners, perceptive thinkers and quality producers are the phrases that can be used for most of the students participating in the assessment process. It is remarkable that the mentors and the learners expended their appropriate amount of time and effort in the assessment process. It highlights a new paradigm of success based in philosophy and outcome based in practice.

The peer review has been used as a tool to assess the 21st century skills of the first year entrants and instrument to enhance learning. There are 330 cohort of learners in the 1st year who are from diverse backgrounds. Most of them have English as a second language. The adoption of the peer review task with the interactions and instructional intervention was done with the motive of improving learning experiences through a varied set of oral and written feed backs. It also enhanced students' engagement and interest in the teaching-learning process. This was a particularly important advantage for students with English as second language along with the ability to actually see examples from their peers to improve their vocabulary. This latter skill can be a difficult thing to achieve for some students given their cultural background. With a detailed procedure of implementation, its outcomes reflect that the students become responsible for their own learning. Peer review gives students experience in critical thinking and promotes editorial skills [12].

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