

Implementation of Innovative Assessment-Based Assignment to Foster Better Understanding in Logistics Courses

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ABSTRACT

Assessment is one of the most important components in teaching and learning. It serves as a common tool to judge the students' level of understanding towards subject matter. Nevertheless, in the 21st century, most of the assessments implemented in the school or in tertiary education are still conventional paper-based examinations. Therefore, there is a practical need for the educators to instil creativity and innovation in designing an assessment. Realizing this issue, the present work aims to implement innovative assessment-based assignments in two logistics courses. In the course named 'Issues in Logistics Industry', students are required to participate in an innovative challenge whereby they need to innovate a variety of devices that would be useful in the field of logistics. In another course named 'Material Management', students are required to participate in a waste recycling activity for fundraising purposes. Both assignments were given marks by panels of lecturers and industrial partners based on a properly designed rubric. Result analysis showed that the students' grades in both courses have greatly improved in comparison to the previous year in which conventional assessment method was used. Worthy to highlight that students have enjoyed the process and both students and panels of examiners have provided very positive feedback about this new approach of assessment. Such encouraging outcomes suggest that the proposed new assessment is feasible to promote learning excitement in the students.

Key Words: *Innovative Assessment; Technological Innovations; Community Project; Technology*

1. INTRODUCTION

Teaching is a profession that teaches and creates all other professions. According to Biesta (2012), teacher is someone equipped with the skills to manipulate and lead the learning process. Teachers influence, inspire, celebrate, plan, listen, differentiate, and lead the future of tomorrow. As John Wooden has said "I think the teaching profession contributes more to the future of our society than any other single profession". In the 21st century, the teaching profession is beyond transferring knowledge from the textbook to the students. Kwo (2010) and Daud et al. (2013) emphasized that teachers must be capable to work with others, with different types of knowledge and skills, and with technology and information. In fact, teachers in the 21st century are facing the challenges as the teacher's role has gone far beyond than preparing teaching content. In line with this, the Partnership for 21st Century Learning has developed a

framework consisting of learning and innovation skills. The framework describes the skills to have the elements namely creativity and innovation, critical thinking and problem solving, communication, and collaboration. It is understood that the education system needs to give priority to skills and human capital in order to adapt to the changes in the education environment and to become more competitive from the economic and social perspectives. In this context, Dill and Van Vught (2010) argued that higher education represents a critical factor in innovation and human capital development. Higher education institutions play a central role in the success and sustainability of the knowledge economy.

Practically, innovations in tertiary education focus mainly on two aspects (Kovacs, 2017). The first aspect focuses on innovations in teaching methodologies. This method is also named as instructional innovations or innovative teaching practices which are used in teaching and learning. The second aspect is technological innovations application in teaching and learning by infiltration, development and use of information and communication technologies (ICT) and online educational resources (OER). Both methods encourage innovativeness in teaching and learning processes in higher education institutions. From another perspective, researchers like Weiss and Legrand (2011) have described innovation in teaching and learning as a process, not an outcome. Weiss and Legrand (2011) argued that innovation starts when someone applies innovative thinking by discovering, integrating, and organizing insights, ideas, and methods to solve problems in new ways. Added by Weis and Legrand (2011), innovation is implementation of new ideas for a positive change. Overall, all these means are to encourage non-traditional learning schemes and to facilitate teacher professional development and learning. It is important to emphasize that new approaches and new pedagogies in teaching and learning are definitely a must in today's social and economic contexts.

Past researchers have indicated that there are many ways to improve creativity in the classroom and in particular, innovative assessment can play a significant role in developing students' creativity and innovation (Kovacs, 2017; Sinay et al., 2017 & Ferrari et al., 2019). Beghetto (2005) claimed that assessment may influence as well as motivate students' creativity. Therefore, setting the right assessment is important to promote classroom understanding and self-improvement. The conventional assessment method such as a test can be considered as a barrier to students' creative thinking because the students are too concerned about scoring high marks rather than think critically when solving the exam questions (Crocco and Costigan, 2007). Beghetto (2005) also has pointed out that the feeling of test pressure has led to a decline in creative thinking among the students. To overcome the conventional assessment, 21st century innovative assessment has introduced a combination of various forms of assessments namely formative, summative, self-assessment, peer-assessment. Such forms of assessment should not be considered competing (Lau, 2016), but rather complementing one another (Siarova et al., 2017). This is to improve the quality of students learning. This paper provides a brief overview of the creativity and innovation in the context of assessment in tertiary higher education. This study will also attempt to define creativity and innovation in the educational context and provide an overview of creative learning and innovative teaching.

2. ISSUE(S) OR PROBLEM STATEMENT

As prescribed, assessment is one of the most important components in teaching and learning. The purpose of having assessments is to determine the level of understanding of the students so that further adjustment in teaching and learning approaches can be done. The conventional assessment normally requires the students to solve paper-based problems. In this regard, written documents such as quizzes, tests, exams have been widely employed as assessment tools (Quansah 2018). Unfortunately, such methods are not able to cultivate the practical and life-long learning skills of the students. In fact, many researchers have shared their criticism on the tendency of conducting formative assessment using regular tests in which students are expected to provide correct answers only (Klenowski 2009; Swaffield 2011; Hargreaves 2013). Those paper-based assessments mainly evaluate the cognitive domain of the students with very limited consideration on both affective and psychomotor domains. More importantly, such assessment methods no longer can trigger the learning excitement in generation Z. Generation Z is known to be more ready to learn through working examples as well as prefer to be challenged in decision

making. Hence, there is a practical need to design an innovative assessment method which allows the students to make various difficult decisions, exposes them to more stakeholders, as well as appraises their critical thinking and life-long learning.

3. RESEARCH CONCEPTUAL FRAMEWORK

In our pilot experiment, students enrolled in the course "Issues in Logistics Industry" and "Material Management" are asked to carry out a practice-based task in which they have the opportunity to bring the theoretical concepts learned during the semester into practise and to learn some others during their semester. For the "Issue in Logistics Industry" course, students were asked to produce a prototype and showcase in the event called Innovative Challenge at the end of semester. Meanwhile, the course "Material Management" required the students to organize a project for managing products that reached end of life. Both projects are well aligned with current issues in the logistic industry such as accidents in warehouses and poor waste management in the logistics industry.

The aim of these projects were to provide a broader understanding from a practical perspective other than from reading notes, listening to lecturers and sitting for written exams. Chapman et al. (2016) claimed students would enjoy the learning experiences with creative teaching approaches that lead to achieve superior performance and display a positive influence in the classroom. To complete their projects, students will apply knowledge and theoretical principles gained during the lecture classes. It is expected that students' participation in this experience-based activity would be positively related to their level of performance in the course and, accordingly, to the final grade they might achieve. More importantly, this will eventually improve the students' satisfaction towards the courses. The conceptual framework of this research presented in Figure 1.

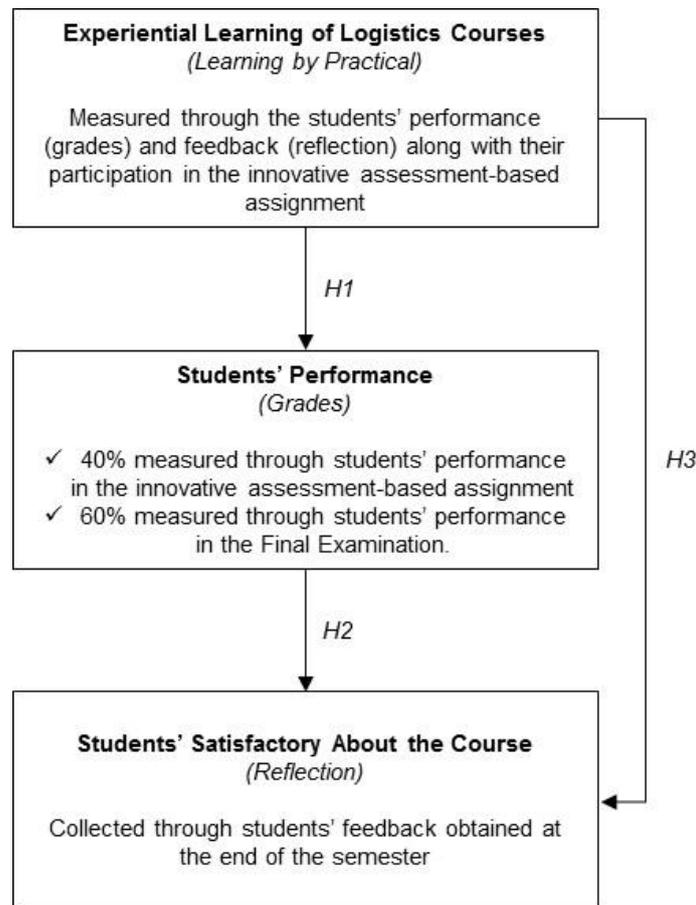


Figure 1: Conceptual framework (A modified version from Leal-Rodriguez and Albort-Morant, 2018)

- H1: Hypothesis that there is a positive relationship between the students’ experiential learning and their grades;
- H2: Hypothesis that the students’ grades has a positive relationship to their satisfaction towards the course;
- H3: Hypothesis that there is a positive relationship between the students’ experiential learning and their satisfaction towards the course.

4. METHODS AND IMPLEMENTATION

Two new innovative assessment-based assignments were proposed and implemented in the logistics undergraduate programme. The two assignments are (1) an innovative challenge for the course ‘Issues in Logistics Industry’ and (2) a fundraising project via waste recycling for the course ‘Material Management’. In the innovative challenge, students are required to use their creativity in designing an intelligent device which can cater to a better workplace in the logistics industry. The team, which was formed by 5 members have to come out with the physical prototype and showcase it to their peers, lecturers, and industrial panels. The innovative challenge project takes 12 weeks to be completed. This innovative challenge project was well discussed before being assigned to the students on week 2 of the semester. The students were given 2 weeks to prepare a brief proposal and followed by presentation of the project proposal. The lecturer would assess the idea, innovativeness and doability prior to approving the project. After the approval, each group has around 8 weeks to carry out their project and develop the prototype. The groups are also required to present the progress of the project and prototype on week 10. On week 14, students are required to carry out the showcase. Each member of the group is required to demonstrate team work, dedication and efforts throughout the project. The assessment is not only on the final outcome, but it is a continuous assessment.

The students were given approximately 2 months for preparation and being assessed by panel assessors on the event day. The event was run for half-day working hours. Table 1 summarises the assignment deadlines according to weeks and type of assessments.

Table 1: Summary of Deadlines for Innovative Challenge and Assessments

Week	Tasks	Assessment
2	Course instructor to give a briefing and assign group assignments.	None
4	Each group is required to submit a brief proposal and do a presentation.	Written report and presentation (20%)
10	Present progress of project/prototype	Product presentation (10%)
14	Innovation Challenge Day	Evaluation based on designed rubric (as per Table 2) (40%)

Assessments were done by using rubrics created by the course instructors. The rubric was created by the course instructor. Note that the content of the rubrics was constructed in the way to assess students’ soft skills and their understanding towards the learning outcomes of each course. Later on, the students’ overall grades were analysed and compared to the previous group of students who sat for the conventional-type assessment. The grading system applied are A (80-100%), A- (75-79%), B+ (70-74%), B (65-69%), B-(60-64%), C+ (55-59%), C (50-54%) and F (below 50%).

For the innovative challenge, marking rubric was designed in such a way to evaluate work product presentation, original creativity, visual display, and oral presentation of the students, with mark weightage 15%, 10%, 10%, and 5%, respectively. Each of this criteria was further assessed from several performance attributes as listed in Table 2.

For the fundraising project, students are required to integrate strategies to conserve the natural resources, reduce waste, and minimize the carbon footprint by recycling. Here, students were asked to form a group with 8 members each; they were to carry out an event called “Your Throw Away Could Pay the Needs!”. On the event day, they were required to set up dropping booths in the campus to gather reuse and recyclable materials (Plastics, Papers, Cans, and Electronics) from staff, students and the

Cheras community. Moreover, all the recyclable items were sold for cash. This assignment also targets to create social responsibility whereby the collected fund was donated to the National Cancer Society of Malaysia. Similar to the Innovative Challenge project, specific deadlines were given to students. The students were given at least 1 and half months to do necessary preparations. Table 3 describes the summary of project deadlines, tasks and assessments. Overall, this group project carries 40%, contribution, creativity, and subject knowledge would contribute 30% and report writing would contribute 10%. Note that the rubrics were shared with students up front so that they were aware of the expected work quality.

Table 2: The structure of rubric designed for the innovative challenge.

Criterion	Performance attributes
A) Work product presentation (15%)	<ul style="list-style-type: none"> • The group conveys a high degree of interest and enthusiasm in their presentation of the product. • The group provides a clear and detailed explanation of what the product is, how it is unique, and how it meets a specific consumer need. • The group's introduction on their work captures your attention.
B) Original creativity (10%)	<ul style="list-style-type: none"> • The product is completely original/innovative. • The product represents a minor modification of an existing product. • The product is a copy of an existing product.
C) Visual display (10%)	<ul style="list-style-type: none"> • Poster layout is logic and self-explanatory. • Poster is attractive and well-constructed. • Visual aids are informative (both poster and video). • Visual aids (poster and video) are appropriate to the topic and support overall presentation.
D) Oral presentation (5%)	<ul style="list-style-type: none"> • The group provides clear, logical, and enthusiastic presentation. • The group conveys confidence in talking about the topic. • The group responses to questions properly.

*Each performance attribute was assigned with a 5-level scale, namely *scale 1*: Strongly Disagree, *scale 2*: Disagree, *scale 3*: Neutral, *scale 4*: Agree, and *scale 5*: Strongly Agree.

Table 3: Summary of Deadlines for Fundraising Project and Assessment

Weeks	Tasks	Assessment
Week 2	Course instructor to give a briefing and assign group assignments.	None
Week 4	Each group is required to present the ways to collect the recycling materials, setting of dropping booths and identify stakeholders. Each group is required to identify 2-5 stakeholders.	The assessments were carried out continuously from week 4. Three key elements such as
Week 6	Preparation of formal invitation letters to stakeholders who agreed to contribute recycling materials and also official letter of invitation to the receiver of fund.	(a) contribution, b)
Week 8- 11	Each group is required to actively campaign and collect recycling materials from students, staffs, and communities around Cheras.	creativity and innovativeness and
Week 12	The project day. Each group is required to set a booth. On the event day, students, staff, and communities are encouraged to visit the dropping booths to contribute recycling materials as well to get informative inputs. Various games were prepared for the visitors. The event ended with a hand over of mock cheque and speech from the leader of the project, invited stakeholders, and head of department.	(c) subject knowledge of course were evaluated.

For this fundraising project through selling recycling materials, marking rubric was designed in such a way to evaluate their contribution, creativity and innovativeness, and subject knowledge with mark weightage 15%, 15%, 10% respectively. Each of this criteria was further assessed from several performance attributes as listed in Table 4.

Table 4: The structure of rubric designed for fundraising project

Criterion	Performance Attributes
(a) Contribution (15%)	<ul style="list-style-type: none"> All requirements and objectives are identified, evaluated and completed. The deliverable offered new information or approach to the topic under discussion. Each member contributed in a valuable way to the project
(b) Creativity and Innovativeness (15%)	<ul style="list-style-type: none"> The demonstration was imaginative and effective in conveying ideas to the audience.
(c) Subject Knowledge (10%)	<ul style="list-style-type: none"> The deliverable demonstrated knowledge of the course content by integrating concepts into the response. The deliverable also demonstrated evidence of extensive research effort and a depth of thinking about the topic.

5. OUTCOME / FINDING(S) OF THE INNOVATION

5.1. Result Comparison for Year 2018 and 2019

For the year 2018, there were 25 students registered for the course named ‘Current Issues in Logistics Industry’. The assessment method was still based on the conventional method. Only 36% of them scored A and A- grade and the remaining scored either B+, B, B- and C+. Comparatively, in 2019, there were 97.8% of students who scored A and A- and only 2.2% scored B-. The huge difference in scoring is mainly because of the change in the assessment method whereby students are required to participate in an innovation challenge. This innovative assessment strategy is one of the initiatives to cultivate the students’ potential towards IR4.0. Summary of the grade comparison is shown in Figure 2.

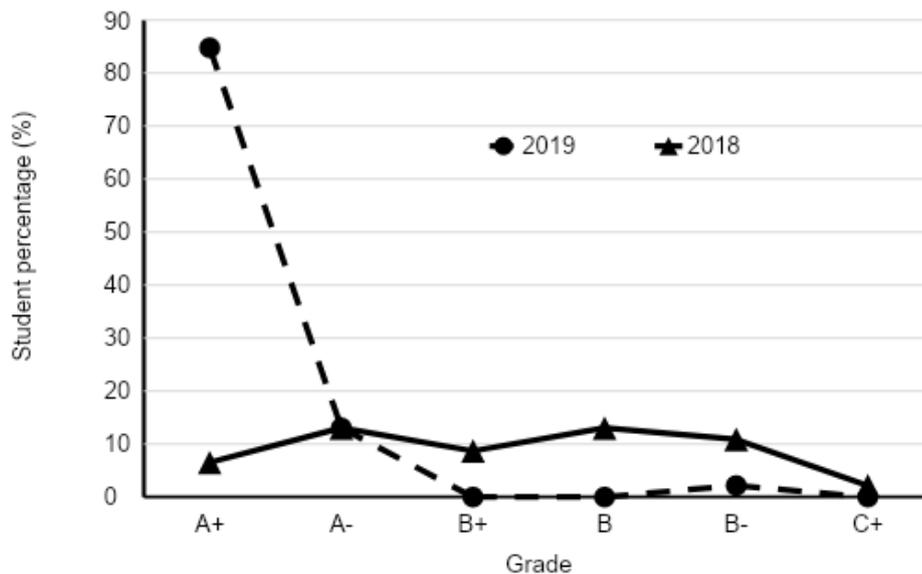


Figure 2: Grade comparison for year 2018 and 2019 in ‘Issues In Logistics Industry’ course. [Assessment method for year 2018: Written-based assessment; Assessment method for year 2019: Innovation challenge]

On the other hand, the same pattern of result was seen in another assessment strategy for the ‘Material Management’ course. In the year 2018, only 26.1% out of 23 students scored either A or A- grade and the remaining 73.9% scored below A. The result drastically changed upon the introduction of the innovative assessment in the year 2019. Here, waste recycling for fundraising activities was introduced in line with the sustainable development goal (SDG). 74.4% of the total 39 registered students scored either A or A- grade. Such a significant enhancement in students’ result indicates successfulness of using the innovative assessment method as compared to the conventional assessment method. A summary of the grade comparison is shown in Figure 3.

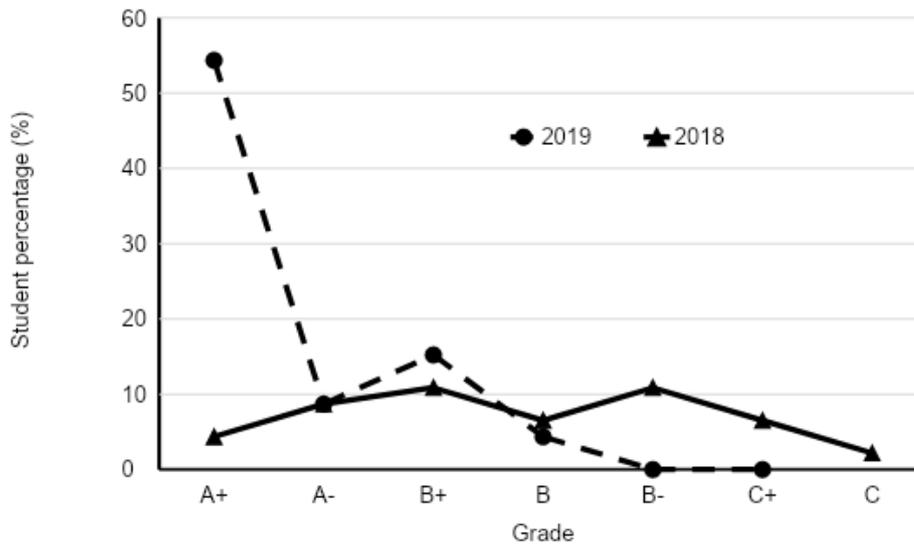


Figure 3: Grade comparison for year 2018 and 2019 in ‘Material Management’ course. [Assessment method for year 2018: Written-based assessment; Assessment method for year 2019: Waste recycling for fundraising]

5.2. Students feedback

Both innovative-based assessments received very positive feedback from the students. Some of the feedback is listed in Table 5.

Table 5: Students feedback for both innovative assessments

Innovation challenge	Recycle waste for fundraising activities
<ul style="list-style-type: none"> ● I learn how to make a video and improve my presentation skill ● I learn about how to design a new product ● It’s a very fun and interesting activity ● More on practical and discovery of knowledge on the industrial needs ● This subject develops team working and spirit to win the competition 	<ul style="list-style-type: none"> ● Fun and relaxing ● I like best about this course is the sustainable materials and management event ● I have the opportunity to contribute to the needy ● The assignment was different and interesting ● Valuable practical knowledge through the event ● This course enables me to gain the knowledge on how the material is flown and controlled along the supply chain ● The assignment is very much related to the real practice rather than just focus on theory

5.3. Panels Feedback

To make this assessment method more impactful, we took initiative to provide the panels with a few related questions for further improvement. The panels’ backgrounds were equally the same in which two panels have had an experience conducting the same assessment method with a different approach whereas the other two panels had never experienced it before. From the survey, it was shown that all panels agreed that this assessment method were seen to be more effective in nurturing students’ understanding and the activity is found to be more interesting compared to the conventional assessment method. Additionally, all panels were also asked about the possible soft skills that the students learned from this assessment method. All the four panels agreed that this type of assessment method allows students to improve on their presentation and communication skills as well as develop a great teamwork spirit. Undoubtedly, it is also able to develop students’ critical thinking based on the three panel’s feedback. The panels were very happy with this kind of assessment method because they believed it can develop students’ problem-solving skill and promote lifelong learning. Through this assessment method, panels strongly believed it is able to create a positive attitude and develop students’ leadership skills. Overall, all panels were very satisfied and gave a scale 5 (1: poor; 5: excellent) for this type of assessment method.

6. CONCLUSION

The main objective of this pilot study was to assess the efficacy of innovative assessment through experiential learning, learning by doing in order to improve the real and future learning skills of the students. The present work successfully implemented two innovative assessment-based assignments to replace the conventional paper-based assessment method. Such implementation was upon consideration of the needs of creative and innovative assessment methods to promote learning excitement and to enhance life-long learning skills of generation Z. The students involved in this new assessment method are the undergraduate students studied in the logistics programme. Results showed that both innovative assessment-based assignments (namely innovative challenge and waste recycling for fundraising) are feasible to serve as new tools to assess students' understanding. In both assignments, students were assessed based on teamwork, original creativity, oral presentation skill, quality of visual display, and different aspects such as event management and work presentation. The study of a group of undergraduate logistics students show that participating in experience-based practises is an efficient approach to improving their performance and skills. Additionally, course instructors revealed better grades have been obtained at the final exam by students who have worked diligently during the course. Students are deeply enthusiastic and inspired to participate in group-working activities and, thus, to learn from doing so. Therefore, conclude that the encouragement of innovative assessment-based assignment through experiential learning methods facilitates the interpretation of theoretical concepts by the students and contributes to the achievement of superior results.

This study has several limitations. Firstly, there is no control group. Therefore, this study is unable to generalize innovative assessments versus to other assessment methods and factors. Besides, this study did not emphasize on students demographics such as personality characteristics, CGPA, and students' number of semesters, which could facilitate more inputs regarding students' approach towards achieving higher grades. Lastly, this study mainly focused on groups of undergraduate logistics students. Therefore, this study would suggest future study to consider conducting the assessments within the control group and experimental group. Furthermore, personality characteristics, students' CGPA and their number of semesters should be tested as moderate variables to investigate the interaction of those variables towards direction or strength of students performance. Finally, this type of innovative assessments should be applied to other programs.

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