

Methods of assessment in project based learning



**ASSIGN
BUSTER**

(A) Synthesis of the Literature

Project-based learning (PBL) in scientific inquiry is an engaging instructional strategy that provides the opportunity of learning science concepts through challenging tasks that encourage students to explore, construct new knowledge, make decisions, and collaborate with their peers. (Erdogan & Bozeman, 2015). PBL in science requires students to demonstrate not only their knowledge of science, but also the ways that they can apply it in the real life (Nicole Holthuis, 2018). One of the fundamental factors to implement PBL strategies more effectively in the class, is the methods of assessment. Incorporating proper and authentic assessment strategies has a significant impact on the functionality of the PBL in learning science concepts. Based on the research carried out in the last 10 years, this literature review will focus on the assessment methods and strategies which best suit the project-based learning approach.

Based on a study by Amy Trauth-Nare and Gayle Buck (2011), and also many other recent studies (Medine Baran, 2018; Pantiwati & Husamah, 2017; Nicole Holthuis, 2018), formative assessment has been considered as one of the best approaches in project-based science learning. The purpose of the formative assessment is not just evaluating the achievement. It is about assessing what students do or do not understand about a science concept. Since PBL is designed to be student centred, it is possible for teachers not to provide students with enough constructive feedback and support of critical thinking. However, research has shown that PBL is most effective when appropriate formative assessment strategies such as self assessment and revision, peer evaluation, and providing clear learning goals and

expectations using a rubric are utilized (Amy Trauth-Nare and Gayle Buck, 2011). It is argued, that these teaching methods and techniques, which give learners the opportunity to structure and track their own learning processes with the guidance and feedback of the instructor, are much more effective than traditional methods, which use the dialogue techniques (Medine Baran, Abdulkadir Maskan, Şeyma Yaşar, 2018).

Based on a study carried out by Stephanie Bell (2010), many of twenty-first-century skills that help learners become productive citizens of a global society are not measurable by standardized tests. Rather, when students learn their processes, reflect on their own work in a collaborative group and also reflect how well they contributed, negotiated, interacted with other group members, the level of efforts, motivations, interests and productivity increased. In addition, by providing positive comments and constructive feedbacks to their peers, students will develop their social skills which help them become aware of their own strengths and improve their interactions with each other. (Amy Trauth-Nare and Gayle Buck, 2011)

The findings of a research by Anastasiya A. Lipnevich and Jeffrey K. Smith (2009) demonstrates that precise and specific feedback that helps students review their own work is the most significant benefit of formative feedback approach. Based on this study, traditional feedback in the form of grades decreases the positive effect of detailed feedback. This happens because grades usually cause negative effect around the task. Furthermore, based on a case study (Renee M. Clary, Robert F. Brzuszek, C. Taze Fulford, 2011) involved junior and senior level undergraduates (N = 40), the rubric appears

to be an appropriate and effective tool for assessing creativity in project-based learning tasks.

The only challenge that teachers might encounter when using formative assessment is the matter of reliability and validity of peer assessment. The reliability of the peer assessment might be affected by the level of friendship between the students. According to a study (Ernesto Panadero, Margarida Romero, Jan-Willem Strijbos, 2013), it is clear that rubrics enhance validity of the assessment for low to medium level of friendship between students, but they increase “ over-scoring” when the level of friendship is high.

Although a significant amount of studies has shown that formative assessment through clear criteria and a structured format is the most effective method in the project-based learning approach, the reliability of these methods of assessment in PBL requires further investigation (Rogheyeh Eskrootchi and G. Reza Oskrochi, 2010). One clear area for future research would be to study how different approaches of feedback and assessment in PBL affect subsequent learning in a course (Anastasiya A. Lipnevich – Jeffrey K. Smith, 2009).

(B) Purpose of the Study

Project-based learning has been considered as one of the most effective approaches of teaching science and engaging students in scientific inquiry (Eurasia Journal of Mathematics, Science & Technology Education, 2016). Incorporating appropriate methods of assessment in PBL plays a crucial role in the effectiveness of this approach. The objective of this study is to provide and analyze different methods of assessment such as formative assessment, <https://assignbuster.com/methods-of-assessment-in-project-based-learning/>

self and peer assessment, and using rubric as an effective tool of assessment in PBL and also to probe the level of reliability and validity of these methods of assessment in project-based learning.

(C) Context of the Study

This study will take place at a public secondary high school located in Mississauga, Ontario where students come from diverse ethnic, cultural and socioeconomic backgrounds. There are currently about 1200 students registered in grades 9 to 12 at this high school. There are 4 grade 10 science classes running in this semester. There are about 30 students in each class which are randomly assigned to these classes. The average of students' results in science standardized tests for all four classes are slightly more than the average of the province. As a result, the academic level of four classes, based on the tests, are almost in the same range. Currently, there is not enough evidence of using formative assessment in project-based learning approaches in these four classes. In this study, for the next new lesson, only two of these classes will incorporate formative assessment strategies such as self and peer assessment, and using a clear rubric for tasks. Teachers in these two classes will be provided enough resources and professional development support to implement these assessment strategies more effectively. The other two classes will continue to use traditional methods of assessment such as written quizzes and tests. The results of these two groups of students will be compared to recognize the difference of these two approaches of assessment and evaluation of science project-based learning. As a result, this study will aim to show the effectiveness of using formative assessment of PBL tasks compared to traditional methods.

(D) Definition of Terms

Project-based learning (PBL): Project-based learning is an approach of teaching that provides authentic learning tasks which focus on the learners' interest and motivation (Michael M. Grant, 2011). These tasks require students to collaborate with their peers, consider the instructor's constructive feedbacks, and revision their own work to improve their performance and come up with a final result (Erdogan & Bozeman, 2015).

Authentic Assessment: Authentic assessment measures the students' ability to apply the constructed knowledge in the real life and beyond the school. Students will enhance their deep understandings of different concepts through collaborative tasks. (Torulf Palm, 2008)

Formative Assessment: In formative assessment, the teacher, instead of grades, will provide constructive feedbacks for students. The goal of these feedbacks is to improve students' understandings and performance. (Huhta, Ari, 2010)

Rubric: Rubric is a type of assessment tool that categorizes students' performance for a given task through specific criteria and definitions. (Bruce S. Cooper and Anne Gargan, 2009)

(E) Limitations of the Study

- The ability of the teachers to incorporate effective formative assessment strategies in project-based learning tasks might affect the results of the study.

- This study takes place in small population of students from only one school. If the sample size of the research was larger and also students were from different schools from different demographics, then the result of the study would be different.
- The measurement of students' engagement in learning science concepts through project-based learning tasks might not be accurate since there are other factors involved in this matter such as the teaching styles and other environmental elements.
- The quality of the rubric design and the clarity of the criteria and expectations could affect the effectiveness of the results of the formative assessments.

References:

1. Holthuis, N., Deutscher, R., Schultz, S. E., & Jamshidi, A. (2018). The New NGSS Classroom: A Curriculum Framework for Project-Based Science Learning. *American Educator* , 42 (2), 23-27.
2. Baran, M., Maskan, A., & Yasar, S. (2018). Learning Physics through Project-Based Learning Game Techniques. *International Journal of Instruction* , 11 (2), 221-234.
3. Trauth-Nare, A., & Buck, G. (2011). Assessment for learning: Using formative assessment in problem-and project-based learning.
4. Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. *The Clearing House* , 83 (2), 39-43.
5. Eskrootchi, R., & Oskrochi, G. R. (2010). A study of the efficacy of project-based learning integrated with computer-based simulation-STELLA. *Educational Technology & Society* , 13 (1), 236-245.

6. Erdogan, N., Navruz, B., Younes, R., & Capraro, R. M. (2016). Viewing How STEM Project-Based Learning Influences Students' Science Achievement through the Implementation Lens: A Latent Growth Modeling. *Eurasia Journal of Mathematics, Science & Technology Education* , 12 (8), 2139-2154.
7. Clary, R. M., Brzuszek, R. F., & Fulford, C. T. (2011). Measuring creativity: A case study probing rubric effectiveness for evaluation of project-based learning solutions. *Creative Education* , 2 (4), 333-340.
8. Ginsburg, H. P. (2009). The challenge of formative assessment in mathematics education: Children's minds, teachers' minds. *Human Development* , 52 (2), 109-128.
9. Panadero, E., Romero, M., & Strijbos, J. W. (2013). The impact of a rubric and friendship on peer assessment: Effects on construct validity, performance, and perceptions of fairness and comfort. *Studies in Educational Evaluation* , 39 (4), 195-203.
10. Lipnevich, A. A., & Smith, J. K. (2009). Effects of differential feedback on students' examination performance. *Journal of Experimental Psychology: Applied* , 15 (4), 319.
11. Grant, M. M. (2011). Learning, beliefs, and products: students' perspectives with project-based learning. *Interdisciplinary Journal of Problem-based Learning* , 5 (2), 6.
12. Palm, T. (2008). Performance assessment and authentic assessment: A conceptual analysis of the literature. *Practical Assessment , Research & Evaluation* , 13 (4), 1-11.

13. Huhta, Ari (2010). “ Diagnostic and Formative Assessment”. In Spolsky, Bernard; Hult, Francis M. *The Handbook of Educational Linguistics* . Oxford, UK: Blackwell. pp. 469–482.
14. Cooper, B. B. S., & Gargan, A. (2009). Rubrics in education. *Phi Delta Kappan* , 91 (1), 54-55.