Project Based Learning : A Study on the Impact of IST&P on the Computer Science Students Learning and Engagement

Tajmilur Rahman
Joshua Nwokeji
Richard Matovu
Gannon University
Erie, PA, USA
rahman007@gannon.edu
nwokeji001@gannon.edu
matovu001@gannon.edu

Stephen Frezza
Franciscan University
Steubenville, PA, USA
sfrezza@franciscan.edu

ABSTRACT

Project-based learning (PjBL) is a desirable form of active learning that facilitate student engagement, team work and problem solving. Current literature in PjBL have studied the merits, demerits, implementation strategies and the impact of PjBL on student performance. However, PjBL has not been properly studied from the lens of Industry Standard Tools and Practices (IST&Ps). Currently, the specific learning effectiveness of PjBL vis-a-vis IST&Ps are largely unknown. To provide insight into the effectiveness of PjBL in relation to IST&Ps, we implemented PjBL in our class using 5 popular IST (SQL, Atlassian Jira, GitHub, Jenkins, and planning poker) and 3 most common Agile Development practices as ISP. We collected data from 120 students juniors and seniors using RIMMS as our instrument. Data was analyzed both qualitatively and quantitatively. Our preliminary results shows that IST&P has significantly positive impact over learning effectiveness, and students' engagement.

CCS CONCEPTS

• **Software and its engineering**;

KEYWORDS

Project Based Learning, IST&P, RIMMS, Students Engagement, Learning Effectiveness

ACM Reference Format:
Tajmilur Rahman, Joshua Nwokeji, Richard Matovu, and Stephen Frezza. 2023. Project Based Learning : A Study on the Impact of IST&P on the Computer Science Students Learning and Engagement. In *Proceedings of the 54th ACM Technical Symposium on Computing Science Education V. 2 (SIGCSE 2023), March 15–18, 2023, Toronto, ON, Canada.* ACM, New York, NY, USA, 1 page. https://doi.org/10.1145/3545947.3576331

1 METHOD

Figure 1 explains the method at a glance. IST&Ps are a collection of tools and practices commonly used in industries. For the tools in our study, we are using SQL, Atlassian Jira, GitHub, and Jenkins for database management, project management, source control, code build, and test integration. We have also used Planning Poker to facilitate Agile sprint planning and story estimation.

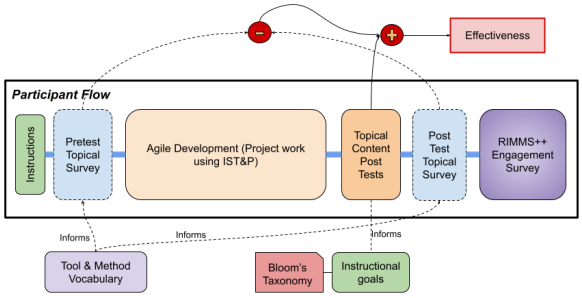

Figure 1: Methodology mapped to participant flow

We followed the agile development methodology and practices. We began assessment of learning with an IST&P topical survey focusing on students' familiarity and ability to use the selected IST&Ps. We also compared student performance on shared IST&P-related (Blooms level 2 [1]) assessment questions. At the end of the projects we will conduct a variant of the RIMMS [2] survey (RIMMS++) to analyze student engagement and a series of interviews to add qualitative connections to the quantitative findings.

We will perform a two-way ANOVA between the pre-test and the post-test survey results, and another two-way ANOVA between the post-test survey results and the topical content test results. to measure learning engagement, and effectiveness.

2 CONCLUSION

While this work is still in-progress, preliminary results from three groups of students (three undergraduate courses) show a positive impact. Our larger study consists of five undergraduate courses involving three faculties that are using IST&P. Once the study is done, it will give us valuable insights about how PjBL in IST&P setup impacts the learning effectiveness and engagement of students.

REFERENCES

[1] R. Britto and M. Usman, "Bloom's taxonomy in software engineering education: A systematic mapping study," in *2015 IEEE Frontiers in Education Conference (FIE)*, 2015, pp. 1–8.
[2] J. M. Keller, "First principles of motivation to learn and e3-learning," *Distance Education*, vol. 29, no. 2, pp. 175–185, 2008.

SIGCSE 2023, March 15–18, 2023, Toronto, ON, Canada

ACM ISBN 978-1-4503-9433-8/23/03.
https://doi.org/10.1145/3545947.3576331