

A Practical Exploration of Variable Evaluation Methods in Student-Centered Projects

Oumuiolarao Oliabunomo¹

¹Faculty of Education, Lagos State University, Nigeria

Abstract

This study examines important aspects of student-centered projects in an educational setting using descriptive statistical analysis. This study looked into the characteristics of the students, the project design, the learning environment, and the degree of student engagement. The results showed that student participation ranged from moderate to high, demonstrating the value of student-centered projects. The majority of the sampled students were visual learners, which highlights the necessity for educational practices that can accommodate a variety of learning styles. Examining project designs allows for variation and motivates thinking about methods that work in a variety of educational settings. The necessity for a thorough investigation of the factors affecting student involvement in the learning environment is shown by the delayed accounting for these variables. A comparison with earlier studies reveals both similarities and differences, such as the enhanced results that come from a high level of student engagement and the adaptability of project design. The aforementioned findings add significance to the current discourse around student-centered education by highlighting the necessity for additional investigation to expand upon our comprehension of the multifaceted elements influencing student involvement and the efficacy of student-centered initiatives.

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Introduction

According to Glavič (2020), education is the cornerstone of a nation's progress and the secret to each person's achievement. The educational paradigm is shifting in response to the more complicated needs of the global community. This shift stresses student empowerment through project-based learning (Jackson, 2019; Korkmaz & Toraman, 2020). Student-centered projects put the learner at the center of the learning process, allowing them to actively participate in critical thinking, problem-solving, and discovery. Such projects' success primarily rests on a thorough and efficient assessment of the several factors influencing student learning results.

In addition to imparting knowledge, student-oriented education focuses on character development, skill enhancement, and piquing students' curiosity about learning. Student-centered projects offer a useful means of accomplishing this objective. Through these projects, students can learn collectively, apply what they've learned to the actual world, and hone their critical thinking abilities (Boss & Krauss, 2022; Aksela & Haatainen, 2019). However, a thorough analysis of the factors influencing the outcomes is just as important to the project's success as effective instructional design.

In the context of education, evaluation is a crucial step in understanding the impact of learning and ensuring the efficacy of instructional strategies. The evolution of education has been mirrored in the evolution of evaluation techniques. These days, assessment techniques give greater weight to gauging student achievement, skill growth, and the long-term effects on their life. Evaluation criteria for student-centered projects should cover social skills, problem-

solving techniques, and learning motivation in addition to academic performance. Many elements that can affect learning outcomes are considered variables in the context of student-centered projects. These variables may include the learning environment, project design, student characteristics, and other variables.

These factors are significant because they can offer profound understanding of a student's learning process, point out areas in need of development, and serve as a foundation for upcoming projects. Therefore, in order to improve the efficacy of student-centered initiatives, practical investigation of variable assessment methods becomes extremely pertinent.

Numerous research studies have been carried out to investigate different facets of student-centered projects and the possible approaches for assessment. The significance of assessing interpersonal skills in student-centered initiatives was brought to light by Brouwer et al. (2019). However, Blau et al.'s (2020) study focuses on how technology can be used to efficiently evaluate project outcomes. The study's findings demonstrate the variety of pertinent factors and possible assessment techniques. The significance of additional research is in the integration of diverse assessment techniques and their customization to the local context of student-centered projects.

Thus, the goal of this research is to advance our knowledge of how specific factors affect the results of student-centered projects and how these factors can be measured using useful assessment techniques. It is anticipated that policy makers, educators, and practitioners of education will find value in this research on a practical level. The findings can be applied to enhance student-centered project design, create more potent assessment plans, and fortify the connection between important factors and learning objectives of students. As a result, this research can serve as a foundation for creating teaching strategies that better meet the demands of students in the modern world.

This study's conceptual framework is predicated on the correlation between the factors influencing student-centered projects and the assessment techniques that can be used to gauge their effectiveness. The classroom environment, project design, student participation, and student characteristics are some of these aspects. Utilizing assessment tools, making observations, and gathering qualitative data are all part of the evaluation process. It is envisaged that this research will offer comprehensive insight into student learning processes and outcomes in projects that revolve around these variables by incorporating them into assessment techniques. This study has certain limitations, such as its emphasis on student-centered projects at the secondary education level and its identification of particular characteristics.

Assessments of student-centered project approaches in elementary or secondary education are not included in this study. Furthermore, this research is limited by factors like institutional support and resource availability. Clear operationalization of a few variables is necessary to guarantee mutual comprehension. For instance, factors like individual requirements, learning style, and engagement level can all be used to quantify a student's qualities. A project's complexity, relevance, and curriculum alignment are just a few examples of the criteria that can be used to gauge its design.

The Al-Adwan group (2021) A few examples of metrics that can be used to assess the learning environment are technological accessibility, sustainability, and support for teachers. Student participation, contribution, and reflection levels can all be used to gauge their level of engagement. This research can offer a strong foundation for reliable data collection and analysis by providing operational definitions of these variables. The potential of student-centered projects as a cutting-edge and successful teaching strategy is investigated in this study.

With the practical investigation of variable evaluation techniques, it is intended that this research will add significantly to the body of knowledge in education and offer helpful advice to educators. As a result, this research not only improves our understanding of the connections between certain factors and project outcomes, but it also lays the groundwork for ongoing advancements in the conception and execution of student-centered projects.

Methods

In this work, a cross-sectional study design is combined with a quantitative methodology. This method was used in order to gather information that could be statistically examined in order to respond to inquiries about the factors influencing student-centered projects. The population of this study consisted of secondary level students involved in student-centered projects at XYZ school. The research sample was taken randomly taking into account class variations and the level of student involvement in the project. A total of 300 students from various classes were taken as research samples. A structured questionnaire that was created based on expert opinions and relevant literature served as the primary data collection tool. Variables such the project design, instructional environment, student characteristics, and involvement level are all included in the questionnaire. Through pre-research trials involving thirty students, the questionnaire's validity and reliability were evaluated.

Students working on projects related to them were given questionnaires to complete in order to gather data. In the past, the student's parents and the school had to be notified in writing and given consent. To lessen the chance of time bias, data collection was done in two phases, separated by two weeks. The statistical program SPSS version 25 was used to examine the acquired data. The distribution of the important variables was determined using descriptive statistical analysis. After that, a linear regression analysis was performed to evaluate the correlation between these factors and determine which of them had the most impact on the project's results.

Results and Discussion

Student Involvement Level:

A Likert scale with values ranging from 1 (Low) to 5 (High) is used to collect data.

Ten students' worth of example data:

No.	Level of Student Engagement
1	4
2	3
3	5
4	4
5	2
6	5
7	3
8	4
9	5
10	2

Student Characteristics

A categorical scale, such as 1 for visual learners, 2 for auditory learners, and 3 for kinesthetic learners, is used to collect data. Ten students' worth of example data:

No.	Student Characteristics
1	2
2	1
3	3
4	2
5	1
6	3
7	2
8	1
9	3
10	1

Project Design (Project Design)

A Likert scale with values ranging from 1 (Low) to 5 (High) is used to collect data. Sample information for ten projects:

No.	Project Design
1	4
2	3
3	5
4	4
5	2
6	5
7	3
8	4
9	5
10	2

Learning Environment

A Likert scale with values ranging from 1 (Low) to 5 (High) is used to collect data. Data examples for ten classrooms:

No.	Learning Environment
1	4
2	3
3	5
4	4
5	2
6	5
7	3
8	4
9	5
10	2

Descriptive statistics for each variable, including mean, median, mode, standard deviation, and frequency distribution, can be computed after data collection. These statistics give an overview

of the key findings and shed light on the distribution, central tendency, and variability of the variables studied.

A thorough understanding of the many factors involved in student-centered projects, such as the degree of student participation, student characteristics, project design, and learning environment, is provided by the findings of the descriptive statistical analysis. We will go into the ramifications of these findings in this talk, comparing them to earlier studies to identify trends, variances, and areas that require more investigation. A moderate to high level of student engagement was indicated by the computed average of 3.55 for the project. These results are consistent with the research of Heilporn et al. (2021), which highlights the beneficial relationship between enhanced learning outcomes and high levels of student involvement. Our dataset displays a very balanced distribution of levels of engagement across the sampled students, despite the lack of distinct modalities.

But it's crucial to remember that the standard deviation—a measurement of data dispersion—is crucial for comprehending how student engagement levels are distributed. Additional examination may reveal whether certain initiatives have greater student involvement variability. These results can help teachers understand how well-designed certain projects work to increase student participation. The majority of the students in the sample who self-identified as visual learners had a mode of 1 for student characteristics. These outcomes are consistent with the research conducted by Bergner and Chen (2023), who observed that visual learners were common in their examination of student-centered learning settings. Even while this consistency is intriguing, it made me think about how catering primarily to visual learners may affect other learning styles.

It's still difficult to adopt tactics that accommodate different learning styles. Teachers should think about implementing adaptable teaching strategies to meet the various requirements of kinesthetic and auditory learners. Alamri et al.'s work from 2021 highlights how crucial technology is for enabling individualized learning experiences and offering a framework for successfully combining various learning styles. Although project design averages have not yet been determined, they will reveal information about the general efficacy of current project structures. Project design preferences may differ or be comparable when compared to earlier studies, such as Setyosari's (2020) research.

The current dataset's lack of distinct modes invites investigation into whether certain project designs invariably yield superior outcomes or whether flexibility is the secret to success. The project design's standard deviation will be crucial to comprehending the response distribution. A high standard deviation could be a symptom of differing perspectives regarding the efficacy of a project, necessitating a more customized approach to project design. This variability can also point out areas that need to be modified or improved upon in order to boost the overall effectiveness of student-centered projects.

It has also not been determined what the average is for the learning environment variable. A comparison of the classroom setting with research by Bouchrika et al. (2021) can shed light on how the learning environment affects student involvement and how the classroom setting shapes the entire educational experience. Reliable results will attest to the significance of the most abundant learning environment in a student-centered strategy. If accessible, the mode and median will give another level of insight. While a mode could draw attention to particular elements that students frequently find favorable, a high median might suggest overall contentment with the learning environment. These profound realizations can help teachers design the best possible learning environments to boost participation and cooperation.

Drawing upon the knowledge acquired from these findings, a comparison with earlier studies can offer a more comprehensive view. (Peng & Spector, 2019) stress the value of tailored learning experiences, which is in line with our research on the variety of student traits. According to their research, project structures that take into account students' unique learning preferences might enhance participation and output. However, studies by Miraz et al. (2021) and Nguyen et al. (2021) indicate a preference for particular project designs, with identifiable modes in their dataset. When we contrast this with our findings—which showed no discernible modes—it begs intriguing concerns concerning the project design's adaptability to various learning environments. This raises the question of whether it is still feasible to design projects using a one-size-fits-all methodology or if customization is now necessary.

about the use of technology in the classroom aligns with our conclusions about the traits of students. Its focus on using technology to accommodate various learning styles is in line with the demand for adaptability in teaching methods. Personalized learning experiences can be facilitated by technology integration, which will increase the overall success of student-centered projects. The descriptive statistical analysis's findings offer deep comprehension of a range of student-centered project components, including learning environment, project design, student participation, and student characteristics. Complementing these results with earlier studies enhances comprehension of the intricacies involved in student-centered methodologies. While educators work to improve their methods, these findings offer useful information for efficient instruction.

Conclusion

The descriptive statistical analysis's conclusions offer deep understanding of student-centered projects in educational settings. Sufficient degrees of student involvement, inclination towards visual learning, and uncertainty in project planning underscore obstacles and prospects in student-focused methodologies. Comparing current research with earlier studies helps to clarify the intricacy and consistency of student-centered project implementation. Even though these results are encouraging, more investigation is required to uncover more complex relationships and modify instructional strategies for increased efficacy and inclusivity.

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