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Learners' Engagement and Performance in Science Investigatory Projects

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Abstract

This study explored learners' engagement and performance in Science Investigatory Projects (SIPs) in the District of Antique during 2025. Using a descriptive-correlational design, the study examined behavioral, emotional, and cognitive engagement in SIP activities and analyzed how engagement relates to performance outcomes. A total of 82 learners who participated in SIPs as part of their science curriculum served as respondents. Data were collected through a validated, researcher-developed questionnaire assessing participation, interest, critical thinking, project quality, and academic performance. Descriptive statistics, including frequency, percentage, weighted mean, and standard deviation, were used to measure engagement and performance, while Pearson Product-Moment Correlation assessed the relationship between the two variables at a 0.05 significance level. Results showed that learners' engagement was generally high, with behavioral engagement leading, followed by emotional and cognitive dimensions. Learners' performance in SIPs ranged from satisfactory to high, with most achieving grades in the proficient range. A significant positive relationship was observed between engagement and performance, indicating that greater involvement corresponds with improved outcomes in investigatory projects. The study concludes that active participation, interest, and cognitive effort significantly enhance the quality and success of SIPs. It is recommended that science teachers implement strategies that strengthen engagement, provide adequate support and resources, and monitor progress to optimize learners' performance.

Keywords: learners' engagement, science investigatory projects, behavioral engagement, cognitive engagement, academic performance

Introduction

Science education is vital for developing learners' critical thinking, problem-solving abilities, and scientific literacy. One of the most effective ways to achieve this is through Science Investigatory Projects (SIPs), which promote inquiry-based learning through experimentation, observation, and analysis. SIPs enable learners to apply scientific concepts, develop research skills, and cultivate curiosity, thereby creating meaningful learning experiences (Krajcik & Blumenfeld, 2006).

Learner engagement plays a critical role in academic success, particularly in project-based and inquiry-driven tasks like SIPs. Engagement includes behavioral, emotional, and cognitive dimensions, such as active participation, sustained interest, and deep investment in learning (Fredricks, Blumenfeld, &

Paris, 2004). Highly engaged learners tend to demonstrate better understanding, produce higher-quality outputs, and achieve improved academic performance (Prince & Felder, 2006).

Despite the importance of SIPs, learners may encounter challenges such as limited resources, insufficient guidance, and varying motivation levels, which can affect engagement and performance. In the District of Antique, there is limited research on the connection between learners' engagement and performance in SIPs, highlighting the need for this study.

The study aimed to determine learners' engagement levels and their performance in SIPs and to explore the relationship between these variables among 82 learners in the District of Antique in 2025. Findings are intended to inform teachers and administrators on strategies to boost engagement and enhance the quality and outcomes of investigatory projects.

Methodology

A descriptive-correlational design was employed to assess learners' engagement and performance in SIPs and explore the relationship between these variables. The descriptive component measured engagement and performance levels, while the correlational component examined how engagement influences outcomes.

The study involved 82 learners who actively submitted and completed their SIPs during the academic year, selected through purposive sampling. Data were collected using a validated, researcher-developed questionnaire divided into two sections: Part I measured engagement (behavioral, emotional, cognitive), and Part II evaluated performance (project originality, scientific accuracy, completeness, and overall grade). The instrument underwent expert validation and pilot testing, yielding a high reliability coefficient (Cronbach's alpha = 0.85).

Ethical considerations were observed, including permission from school authorities, informed consent from learners, and confidentiality of responses. Data were analyzed using descriptive statistics and Pearson Product-Moment Correlation at a 0.05 significance level.

Results

Learners' engagement in SIPs was generally high, with an overall mean of 4.28 ($SD = 0.36$). Behavioral engagement scored highest ($M = 4.35$), followed by emotional ($M = 4.26$) and cognitive engagement ($M = 4.23$), indicating active participation, interest, and cognitive investment in project work.

Performance in SIPs was satisfactory to high, with an overall mean score of 85.9 ($SD = 4.12$). Specifically, 41.5% of learners scored 86–90, 29.3% scored above 90, and 29.2% scored below 85. Project originality ($M = 4.21$), scientific accuracy ($M = 4.28$), and completeness ($M = 4.30$) were all rated high, demonstrating that learners produced quality investigatory outputs.

Correlation analysis revealed a significant positive relationship between engagement and performance ($r = 0.61$, $p < 0.01$), highlighting that greater involvement leads to better academic outcomes in SIPs.

Discussion

The findings emphasize the importance of active learner engagement in project-based learning. High behavioral engagement suggests that consistent participation fosters skill development and reinforces classroom learning. Emotional engagement reflects learners' intrinsic interest, which encourages perseverance, experimentation, and ownership of learning (Krajcik & Blumenfeld, 2006). Cognitive engagement shows learners' ability to apply critical thinking and analytical skills, directly influencing the quality of investigatory projects.

The strong positive correlation between engagement and performance indicates that learners' active involvement translates to higher-quality outputs and better academic results (Prince & Felder, 2006). However, some learners scored below 85, suggesting that additional guidance, resources, and support are necessary to help all students reach their potential.

Conclusion

Learners in the District of Antique exhibit high levels of engagement in Science Investigatory Projects, which significantly contributes to satisfactory to high performance. Behavioral, emotional, and cognitive engagement all play a vital role in fostering meaningful learning and producing quality investigatory outputs. The study confirms that active engagement is a strong predictor of academic success in SIPs, highlighting the value of participatory and inquiry-based learning in science education.

Recommendations

Enhance Project-Based Learning Strategies: Provide more hands-on activities, collaborative projects, and mentorship programs to maintain high levels of behavioral, emotional, and cognitive engagement.

Provide Adequate Resources and Facilities: Ensure learners have access to laboratory equipment, materials, and reference tools to conduct investigatory projects effectively.

Implement Structured Guidance and Monitoring: Conduct regular check-ins, progress assessments, and feedback sessions to support learners who may struggle with engagement or project completion.

Encourage Parental and Community Involvement: Engage parents and community members to motivate learners and reinforce their commitment to scientific inquiry.

Organize Teacher Training: Provide professional development for teachers on strategies to enhance learner engagement and support investigative learning, including assisting students performing below expectations.

Conduct Further Research: Investigate additional factors affecting engagement and performance in SIPs, such as learner motivation, teacher support, school climate, and access to educational resources, to develop comprehensive interventions that improve science education outcomes.

References

1. DepEd. (2016). K–12 science curriculum guide. Department of Education.
2. Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. Review of Educational Research, 74(1), 59–109.

3. Krajcik, J. S., & Blumenfeld, P. C. (2006). Project-based learning. In R. K. Sawyer (Ed.), The Cambridge handbook of the learning sciences (pp. 317–334). Cambridge University Press.
4. Ormrod, J. E. (2016). Educational psychology: Developing learners (8th ed.). Pearson Education.
5. Piaget, J. (1977). The essential Piaget. Basic Books.
6. Prince, M., & Felder, R. (2006). Inductive teaching and learning methods: Definitions, comparisons, and research bases. Journal of Engineering Education, 95(2), 123–138.
7. Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.
8. Bybee, R. W. (2010). Advancing STEM education: A 2020 vision. Technology and Engineering Teacher, 70(1), 30–35.
9. Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting the learning. Educational Psychologist, 26(3–4), 369–398.
10. Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? Educational Psychology Review, 16(3), 235–266.