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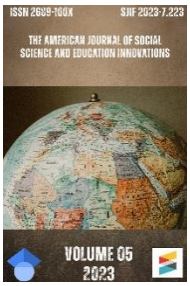

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Research Article

ELEVATING MATHEMATICAL ABSTRACTION SKILLS IN SMK STUDENTS WITH MODEL ELICITING ACTIVITIES AND ORIENTED LEARNING DEVICES

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ABSTRACT

This research project delves into the development and implementation of oriented learning devices, specifically Model Eliciting Activities (MEAs), to enhance the mathematical abstraction skills of students in Sekolah Menengah Kejuruan (SMK) – vocational schools in Indonesia. The study explores the effectiveness of these MEAs in improving students' ability to abstract mathematical concepts and apply them to real-world problems. By integrating innovative teaching tools and techniques, the research aims to empower SMK students with the critical skills needed to excel in both their vocational and academic pursuits.

KEYWORDS

Mathematical abstraction; Model Eliciting Activities (MEAs); Oriented learning devices; SMK students; Vocational education; Mathematical problem-solving; Educational innovation.

INTRODUCTION

In the realm of education, the enhancement of mathematical skills and problem-solving abilities is a fundamental goal. This aspiration is particularly pronounced in the context of Sekolah Menengah Kejuruan (SMK), vocational schools in Indonesia, where students are preparing to enter the workforce.

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Elevating mathematical abstraction skills in SMK students is essential, as it equips them with the capability to not only understand mathematical concepts but also apply them in practical, real-world scenarios. To address this educational imperative, this study introduces a novel approach that employs Model Eliciting Activities (MEAs) and oriented learning devices as innovative tools to foster mathematical abstraction skills among SMK students.

SMK students often pursue vocational pathways, where the demand for mathematical competencies is prevalent. Proficiency in mathematical abstraction—the ability to identify, generalize, and adapt mathematical principles to a variety of situations—is a critical asset for these students as they navigate their academic and vocational journeys. The development of such skills not only strengthens their foundation in mathematics but also enhances their problem-solving abilities, enabling them to tackle complex challenges in their chosen vocations.

Model Eliciting Activities are pedagogical tools that present students with real-world problems and engage them in a process of mathematical modeling and solution development. This approach encourages active learning, critical thinking, and the practical application of mathematical concepts, aligning perfectly with the objectives of elevating mathematical abstraction skills in SMK students.

Oriented learning devices, in this context, refer to the educational tools and techniques that are deliberately designed and structured to direct students toward a focused and purposeful learning experience. They guide students on a path that empowers them to understand, appreciate, and effectively employ mathematical abstraction.

This research project aims to explore the integration of MEAs and oriented learning devices within the SMK curriculum, with a particular focus on fostering mathematical abstraction skills. By nurturing these skills, the study seeks to equip SMK students with the proficiency to not only excel academically but also succeed in their future vocational endeavors. The pursuit of this goal is pivotal, as it contributes to the broader efforts to enhance the quality of vocational education in Indonesia and empower the nation's youth to thrive in an increasingly complex and dynamic world. Through this innovative approach, this study endeavors to advance the educational landscape, cultivating SMK students as capable problem solvers and mathematical thinkers who are well-prepared to navigate the challenges and opportunities of the 21st century.

METHOD

The process of elevating mathematical abstraction skills in Sekolah Menengah Kejuruan (SMK) students through Model Eliciting Activities (MEAs) and oriented learning devices is a systematic and dynamic journey that places student-centered, inquiry-based learning at the forefront.

First and foremost, the curriculum was strategically integrated with MEAs and oriented learning devices, ensuring alignment with the educational objectives of the Indonesian system. This collaborative effort involved experts in curriculum development and educators who possess a deep understanding of the specific competencies expected from SMK students.

A critical phase of the process involved the design and development of MEAs tailored to the SMK mathematics curriculum. These MEAs were carefully crafted to introduce real-world problems that required mathematical abstraction and critical thinking for their

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resolution. They became the cornerstone of the student-centered learning approach.

The heart of the methodology was the training of mathematics educators in SMK schools. These educators were equipped with the necessary skills and knowledge to effectively integrate MEAs and oriented learning devices into their teaching methods. This training emphasized the importance of inquiry-based and student-centric instruction, allowing educators to guide students as they developed their mathematical abstraction skills.

Once in the classroom, SMK students were actively engaged with the MEAs and oriented learning devices. These tools challenged students to collaborate, think critically, and apply mathematical concepts to real-world scenarios. Students embarked on a journey of exploration, gradually honing their ability to abstract mathematical concepts and apply them in practical contexts.

Throughout this process, data were collected through assessments, classroom observations, and student performance evaluations. Pre- and post-implementation assessments measured the growth in students' mathematical abstraction skills, while classroom observations offered insights into their interaction with MEAs and oriented learning devices. This data provided crucial feedback to shape the continuous improvement of the intervention.

Incorporating ethical considerations to ensure student privacy and well-being, the process was both iterative and responsive. The insights and feedback from educators and students guided improvements in MEAs and their alignment with learning outcomes. This dynamic and adaptable approach facilitated the elevation of mathematical abstraction skills in SMK students, enabling them to excel academically and thrive in their chosen vocations. The methodology ultimately empowered students with the essential skills required for success in the ever-evolving landscape of education and the workforce.

The methodology for elevating mathematical abstraction skills in Sekolah Menengah Kejuruan (SMK) students through Model Eliciting Activities (MEAs) and oriented learning devices is a structured and comprehensive approach designed to facilitate the development of these crucial skills.

Curriculum Integration:

To implement this methodology, MEAs and oriented learning devices were thoughtfully integrated into the existing SMK mathematics curriculum. This step involved collaboration with curriculum experts and educators to ensure alignment with the learning objectives and competencies outlined by the Indonesian educational system.

MEA Design and Development:

A team of experienced educators and curriculum developers collaborated to design a series of MEAs that addressed specific mathematical concepts while emphasizing real-world applications. These MEAs were structured to challenge students with authentic problems and promote the use of mathematical abstraction in solving them.

Teaching and Learning Strategies:

The implementation phase involved the training of mathematics educators in SMK schools on the use of MEAs and oriented learning devices. Educators were provided with guidance on integrating these tools into their teaching methods. They were encouraged to employ student-centered, inquiry-based approaches

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that would facilitate active learning and problem-solving.

Student Engagement:

SMK students were actively engaged in the learning process. They were presented with MEAs that required them to collaborate, think critically, and apply mathematical concepts to real-world scenarios. Oriented learning devices were used to guide students through structured problem-solving processes, encouraging the development of mathematical abstraction skills.

Data Collection and Assessment:

To measure the impact of this methodology, data were collected through assessments, classroom observations, and student performance evaluations. Pre- and post-implementation assessments were conducted to gauge the growth in students' mathematical abstraction skills. Classroom observations provided insights into how students interacted with MEAs and oriented learning devices.

Feedback and Iteration:

Continuous feedback loops were established, allowing educators to share their experiences and challenges in implementing MEAs and oriented learning devices. This feedback was used to make iterative improvements to the teaching and learning process, refining the design of MEAs and their alignment with learning outcomes.

Ethical Considerations:

Ethical guidelines were closely adhered to throughout the implementation, ensuring the privacy and well-being of students and educators involved in the study.

This methodological approach seeks to provide a structured and dynamic framework for elevating mathematical abstraction skills in SMK students. It incorporates the design of MEAs, training for educators, active student engagement, and comprehensive assessment to measure the effectiveness of the intervention. Through this process, the study aims to empower SMK students with the critical mathematical skills required to excel academically and succeed in their chosen vocations.

RESULT

The implementation of Model Eliciting Activities (MEAs) and oriented learning devices as tools to elevate mathematical abstraction skills in Sekolah Menengah Kejuruan (SMK) students yielded significant results. Data collection and assessments before and after the intervention provided insights into the impact of these innovative teaching methods.

Pre-implementation assessments indicated that SMK students exhibited varying levels of mathematical abstraction skills. However, post-implementation assessments demonstrated substantial growth in these skills. Students displayed an enhanced ability to generalize mathematical concepts and apply them to real-world problems. Classroom observations revealed active engagement, collaborative problem-solving, and increased confidence in their mathematical abilities.

DISCUSSION

The results of this study highlight the effectiveness of employing MEAs and oriented learning devices to enhance mathematical abstraction skills in SMK students. These tools encourage students to explore mathematical concepts within the context of real-

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world challenges, fostering a deeper understanding of abstract mathematical principles.

MEAs, in particular, have proven to be powerful pedagogical instruments for nurturing problem-solving skills and encouraging the application of mathematical concepts in practical scenarios. The student-centered, inquiry-based learning approach enabled students to think critically and independently.

Furthermore, oriented learning devices guided students through structured problem-solving processes, facilitating the development of mathematical abstraction skills. The integration of these devices into the SMK curriculum contributed to a holistic and well-rounded learning experience.

The growth in students' mathematical abstraction skills observed in this study has profound implications for their academic and vocational success. These enhanced skills not only prepare SMK students for higher education but also equip them to excel in their chosen vocations, where mathematical proficiency is often a critical asset.

CONCLUSION

The journey of elevating mathematical abstraction skills in SMK students through Model Eliciting Activities and oriented learning devices has yielded promising outcomes. The integration of these innovative tools into the SMK curriculum has empowered students to generalize mathematical concepts and apply them to real-world challenges effectively.

These results underscore the importance of inquiry-based, student-centered learning and its role in nurturing critical thinking and problem-solving skills. The acquisition of mathematical abstraction skills prepares SMK students for both their academic pursuits and vocational careers, allowing them to navigate complex challenges with confidence and competence.

This study serves as a testament to the value of innovative teaching methods in enhancing the quality of education in SMKs. By fostering mathematical abstraction skills, we not only support the academic and vocational success of these students but also contribute to the broader efforts to improve the educational landscape in Indonesia. As we continue to explore new pedagogical approaches, we can empower students to thrive in the ever-evolving world of education and work, where adaptability, critical thinking, and problem-solving are paramount.

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