

Program Management for Strengthening Science and Character Education Learning Outcomes in Vocational Schools throughout Sebatik Nunukan Island - North Kalimantan

Serly Indrawati^{1*}, Tina Rahmawati¹

¹Magister of Education Management, Faculty of Education and Psychology, Universitas Negeri Yogyakarta, Indonesia

²Departement of Guidance and Counseling, Faculty of Education and Psychology Universitas Negeri Yogyakarta, Indonesia

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Corresponding Author:

Serly Indrawati

Serlyindrawati.2022@student.uny.ac.id

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Abstract: Research This research examines the management of knowledge strengthening and character education programs in vocational schools throughout Sebatik Nunukan, North Kalimantan. Using a qualitative approach, data was collected through observation, in-depth interviews, and documentation studies with research subjects including teachers, school principals, and students. Data analysis was carried out using thematic methods and the Miles, Huberman, and Saldana model. The research results show that limited educational facilities such as laboratories and libraries hinder the science teaching process. Character education is often inconsistent due to a lack of training and support for teachers, requiring ongoing training and professional support. Local community participation in character education is still limited, even though it is very important to create an environment that supports character values. This research emphasizes the importance of improving educational facilities, continuous training for teachers, community involvement, implementing innovative learning methods, and utilizing technology in programs to strengthen knowledge and character education in vocational schools throughout Sebatik Nunukan. It is hoped that these efforts can improve the quality of education and produce a generation that is competent and has good character.

Keywords: Character Education; Program Management; Science; Sebatik Nunukan; Vocational School

Introduction

Education in Indonesia continues to adapt to increasingly complex global demands, especially in facing the challenges of the Industrial Revolution 4.0 which demands increased student competence and character (Setiyawami et al., 2019). According to Human Capital theory, education is an important investment in improving the quality of human resources to increase productivity and economic growth (Sudarwati & Naim, 2022; Goczek et al., 2021). One aspect of main concern is

strengthening knowledge and character education, especially in Vocational High Schools (SMK). Vocational Schools have a strategic role in producing skilled workers who are ready to face industrial dynamics (Li et al., 2021). Sebatik Nunukan, an island in North Kalimantan, has a number of vocational schools which play an important role in producing skilled workers. However, geographical challenges and limited resources are significant obstacles (Zickafoose et al., 2024).

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This condition requires an effective program management strategy to improve the quality of education and student character (Iskandar et al., 2022; Ula & Suwarno, 2023). Bronfenbrenner's Ecological Theory states that a supportive learning environment, including family and community involvement, is key to optimal individual development (Navarro & Tudge, 2023). As a border area, it has unique challenges in implementing comprehensive and sustainable education programs. According to Vygotsky's theory of the Zone of Proximal Development, social interaction with the surrounding environment greatly influences students' learning processes (Daneshfar & Moharami, 2018). Therefore, character education in vocational schools throughout Sebatik Nunukan needs to be designed in such a way that it involves active participation from the local community to create a supportive learning environment.

The main problem faced is the lack of adequate educational facilities and infrastructure. Research conducted by Yangambi (2023), shows that limited learning facilities, such as laboratories and libraries, can hinder the development of students' maximum potential. Apart from that, teacher professional development is also an important aspect that needs to be considered. Continuous training and development of teacher competency in implementing character education based on local and global values is very necessary (Susatya et al., 2021). Howard Gardner's Theory of Multiple Intelligences is also relevant in this context, where recognition of various types of intelligence, including moral and social intelligence, must be integrated in the vocational school curriculum.

Implementing learning that accommodates various types of intelligence can help develop students' potential holistically. In managing programs to strengthen knowledge and character education in vocational schools throughout Sebatik Nunukan, a holistic and collaborative approach is needed. A study by Könings et al. (2021), emphasize the importance of community involvement in supporting educational programs, which can increase a sense of shared ownership and responsibility for educational success. In addition, project-based learning strategies that integrate character values can increase student involvement in the learning process. According to research conducted by Trisdiono et al. (2019), project-based learning which involves practical and real activities is able to develop critical thinking skills and strengthen character values such as cooperation and responsibility.

Limited resources also require innovative solutions. The use of information and communication technology (ICT) in the learning process can be an alternative to overcome these limitations. According to (Haleem et al.,

2022), the integration of ICT in learning not only increases access to information but also allows for more interactive and interesting learning. Character education is crucial in forming a generation that is not only academically competent, but also has good ethics and morals (Rahayu & Dong, 2023). Character education includes values such as integrity, responsibility, hard work and honesty which must be internalized in every aspect of learning (Hart, 2022). In vocational schools, the challenge of strengthening character education is often related to a curriculum that is more oriented towards technical skills rather than students' personal development (Amilda et al., 2023). This research focuses on managing programs to strengthen knowledge and character education in vocational schools throughout Sebatik Nunukan. Given the importance of integration between science and character education, effective management must include a holistic approach that pays attention to students' cognitive, affective and psychomotor aspects (Masturin & Zaman, 2022).

Apart from that, the involvement of all stakeholders, including teachers, parents and the community, is the key to the success of this program (Vlcek & Somerton, 2023). In particular, this research identified several main problems in the management of character education programs in vocational schools throughout Sebatik Nunukan. First, there is a lack of training and professional development for teachers to integrate character education in teaching (Vlcek & Somerton, 2023). Second, limited resources and facilities that support character strengthening programs, such as reading books, interactive learning media, and a conducive learning environment. Third, the lack of involvement of parents and the community in the character education process in schools.

Apart from these challenges, there are also other factors that influence the effectiveness of knowledge strengthening and character education programs. According to (Utami et al., 2019), positive role models from teachers and a conducive school environment greatly influence the internalization of character values in students. This shows that apart from the curriculum and learning methods, the exemplary aspect of educators is also an important element in character education. Furthermore, research also shows that the use of technology and innovative learning media can support strengthening character education. Research conducted by (Fariasih & Fathoni, 2022), shows that the implementation of project-based learning that integrates character values can increase student involvement and motivation. Technology not only improves students' technical skills but also helps in internalizing character values through interactive and contextual learning experiences.

A study conducted by (Mauliza et al., 2022), at JPPIPA UNRAM emphasized the importance of integrating character education in science learning at vocational schools, where it was found that students who received character education tended to have better learning outcomes and more positive behavior. Project-based learning that integrates character values can increase student involvement and motivation in learning. This research aims to provide a comprehensive overview of the management of knowledge strengthening and character education programs in vocational schools throughout Sebatik Nunukan as well as offering recommendations for overcoming the challenges faced. It is hoped that the results of this research can become a reference for policy makers and educational practitioners in formulating more effective strategies to strengthen character education in vocational schools.

Method

This research uses a qualitative approach with data collection techniques that include observation, in-depth interviews, and documentation studies (Busetto et al., 2020). The research subjects were teachers, school principals, and students at several vocational schools in Sebatik Nunukan. This research aims to identify the main patterns and themes related to the management of knowledge strengthening and character education programs in vocational schools. The validity of the data in this research is guaranteed using technical triangulation, which involves the use of various data collection methods (interviews, observations, and documentation) to confirming research findings. This triangulation ensures that the data obtained is accurate and reliable. Respondents included school principals, teachers, parents or guardians of students and students at Sebatik Vocational School. Data collection techniques are interviews, observation and documentation. The validity of the data used is using triangulation techniques. Data analysis using the Miles, Huberman, and Saldana models. Analysis consists of three streams of activities that occur simultaneously, namely: data condensation, data display, and conclusion drawing, as follows:

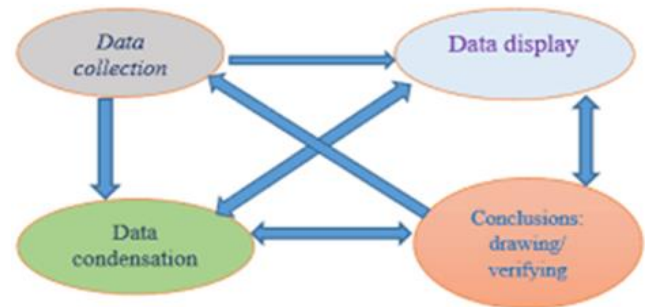


Figure 1. Interactive Data Analysis Model

Result and Discussion

Based on the results of the discussion in this research, the research flow above can be explained from the results of data condensation, data display, and conclusion drawing, this is explained.

Data Condensation

Limited Facilities and Resources

From interviews and observations, it was revealed that vocational schools in Sebatik Nunukan face significant limitations in facilities and infrastructure. Inadequate facilities such as laboratories and libraries hinder the quality of teaching and learning. This limitation has an impact on the effectiveness of the science strengthening program, because students do not get adequate practical experience in the scientific field (Kerans, 2022; Darling-Hammond et al., 2020). Previous research shows that adequate facilities are an important factor in the success of the learning process (Tiara Octavia et al., 2020).

Integrating Character Education in the Curriculum

Findings from interviews with teachers show that there are efforts to integrate character education in the curriculum, but implementation is often inconsistent. The main factor hindering implementation is a lack of training and support for teachers. Teachers feel inadequately prepared to teach character values effectively due to limitations in professional training and resources (Admiraal et al., 2023). Similar research found that effective teacher training greatly influences the success of character education (Karmina et al., 2023).

The Role of Community in Character Education

Observations show that the involvement of local communities in supporting character education is still limited. Many communities are not yet active in activities that support character values in schools, which has an impact on the lack of external support for student character development (Haerudin et al., 2023). Key

factor in supporting character education and improving the quality of education (Dabdoub et al., 2023).
Presentation of data (data display)

Table 1. Display data

| Main Theme | Limited Facilities | Community Support | Teacher Training |
|----------------------------------|--|--|------------------------------------|
| Influence on Science | Inhibits practical work | At least, it doesn't have a big effect | Lack of ability |
| Influence on character education | Lack of space for character activities | Slightly supports character activities | Lack of understanding of character |
| Intervention required | Facility improvements | Increased community engagement | Continuous training |

Data from interviews and observations were organized into a thematic matrix to visualize the relationships between main themes. This matrix shows that limited facilities are directly related to difficulties in strengthening knowledge, while local community support is correlated with the success of implementing character education. Thematic examples in the matrix show that schools with better facilities tend to have more effective character education programs (Sakban & Sundawa, 2023).

Conclusion drawing
The Importance of Strengthening Facilities

From the results of the analysis, it is clear that improving facilities and infrastructure in schools is a critical step to increase the effectiveness of educational programs. Investment in educational facilities can support science teaching and facilitate the implementation of character education programs more effectively (Surmana et al., 2022).

Teacher Professional Training and Development

Continuous teacher training and professional support are needed to improve teachers' abilities to integrate character education into the curriculum. Training programs based on real practice and direct experience can improve teacher skills and knowledge (Salo et al., 2024; Faudiah et al., 2023; Osborne et al., 2019).

Increased Community Engagement

To increase the effectiveness of character education, local community involvement must be strengthened. An active community can provide additional support and create an environment that is more supportive of character values outside of school (Prince & Diggory, 2023).

Innovation in Learning

The use of innovative learning methods, such as project-based learning, can improve students' understanding and application of character values in

practical contexts. This method has proven effective in facilitating the integration of knowledge and character (Andriani et al., 2023; Refmidawati, 2023).

Use of Technology
The use of information and communication technology (ICT) can help overcome limited facilities and increase interaction in learning. The integration of ICT in education must be carried out strategically to maximize its benefits (Dhani et al., 2023).

Conclusion

This research concludes several main things related to the management of knowledge strengthening and character education programs in vocational schools throughout Sebatik Nunukan. First, limited educational facilities such as laboratories and libraries hinder the teaching and learning of science. Teachers need ongoing training and professional support to teach character values effectively. Real practice-based training programs are very necessary to improve teachers' abilities and knowledge in this field. Third, the involvement of local communities in supporting character education is still limited. Local community participation is very important to create an environment that supports character values outside the school. Increased community involvement can provide additional support and strengthen existing character education programs. Fourth, the application of innovative learning methods such as project-based learning has proven effective in increasing students' understanding and application of character values in practical contexts. This method helps integrate science and character education more effectively and relevantly to students' daily lives. Fifth, the use of information and communication technology (ICT) can be a solution to overcome limited facilities and increase interaction in the learning process. The integration of ICT in education must be carried out strategically to maximize its benefits, especially in supporting science teaching and character education.

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Author Contributions

Author contributions include S.I. and T. R: collecting data, analyzing data, writing original drafts, and so on; S.I. and T.R: focus on methodology and review writing.

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Conflicts of Interest

The authors declare no conflict of interest.

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