Development of An Academic Supervision E-Module Based on Coaching to Enhance Teachers' Pedagogical Competence

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Abstract: This study aims to develop an interactive and practical academic supervision e-module based on coaching to enhance teachers' pedagogical competence. The research employs a Research and Development (R&D) method using mixed approaches. The study subjects consist of five school principals and five teachers at the Ki Hajar Dewantara Elementary School, the Education Coordinator, Semarang Regency, Central Java Province, following the development procedures of the Borg and Gall model. Product trials were conducted using a Pre-Experimental Design. Data were collected through interviews, questionnaires, and observations. Product validation involved two expert validators (content and IT experts) using both qualitative (data and source triangulation) and quantitative (validity) approaches for data validation. Data analysis was carried out both qualitatively and quantitatively using the Mann-Whitney statistical test. The product validation by experts resulted in an average score of 91.2% (categorized as very valid) for content feasibility and 88.5% (valid) for technological aspects. The validation outcomes revealed an average score of 91.2% (very valid) for content and 88.5% (valid) for technology. The trial results showed an improvement from 19.2% before coaching to 97.2% after coaching, shifting the category from "fair" to "excellent." The Mann-Whitney test results also indicated a significant difference in teachers' pedagogical competence before and after coaching in academic supervision. Additionally, qualitative findings highlighted that the e-module provides easily accessible practical guidance and helps school principals deeply understand coaching techniques. In conclusion, the academic supervision e-module based on coaching is valid and effective in enhancing teachers' pedagogical competence.

Introduction

In the world of education, supervision is something that is very important to ensure good quality learning. Educational supervision is the best teaching and learning process, involving teachers and students, through a series of actions, guidance and direction. (Mahlopi, 2022). The purpose of educational supervision is to improve the pedagogical skills of teachers, with the ultimate goal of improving student achievement (Robert J. Marzano, Toni Frontier, 2011). In addition, educational supervision can also help teachers identify weaknesses and strengths in teaching and provide recommendations for improvement. Educational supervision is expected to increase the effectiveness and efficiency of learning so that it can achieve the desired educational goals (Gotwalt, 2023).

One form of educational supervision is academic supervision. Academic supervision According to (Glickman D, 2017) is one way to improve teacher professionalism in planning,

implementing the learning process and evaluating student learning outcomes in order to improve learning so that local and national educational goals can be achieved properly. The purpose of academic supervision is to provide assistance and direction to teachers to improve teaching and student learning abilities (Ghavifekr et al., 2019). The supervisor will provide regular feedback on teacher performance and provide recommendations that can help improve the quality of teaching. Academic supervision can also help teachers improve technical and professional skills in teaching (Chaula, 2023). Academic supervision can be done through direct observation in class, group discussions, training, and performance evaluations.

According to (Permendikbud, 2018) Number 15, one of the main tasks of the principal is to provide academic assistance through academic supervision activities. This activity aims to help teachers improve their competence in managing the learning process and improve teacher performance in schools. One form of academic supervision is through class visits, where the principal can observe and evaluate teacher performance in teaching and provide the necessary feedback (Garman, 2020). The stages of class visits include preparation, observation during the visit, the final stage of the visit, and follow-up. The principal is responsible for carrying out these four stages carefully and on time (Astuti, 2022).

Academic supervision can be conducted by someone who has the appropriate qualifications and experience such as a principal, program coordinator, or school supervisor. However, the supervisor needs to ensure that the supervision is conducted in a way that is not intimidating or detrimental to the teacher and students. Instead, supervision should be conducted collaboratively and help the teacher and students achieve better learning goals (Wiyono et al., 2021). The use of models in coaching conversations is important to help clients achieve desired goals or come to rational conclusions about what they want to achieve (Somià et al., 2024). The model used depends on the specific session situation or the coach's level of familiarity with the model.

The implementation of the supervision program at the Ki Hajar Dewantara Elementary School, and the Education Coordinator, Banyubiru District, Semarang Regency, Central Java Province is still not optimal. Although the government has facilitated the existence of PMM which has detailed guidance on the steps for implementing supervision complete with its instruments, most principals can still do it formally. Therefore, it is necessary to have an important understanding of coaching in supervision activities. Meanwhile, most of the Principals of the Ki Hajar Dewantara Elementary School, the Education Coordinator, Banyubiru District do not fully understand the coaching technique in supervision because there is no coaching-based academic supervision guide. Actually, in the education of driving teachers, there is coaching training, but it is still general in nature and the modules are still not very appropriate for academic supervision. Meanwhile, there is only 1 Principal of the Ki Hajar Dewantara Elementary School, the Education Coordinator, Banyubiru District who is a driving teacher, meaning that the other principals have never received training on the use of coaching techniques in supervision.

The implementation of coaching-based academic supervision is a solution to overcome several problems that arise during the academic supervision process (Mok & Staub, 2021). This approach is considered capable of creating a warmer and more intimate environment for teachers (Garman, 2020). Coaching itself is defined as a process in which a trainer or coach helps individuals or groups achieve predetermined goals (Gillespie & Amador, 2024). Although generally carried out in professional areas such as business or careers, coaching can also be applied to personal life or health. The coaching process involves providing constructive feedback and assistance in overcoming obstacles that may

arise on the way to achieving predetermined goals (Glover et al., 2023). This is considered a valuable investment for individuals or organizations that aim to improve performance and achieve success. The main purpose of coaching is to facilitate individuals or groups in achieving their goals effectively and efficiently (Mardiyatun, 2021). The coaching process helps individuals to identify strengths and weaknesses, develop new skills, improve performance, and achieve higher goals.

In the context of coaching-based academic supervision, this approach combines coaching techniques with the academic supervision process to support the professional and personal development of educators (Mustafa, 2022). The main goal of this approach is to create a collaborative environment where educators can reflect on their teaching practices, identify areas for development, and set specific goals (Sahlberg & Stringer, 2022). The implementation of academic supervision is generally based on the needs and goals of the school, divided into three stages, namely planning, implementing supervision, and following up (Irayati et al., 2022).

Although the concept of coaching-based supervision is still relatively new in the Indonesian context, several researchers have begun to study its implementation. (Ulfah & Noviansah, 2020) In their study and several previous studies have shown that coaching is effective in improving teacher skills and performance. Along with the importance of the role of academic supervision carried out by educational supervisors, as well as the need for a supervisory approach that is able to overcome existing obstacles, research has been conducted by reviewing 13 articles on the implementation of coaching-based supervision. It is hoped that this research can provide a strong foundation for educational supervisors in implementing coaching-based supervision and for further researchers to expand scientific knowledge about supervision.

It is necessary to develop a module as a guide for implementing academic supervision, which can be clearly structured so that it is easy for the principal to understand and implement. This module should include detailed steps, provide relevant tools and resources for the principal, and establish an evaluation method to measure the success of the supervision implementation. The process of developing this module should involve participation from various parties, such as teachers, principals, and education supervisors, to ensure that it is in line with practical needs in the field.

It is undeniable that the procurement of modules requires costs and is less practical to use anywhere (Irmawati et al., 2023). Therefore, the author plans to develop this module in electronic form or e-module. With the e-module, learning can be done flexibly and efficiently. Users can access materials anytime and anywhere through digital devices, such as smartphones or tablets. In addition, e-modules also allow the addition of multimedia features, such as videos, animations, and interactive quizzes, which can improve user understanding and involvement. The development of this e-module is expected to provide innovative solutions in supporting a more modern and adaptive academic supervision process to technological developments.

Through the development of this e-module, the implementation of coaching-based academic supervision also opens up opportunities for innovation and further research in the realm of education. Researchers can explore the impact of this approach on teacher motivation, changes in teaching practices, and its contribution to student academic achievement. Thus, coaching-based supervision is not only beneficial for teacher professional development but also has the potential to provide a significant positive impact on the education system as a whole. Therefore, this study aims to develop an e-module on coaching-based academic supervision to enhance teachers' pedagogical competence.

Research Method

This study uses a Research and Development (R&D) method with the Borg and Gall model, which consists of five stages: needs analysis, planning, product development, expert validation, and product revision (Borg & Gall, 2003). This method was chosen to ensure that the developed coaching-based academic supervision e-module meets user needs and is effective in improving teacher pedagogical competence.

Data were collected through three main techniques: interviews, questionnaires, and observations. Interviews were conducted to explore the needs of principals and teachers regarding academic supervision and coaching techniques. Questionnaires were used to assess the feasibility of the module material and IT experts and to collect feedback from users after the trial. Observations were conducted to see the implementation of the module in the supervision stages: pre-observation, observation, and post-observation.

The research data sources consisted of five school principals and five teachers at the Ki Hajar Dewantara Elementary School, the Education Coordinator, Banyubiru District, Semarang Regency, Central Java Province as the main subjects, and relevant literature as secondary data. Data analysis was conducted qualitatively for interviews and observations, and quantitatively for questionnaires using percentages. The Mann-Whitney statistical test was used to analyze differences in teacher pedagogical competence before and after the use of the module because the data obtained were ordinal and not normally distributed.

Results and Discussion

This study was analyzed to ensure that the products developed were in accordance with the research objectives, namely: First, Describe the implementation of academic supervision at the Ki Hajar Dewantara Elementary School, Education Sector Coordinator, Banyubiru District at this time; Second, Analyze the weaknesses in the implementation of academic supervision at the Ki Hajar Dewantara Elementary School, Education Sector Coordinator, Banyubiru District at this time; Third, Develop a coaching-based academic supervision e-module to improve teacher pedagogical competence.

Based on interviews conducted with 5 principals and 10 teachers in the Ki Hajar Dewantara Cluster, the following is detailed data on the challenges of academic supervision, namely: First, the principal's lack of understanding of coaching techniques; Second, Supervision that is Formal; Third, lack of special training for coaching-based supervision; Fourth, limited access and practical guidance.

The development of the Coaching-Based Academic Supervision e-Module aims to improve the quality of supervision in education by identifying obstacles through needs analysis conducted through interviews with principals and teachers. This e-module is designed to address the challenges of supervision with a coaching approach, providing systematic theory and practical guidance, complete with real examples and tools, and using simple language to be easily understood by all users with step-by-step guidance that helps avoid mistakes. With a practical orientation, the e-module includes assignments and exercises to hone user skills and has a digital format that allows easy access through devices without the need for additional software, supporting independent or group learning. (Kuncahyono & Kumalasani, 2019) explain in their studies that the application of multimedia formats, including video, audio, and text, takes into account various learning styles, so that with careful planning, this e-module is expected to be an effective tool to improve the supervision skills of principals and teachers, and have a positive impact on the quality of learning in schools.

The development of a coaching-based academic supervision e-module aims to provide a practical tool for school principals. The development process follows the model (Borg & Gall, 2003) until revision based on expert validation and trials. This e-module integrates supervision theory, coaching principles, and practical needs identified during the initial research. The development of the initial draft of the coaching-based academic supervision e-module began with a needs analysis to create effective and interactive learning media. This e-module was designed using Google Sites, which integrates multimedia elements and user-friendly navigation. The module structure includes a cover page, an introduction to the importance of supervision, and a usage guide.

The module is divided into several chapters covering basic concepts of supervision, implementation steps, and case studies to provide practical experience (Rismayanti et al., 2022). There are also exercises and evaluations at the end of the module, including interactive quizzes and case study-based exercises. The e-module is responsive and compatible with various devices, and is equipped with learning videos and infographics. Discussion forums are provided for collaboration between principals and teachers. This initial draft will be validated by material and IT experts to ensure the suitability of the content and optimal function of the module.

Module Validation

Validation was conducted by two experts, namely a material expert and an IT expert. The material expert assessed the contents of the module related to suitability with the objectives of academic supervision, clarity of the material, and relevance of the content to the teacher's needs. Meanwhile, the IT expert evaluated the interface design, ease of access, and interactivity of the module.

Table 1 Module Validation Results by Material Experts

No	Assessment Components	Percentage	Criteria
1	Module Goals and Objectives	80%	Valid
2	The Relation of Material to Coaching Principles	100%	Valid
3	Structure and Flow of Material Presentation	90%	Valid
4	Clarity and Readability of Language	100%	Valid
5	Content Quality and Relevance	100%	Valid
6	Activities and Exercises	80%	Valid
7	Evaluation and Feedback	80%	Valid
8	Compliance with Educational Standards	90%	Valid
Mean		90%	Valid

Table 2 Module Validation Results by IT Experts

No	Assessment Components	Percentage	Criteria
1	Design and Layout	100%	Valid
2	Completeness of Features	100%	Valid
3	Compatibility and Performance	93%	Valid
4	Ease of Use	93%	Valid
5	Functionality i illustration/image	80%	Valid
Mean		93.2%	Valid

The results in the table above are grouped and determined into a category based on the criteria in the following table:

Table 3 Category intervals

No	Interval	Category
1	81-100%	Very worthy
2	61-80%	Worthy
3	41-60%	Quite decent

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| 4 | 21-40% | Not feasible |
| 5 | 0-20% | Totally unworthy |

The expert score for the assessment of the validation test of the Coaching-Based Academic Supervision e-module material is 90%, which is included in the very feasible category, so that the product is ready to be tested without revision, with suggestions to maintain the coherence of the material and add case studies. The score for the IT validation test assessment is 93.2%, also very feasible, and the product is ready to be tested without revision, with suggestions to add illustrations to improve the visual appeal of the module.

Module Trial Results

Product trials were conducted to measure the effectiveness of coaching-based academic supervision e-modules in improving teachers' pedagogical competence. The results of the pre- and post-coaching assessments showed significant changes in teachers' pedagogical competence scores based on the predetermined rubric.

Table 4 Trial results before and after coaching in academic supervision

NO	Coach	INSTITUTION	BEFORE COACHING (%)	AFTER COACHING (%)
1	Class VI Teacher	S DN Rowoboni 01	19 %	97 %
2	Class V Teacher	S DN Rowoboni 02	20 %	98 %
3	Class IV Teacher	S DN Tegaron 01	18 %	96 %
4	Class V Teacher	S DN Tegaron 02	20 %	98 %
5	Class V Teacher	S DN Sepakung	19 %	97 %
Average			19.2%	97.2%

Based on the table above, the average pedagogical ability of teachers before being given coaching techniques in academic supervision got a score of 19.2%, while the average pedagogical ability of teachers after being given coaching techniques in academic supervision got a score of 97.2%.

Table 5 Test result category intervals

No	Interval	Category
1	81-100%	Very Competent
2	61-80%	Competent
3	41-60%	Quite Competent
4	21-40%	Not Competent
5	0-20%	Very Incompetent

Before coaching, all teachers were in the Very Incompetent category with a score between 0-20% according to the assessment rubric. After the implementation of coaching, all teachers managed to reach the Very Competent category with a score between 81-100%. This shows that coaching-based academic supervision has a significant impact on teachers' ability to meet pedagogical competency standards.

The assessment rubric includes eight main components of pedagogical competence, namely Interactive Activities, Expectations for Students, Learning Instructions, Adaptive Instructions, Classroom Atmosphere Order, Implementation of Positive Discipline, Attention and Concern, and Constructive Feedback. Based on the assessment results, these components showed improvements in all indicators. For example: Before coaching, the scores on the "Interactive Activities" component mostly only reached the Less Competent level (score 3), but after coaching increased to the Very Competent level (score 5). In the "Adaptive Instruction" component, previously many teachers had difficulty adjusting learning methods to student needs, but after coaching their scores increased significantly to the highest level.

The results of the Mann-Whitney trial of teacher pedagogical competency assessment data before and after providing coaching-based academic supervision can be seen in Figure 1 below:
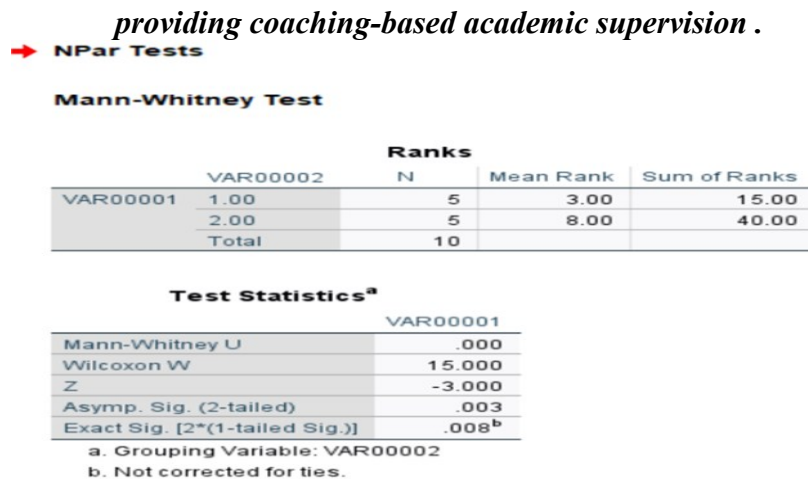

Figure 1. Mann-Whitney test of teacher pedagogical competence before and after

Based on the table above, it can be clearly seen that the average rating before being given coaching-based academic supervision (1.00) was 3.00 and after being given coaching (2.00), the average rating became 8.00. Thus, it can be interpreted that there was an increase in the average rating of teacher pedagogical competence before and after the implementation of coaching techniques in academic supervision by the principal. Furthermore, it can be seen that the Asymp. The Sig value is 0.003 so Asymp. Sig <0.005, which means that Ho is rejected and Ha is accepted. This shows that there is a significant difference between teacher pedagogical competence before and after coaching is carried out in academic supervision.

Observation Results

Observations were conducted during the implementation of the module to see the direct impact on the implementation of academic supervision. The data showed an increase in the quality of principal supervision, including in the pre-observation, observation, and post-observation stages. In the pre-observation stage, before the module was implemented, this stage was often ignored by the principal. After using the module, the principal was able to design a more planned supervision schedule and hold initial discussions that focused on teacher needs. In the observation stage, the module helped the principal record learning activities in a more structured way using the instruments provided. In the post-observation stage, reflective discussions between the principal and teachers increased significantly, resulting in more constructive feedback and having an impact on improving learning. Comparison of Supervision Implementation Before and After Using the Module can be seen in the following figure:
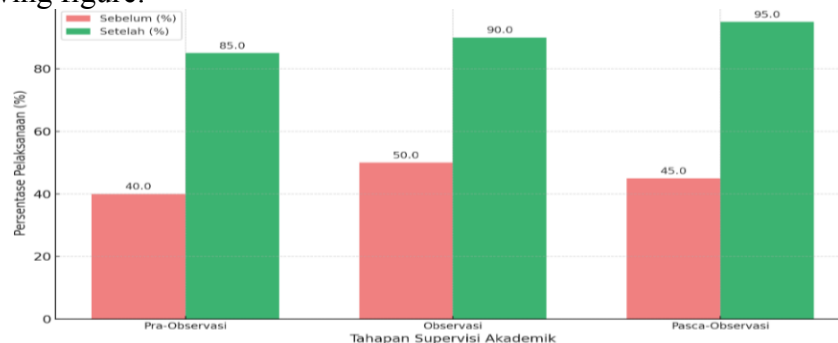

Figure 2. Comparison of Supervision Implementation Before and After Using the Module

The graph above shows a significant increase in the implementation of academic supervision by the principal before and after the use of the e-module. At the pre-observation stage, the implementation rate increased from 40% to 85%, while the observation and post-observation stages increased from 50% and 45% to 90% and 95%, respectively.

The results of this observation confirm that the module helps principals carry out supervision in a more structured and effective manner at all stages. The combination of module validation, trial data, and observation results show that this e-module is effective in supporting the improvement of academic supervision and teacher pedagogical competence.

The implementation of the coaching-based academic supervision trial provided significant results and demonstrated the effectiveness of this approach in improving the quality of learning in schools. The evaluation process was carried out comprehensively, covering key aspects such as improving teacher pedagogical competence, the effectiveness of the coaching method, and its impact on the working atmosphere and quality of learning in the classroom.

Discussion

This study aims to develop a coaching-based academic supervision e-module that can help principals carry out supervision effectively and have an impact on improving teachers' pedagogical competence. This is based on the background in Chapter I which explains that academic supervision at SD Negeri Gugus Ki Hajar Dewantara is often carried out only as an administrative formality. Observations made by the principal are rarely followed by reflective discussions or meaningful follow-ups. This finding confirms the conditions expressed (Nawas, 2023), that the main obstacles to academic supervision include teacher unpreparedness, lack of principal training, and a supervision approach that is not relevant to teacher needs.

The e-module developed in this study is an innovation designed to overcome the weaknesses of traditional supervision. As explained in Chapter III, the development of the e-module uses a five-stage model (Borg & Gall, 2003), starting from initial research to product revision based on expert validation and trials. This product is based on the theories in Chapter II, including the principles of academic supervision (Glickman D, 2017), which emphasizes three important stages of supervision: pre-observation, observation, and post-observation. These three stages are integrated into an e-module that is equipped with a guide to practical steps, observation instruments, and a format for coaching-based reflective discussions.

Improving Supervision Effectiveness Through Coaching

The results of the study indicate that this e-module is able to change the practice of academic supervision from an evaluative approach to a more collaborative and empowering approach. In this context, the coaching approach is a key element in the module's success. Coaching, as defined by (Gillespie & Amador, 2024), is a collaborative process that allows supervisors and teachers to discuss reflectively and find solutions together. This study supports their findings, where principals who use this module are able to create better working relationships with teachers, thereby increasing teacher involvement in the supervision process.

The TIRTA Model (Objectives, Identification, Action Plan, and Responsibilities) adopted in this e-module has proven effective in creating a focused dialogue between the principal and teachers. This finding is in line with research (Sary, O.I.P.; Wulandari, 2022)and (Tanggulungan & Sihotang, 2023), which found that the TIRTA Model helps improve communication, encourages reflection, and motivates teachers to continue improving the quality of their learning. Teachers who were previously passive in receiving

feedback, after using this module, became more proactive in designing solutions to the learning challenges they faced.

Impact on Teachers' Pedagogical Competence

The results of this study show a significant increase in teachers' pedagogical competence, which includes the ability to design learning, manage classes, and evaluate student learning outcomes. Teachers who previously only met administrative requirements are now better able to create an interactive learning atmosphere and support student development. This is in line with the findings of (Sintya et al., 2023), which highlight that better teacher pedagogical competence has a direct impact on student motivation and learning outcomes. In addition, research (Glover et al., 2023) shows that effective coaching helps teachers develop teaching strategies that are more innovative and relevant to students' needs, which is also reflected in the results of this study.

Teachers' ability to manage the classroom also increased significantly. Teachers are better able to create a conducive learning atmosphere and actively involve students in learning. This supports research (van der Marel et al., 2022) and (Gotwalt, 2023), which found that coaching-based supervision strengthens teachers' technical skills in classroom management and encourages their professionalism.

Technology Integration in Academic Supervision

This e-module is designed by utilizing digital technology, using the Google Sites platform, which allows flexible access anytime and anywhere. This advantage supports the findings (van der Linden et al., 2023), which state that digital technology can increase supervision efficiency through interactive and data-based learning tools. In addition, (Padwa & Erdi, 2021) the integration of multimedia in the module, such as videos and quizzes, strengthens the principal's learning about coaching-based supervision techniques. This technology-based approach also supports research (Somià et al., 2024), which shows that competency-based coaching through digital media can create a more dynamic and relevant learning experience for participants. In the context of academic supervision, this e-module is a tool that helps principals develop supervision skills continuously.

Obstacles and Handling Strategies

Despite showing significant success, this study also found several obstacles, such as teacher resistance to feedback and limited time for supervision implementation. This is in accordance with the findings of (Chaidir, 2021)and (Chaula, 2023), which highlighted that teacher unpreparedness and busy academic schedules are often the main obstacles in implementing academic supervision. To address this, this e-module provides guidance for building a more positive relationship between principals and teachers and recommends integrating supervision into the academic calendar to ensure its consistent implementation.

Contributions and Implications

This study strengthens the findings (Iremeka et al., 2021) on the importance of goal-based supervision to improve the quality of learning. With this coaching-based academic supervision e-module, principals are not only given the tools to carry out supervision effectively but are also empowered to create a supervision culture that supports teacher professional development. This is in line with research (Sahlberg & Stringer, 2022) and (Ibrahim, 2013), which found that coaching is a relevant approach to improving teacher performance and well-being, especially in the early stages of their careers.

Overall, this coaching-based academic supervision e-module has proven to be an effective innovation in improving the quality of supervision and teacher pedagogical competence. With a modern, adaptive, and technology-based approach, this module is able to overcome the weaknesses of traditional supervision and create a more collaborative and

empowering working relationship. These findings provide an important contribution to the development of academic supervision practices in Indonesia and open up opportunities for further research in optimizing coaching-based approaches at various levels of education.

Conclusion

The conclusion obtained from the results of this research is that the product validation by experts resulted in an average score of 91.2% (categorized as very valid) for content feasibility and 88.5% (valid) for technological aspects. The validation outcomes revealed an average score of 91.2% (very valid) for content and 88.5% (valid) for technology. The trial results showed an improvement from 19.2% before coaching to 97.2% after coaching, shifting the category from "fair" to "excellent." The Mann-Whitney test results also indicated a significant difference in teachers' pedagogical competence before and after coaching in academic supervision. Additionally, qualitative findings highlighted that the e-module provides easily accessible practical guidance and helps school principals deeply understand coaching techniques. In conclusion, the academic supervision e-module based on coaching is valid and effective in enhancing teachers' pedagogical competence.

Recommendation

The coaching-based academic supervision e-module is expected to serve as a primary guide for school principals in implementing systematic supervision, encompassing the stages of planning, observation, and post-supervision reflection. Principals are encouraged to continuously enhance their coaching skills through relevant training to deliver constructive and targeted feedback. For teachers, this supervision can be utilized as an opportunity to reflect on teaching practices, identify areas for improvement, and design innovative strategies that foster optimal student engagement. The government and stakeholders are expected to incorporate this e-module into national education quality improvement policies. Adequate technological infrastructure support, such as stable internet access and digital devices, is crucial to ensure the e-module is easily accessible. Additionally, specialized training for school principals and the involvement of teacher training institutions needs to be enhanced to expand the adoption of coaching-based supervision. Further research integrating multimedia and psychological approaches is also essential for future development. Future researchers are advised to conduct trials of the e-module in various school contexts to ensure its flexibility in meeting different needs. In-depth research on the long-term impacts of coaching-based supervision on student achievement, school work climate, and teachers' professional development is also necessary. To support areas with limited internet access, the development of an offline-accessible e-module is a relevant innovation to pursue.

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