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Effect of Additional Training and Activities on Science Teacher Modification Skills

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Abstract: This study aims to answer research questions about: (a) Does the number of training sessions attended affect the modification skills of science teachers? and (b) Do additional activities affect the modification skills of science teachers? The study uses a qualitative method with a sequential explanatory approach using questionnaires and interviews as instruments. The subjects of this research are 12 elementary and junior high school science teachers who are members of subject teachers' deliberation groups. The results show that the teachers' ability to modify learning designs involving students is influenced by the number of training sessions and additional activities. The data indicates that the more teachers attend training sessions, the better they are at modifying learning materials involving students, meaning that training has a positive effect on improving the modification skills of science teachers. Conversely, the more additional activities teachers engage in, the lower their ability to modify learning materials involving students, indicating that excessive additional activities have a negative impact on the modification skills of science teachers.

Keywords: Additional activities; Modification skills & science; Teacher; Training

Introduction

Diverse entities have undertaken educational innovation endeavors to augment the proficiency of educators and enhance the academic achievements of pupils. It was observed that some individuals participate in ongoing professional development programs, while others analyze the execution of such programs to evaluate the efficacy of the models and strategies they employ (Yulianto & Widodo, 2020). According to Deunk et al. (2018), educators are required to modify their instructional approaches to cater to the varied educational requirements of their students. According to McHugh (2007), there is a common assumption that the acquisition of skills necessary for teachers to deliver differentiated instruction is a gradual process, and that teachers will gradually develop both skills and confidence over the course of several years of experience. Nevertheless, in actuality, some educators do not effectively adapt their instructional methods to accommodate the varying needs of their pupils, despite having taught for numerous years. According to a research conducted by the Education Inspectorate in the Netherlands (van Geel et al., 2022), nearly 50% of newly appointed primary school teachers reported that they lacked adequate preparation to modify their instructional strategies in accordance with the diverse learning requirements of their students. According to Schmidt (2012), educators who exhibit reluctance towards enhancing their pedagogical skills and knowledge may not be able to furnish students with the necessary learning opportunities and comprehension.

The benefits of group learning in training include individuals interacting and collaborating within their

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groups. In addition to learning, they will also discover new things through sharing outcomes and best practices with other teachers. Therefore, it is necessary to design a professional learning community in which educators from various schools engage in collaborative learning (Katz & Earl, 2010). Professional development is crucial for improving teachers' skills, maintaining accreditation, and testing pedagogical theories and practices (Darling-Hammond, 2020; Lefstein et al., 2020; Evert & Stein, 2022). Novice teachers show significantly lower implementation of differentiated instruction (DI) compared to teachers with more than three years of experience (van Geel et al., 2022). Other research indicates that teachers learn best and implement learning more effectively when they learn with their peers, collaborating with each other to share expectations, motivations, teaching processes, and outcomes (Sun et al., 2013; Evert & Stein, 2022). The findings of Oddone emphasize the importance of teachers' participation in professional learning communities as instructors or facilitators that effectively contribute to participants' professional development. He adds that these findings are essential for policymakers, school administrators, and practitioners to inform the development of flexible, innovative, and remotely accessible professional learning approaches (Oddone, 2022).

The government has provided opportunities for teachers to enhance their professionalism through continuous training, research, scientific writing, and other professional activities (Fitria et al., 2019). These activities are often carried out by subject-specific teacher communities, associations, or subject teachers' working groups. Common activities include seminars, workshops, and study visits. By participating in such training activities, it is expected that teachers can enhance their ongoing professionalism, especially in modifying learning materials that actively engage students in the learning process. As a result, participants benefit not only themselves but also their fellow teachers at their schools. However, many teachers fail to implement the learning outcomes they acquire through training or workshops, let alone disseminate best practices to other teachers. Therefore, this research focuses on two important aspects: (a) Does the number of training sessions attended affect the modification skills of science teachers? (b) Do additional activities affect the modification skills of science teachers?

Method

Subjects

This research was conducted on 12 elementary and junior high school science teachers who were members of the Science Subject Teachers' Deliberation Group (MGMP IPA). The study utilized a qualitative method with a sequential explanatory approach to gather data.

Data Collection Techniques

In the initial stage, the researchers distributed questionnaires to 12 teachers from six different schools. The results were then analyzed based on scoring criteria. Subsequently, the researchers conducted interviews with four respondents, two from the upper level and two from the lower level.

Data Analysis Techniques

The data analysis techniques employed in this study included quantitative and qualitative descriptive analysis. The response questionnaire utilized an agree (A) and disagree (DA) scale, and the percentage of respondents' responses was calculated. The results were then analyzed and interpreted by comparing them quantitatively and qualitatively, followed by a descriptive interpretation.

Result and Discussion

Questionnaire Response Results

The questionnaire responses from the 12 participants who attended the training encompassed two important aspects: the number of training attended by teachers and the number of additional activities conducted by teachers, which can influence their skills in modifying learning materials involving students. The data can be observed in Figures 1 and 2.

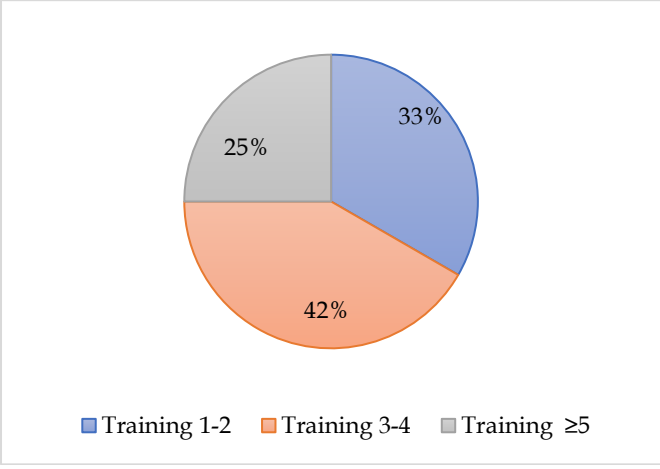

Figure 1. Number of training attended by science teachers

Figure 1 above represents the response data from 12 teachers who filled out the questionnaire regarding the number of training they attended in the past year. The data shows that 4 teachers attended 1-2 training, 5 teachers attended 3–4 training, and 3 teachers attended 5 or more training.

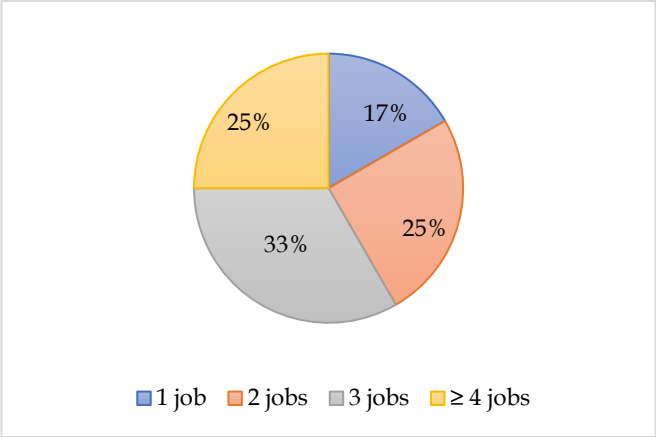

Figure 2. Number of additional science teacher activities

The data from the questionnaire responses of the 12 teachers regarding the number of additional activities they engaged in besides teaching in the past year are as follows: There were 2 teachers who only focused on teaching, 3 teachers who both taught and were involved in extracurricular activities or held leadership positions in the school, 4 teachers who had 3 additional activities in the school or community, and 3 teachers who had 4 or more additional activities.

The aforementioned data depicts the progress made by science educators in enhancing their ability to adapt instructional materials according to predetermined benchmarks and evaluation standards, as outlined below: (a) a score of 4 is given if they fulfill 3 indicators; (b) a score of 3 is given if they fulfill 2 indicators; (c) a score of 2 is given if they fulfill 1 indicator; and (d) a score of 1 is given if they do not fulfill any indicators but provide an answer. Out of the 12 training participants, 4 individuals (P1, P5, P10, and P11) had low-level modification skills, which improved slightly after the training but not significantly. On the other hand, those at the moderate level (P2, P4, and P12) and those at the good level (P3, P7, P8, and P9) showed improvement in their skills after the training, although participants P2 and P7 did not show any changes.

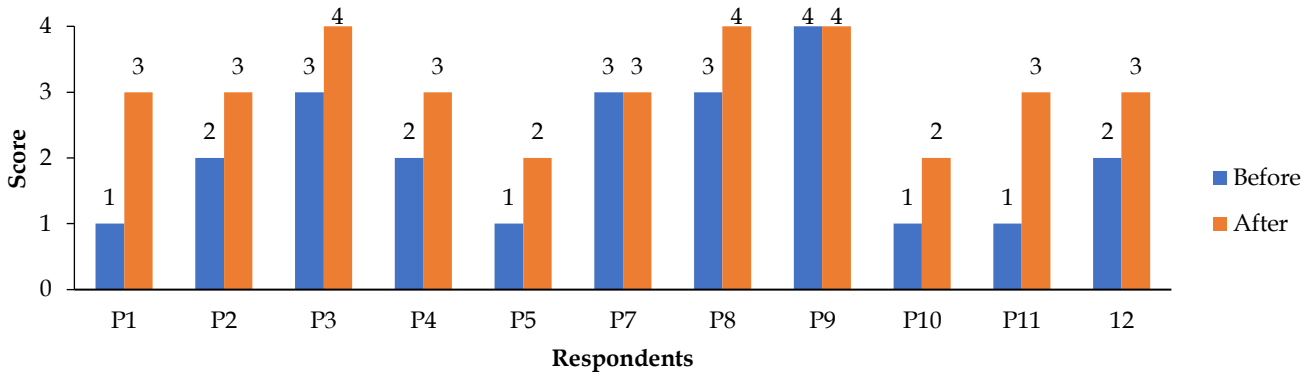

Figure 3. Improved Science Teacher modification skills before and after the test

Interview Results

Interviews were conducted with teachers who had high-level modification skills to gain deeper insights into the test results and questionnaire responses. The researcher interviewed two teachers at the lower level who were considered to have significantly different responses compared to other participants. The researcher asked P1 and P10 why they chose to use existing teaching materials without modifying them.

P1: I choose to use available teaching materials because they are widely accessible, such as textbooks available at school, lesson plans, and student worksheets available on the internet. So, I just download and use them.

P10: Besides the easily accessible teaching materials nowadays, I have many additional responsibilities both inside and outside of school. In school, I'm involved in student organizations, I'm a member of the MGMP (Subject Teacher Discussion Forum), and I hold a leadership position in the school, which sometimes requires meetings twice a week.

Then the interviewer continued to ask about the number of training they attended as a form of professional development for teachers. How many training did they attend, and did these training have any relevance or support their profession as teachers?

P1: I have attended numerous training in recent years. In 2022 alone, I participated in 4 activities, including 2 online training organized by the Ministry of Education and Culture and 2 offline training organized by the Education Office.

P10: I attended six training activities in 2022. The aforementioned trainings encompassed two sessions on extracurricular coaching, two sessions on the development of student-centered learning, and two sessions on enhancing school quality. The aforementioned training sessions were coordinated by the MGMP, the Education Office, the Education Quality Assurance Agency, and the Ministry of Education and Culture.

The interviews were conducted to delve deeper into the participants' responses to the questionnaire and test results. The researcher interviewed two teachers at a higher level. The author asked P3 and P8, "Why is it important to plan or modify teaching materials?"

P3: The teaching materials, such as lesson plans, student worksheets, and other resources, need to be modified according to the students' needs and the learning environment. I adapt them based on the competencies I want to develop or train in my students.

P8: I use existing teaching materials but modify them according to the specific class I teach, aligning them with the competency mapping and learning outcomes.

The author then asked about "additional activities in school and the community."

P3: I only focus on being a classroom teacher. My daily routine involves dealing with students and ensuring that they stay in the classroom even when there is no subject teacher present. In fact, I often have to substitute for other teachers, even though it's not my discipline.

P8: I'm just a regular teacher, but sometimes I'm asked to be part of organizing school activities or to act as an MC at community events. However, it's not a regular occurrence, and I only act as an MC if it doesn't conflict with my school activities.

Then the author continued to ask about the number of training they attended as a form of professional development for teachers. How many training did they attend, and did these training have any relevance or support their profession as teachers?

P1: I have attended numerous training in recent years. In 2022 alone, I participated in five training, both offline and online, some of which were free and some of which were paid. I believe self-development is important.

P10: I attended three training activities in the past year, including professional teacher coaching, classroom action research, and public speaking training.

The study's results indicate that science teachers' modification skills are impacted by various factors, as evidenced by the author's analysis of documents, participant feedback, and test outcomes. *Firstly*, teachers' ability to design student-involved learning through modification is influenced by the training they attend. Training can impact teachers' professionalism in instructional design (Lyles, 1956), and teachers' competencies depend on the training they participate in (Shukla, 2014). Teachers need to continue learning and engage in scientific activities such as training, seminars, and workshops to broaden their knowledge, enhance their experience, and apply them in their teaching (Wenno, 2016). Therefore, one of the most important aspects of improving competencies is for teachers to participate in training activities (Pratama & Lestari, 2020). Maritasari's research found that training significantly and positively influences teachers' competencies (Maritasari et al., 2020). Other studies also indicate a positive relationship between teachers' competencies and classroom performance (Setyono, 2011). The better a teacher's competence, the better their performance, while poor competence can negatively impact a teacher's performance (Giantoro et al., 2019).

Secondly, teachers' ability to design student-involved learning through modification is influenced by additional responsibilities. These additional tasks can significantly affect a teacher's ability to modify lesson plans. Here are some aspects that explain this relationship: (1) Limited time: creating effective lesson plans requires sufficient time and thoughtful planning to set learning objectives, prepare materials, and design appropriate teaching strategies. If teachers have excessive workloads, they may not have enough time to dedicate to developing well-designed lesson plans. (2) Time management skills: teachers need to prioritize tasks and allocate their time wisely for various instructional activities. (3) Planning quality: when teachers feel rushed or stressed due to additional workload, they may not be able to fully focus on lesson planning.

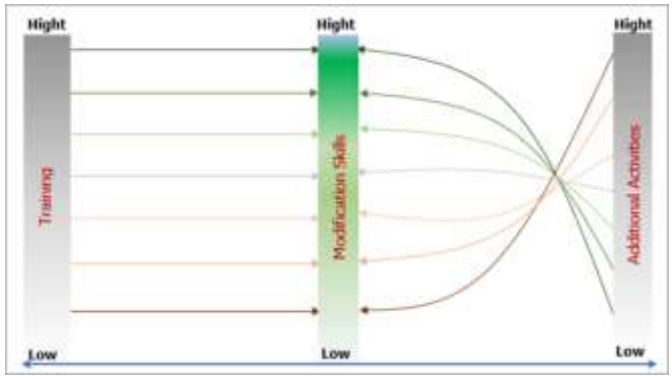

Figure 4. Relationship between training and additional activities with science teacher modification skills

The above diagram illustrates the relationship between the number of training attended and the additional activities of science teachers with their modification skills. The data shows that the more training teachers attend, the better they become at modifying instructional materials that involve students, indicating a positive influence of training on improving science teachers' modification skills. Conversely, the more additional activities teachers engage in, the lower their ability to modify instructional materials involving students, indicating that excessive additional activities have a negative impact on science teachers' modification skills. In addition to continuous motivation and appreciation for teachers' achievements and successes in designing engaging learning experiences that make students active, creative, innovative, and enjoyable,

educators need to focus on creating a learning environment and instructional processes that foster and enhance intrinsic motivation (Deci & Ryan, 2000). Considering these factors, it is important for teachers to understand and embody the values of an educator (Widia et al., 2022).

Conclusion

The ability of teachers to modify student-involved instructional design is influenced by the number of training and additional activities. Data shows that the more training teachers attend, the better they become at modifying instructional materials that involve students. This means that training has a positive impact on improving science teachers' modification skills. On the other hand, the more additional activities teachers engage in, the lower their ability to modify instructional materials involving students. This indicates that excessive additional activities have a negative impact on science teachers' modification skills. Therefore, teachers need to continue learning and participate in training, seminars, and workshops to enhance their competencies. Training also have a positive influence on teachers' classroom performance. Additionally, it is important for teachers to avoid excessive additional tasks, as time constraints can hinder their ability to plan effective learning experiences. When teachers feel rushed or stressed due to additional responsibilities, they may not be able to fully focus on lesson planning.

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Conceptualization, W. and A.W.; methodology, W. and A.W.; Instruments, W; validation, A.W. and I.K.; formal analysis, W.; data curation, A.W. and I.K; writing—original draft preparation, W; writing—review and editing, W. A.W. and I.K.; Submid and Correspondent, W. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest
Declare conflicts of interest or state "The authors declare no conflict of interest.

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