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Enhancing Teachers' Competence in Designing Computer-Based Test Questions through In House Training

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ABSTRACT

This study aims to enhance teachers' competence in designing computer-based test (CBT) questions. It was conducted at Muhammadiyah Mlati Senior High School in January and involved 18 teachers. This research is a School Action Research consisting of two cycles. Data were collected through questionnaires and documentation. The results indicated that in Cycle I, 28% of teachers were in the good category, 39% were in the adequate category, and 33% were in the poor category. In Cycle II, there was a significant improvement, with 94% of teachers in the very good category and 6% in the good category. Competence in designing CBT, including creating class lists, increased by 58%. A similar improvement of 39% was observed in inputting questions from Microsoft Word to Microsoft Excel and creating supporting files such as images, audio, and video. The smallest improvement, 12%, was seen in teachers who were still confused about downloading student answer results. The conclusion of this study is that in-house training (IHT) can improve teachers' activities and competence in designing CBT questions.

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1. Introduction

Improving teachers' competence in designing Computer-Based Test (CBT) questions is crucial in 21st-century digital education, which emphasizes the use of technology in the learning process (Paje et al., 2021). According to Ahmed & Opoku (2022) and Siswanto et al. (2024), mastery of Information and Communication

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Technology (ICT) has become essential in education because learning evaluations have transitioned from paper-based methods to digital formats. In this digital era, teachers with low skills in creating CBT questions need to adapt in terms of knowledge, skills, and precision in using computers (Creed et al., 2022; Siswanto & Peni, 2023). Teachers need skills to design effective and engaging assessment instruments, incorporating audio, visual, audiovisual, and multimedia elements to enhance student motivation in learning.

The CBT system aids teachers in the evaluation process and speeds up feedback. This system, a derivative of Computer Assisted Instruction (CAI), includes automatically scored questions and interactive media (Hidayat et al., 2022; Jiang et al., 2023). According to Lutfiani & Meria (2022), using computers in learning encompasses planning, test administration, data analysis, and keeping records of learning progress. The advantages of CBT include accurate testing, time efficiency, and ease of assessment, though there are challenges in preparing equipment and computer skills.

Sultan dan Tananda et al. (2023) state that CBT reduces paper costs and increases score validity. Kurniati & Wiyani (2022) reveal that in-service training enhances educators' knowledge and skills, especially for younger educators, through In-House Training (IHT). Generally, IHT aims to improve the quality of human resources in an institution, strengthen relationships among participants, and increase motivation to solve problems collectively (Risdianto et al., 2023; Syahwani et al., 2024).

IHT is conducted at the participants' location with relevant materials, making it easier for participants to practice the content and improve educator performance (Hariany et al., 2021; Suprihatin, 2024). Peipert et al. (2023) found that CBT can enhance student learning outcomes. However, research examining IHT as an alternative training method for creating CBT questions is still limited. This study hypothesizes that IHT can improve competence in designing CBT questions by more than 85%. The benefit of this School Action Research is to help schools solve teacher problems by enhancing their competence in designing CBT questions through IHT, ultimately improving the quality of learning and the school.

2. Method

This activity was conducted at Muhammadiyah Mlati Senior High School, located at Jl. Magelang km7, Sinduadi, Mlati, Sleman, D.I.Y in January 2024, involving 18 teachers as the research subjects. The study employed the School Action Research method with two cycles, consisting of the stages of planning, implementation, observation, and reflection (Kemendikbud, 2010). Data collection techniques included questionnaires to measure teachers' competence in designing CBT questions after attending IHT, observations to assess the benefits of IHT in enhancing teachers' competence, and documentation of the CBT questions created. The data were analyzed descriptively using percentages to observe the improvement in teachers' competence in designing CBT questions.

Table 1. Teacher Activity Questionnaire

Code	Question
A	Creating questions in Microsoft Word
B	Input questions from Microsoft Word to Microsoft Excel
C	Creation of supporting files such as images, audio and video
D	Make a class list
E	Make a study list
F	Make a list of students
G	Create a home page (cover) for the application
H	Input questions from Microsoft Excel to the application
I	Download student answers
J	Read the downloaded student answers

The data analysis steps refer to the modified method by Widoyoko (2018). The process begins with summarizing the expert assessment scores, calculating the total and average scores obtained, and then converting the results into data presented in the following table.

Table 2. Classification of Validity Criteria

No	Score	Criteria
1	$\bar{X} > 72$	Very good
2	$54 < \bar{X} \leq 72$	Good
3	$37 < \bar{X} \leq 54$	Enough
4	$17 < \bar{X} \leq 37$	Less
5	$\bar{X} \leq 17$	Very less

3. Results and Discussion

Result

The results obtained from the training are presented as follows. Teachers' competence in designing CBT questions after the intervention of In-House Training in Cycle I is shown in Figure 1.

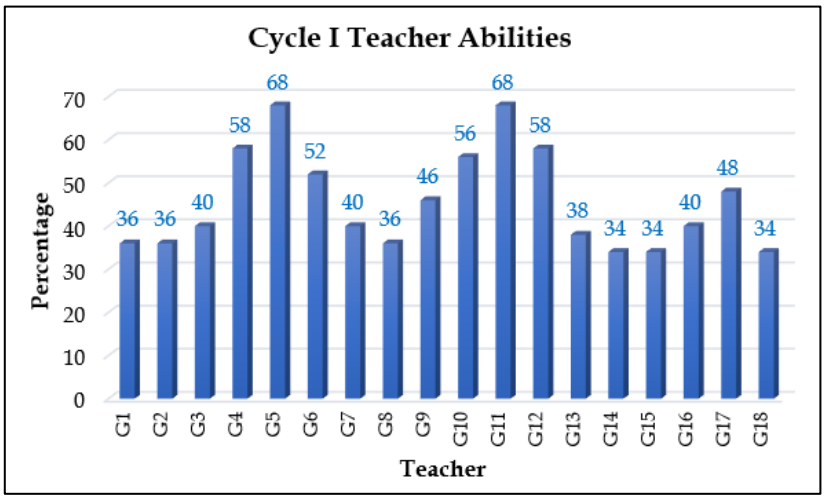

Figure 1. Teachers' Competence in Designing CBT Questions Cycle I

Based on the findings in Figure 1, 5 teachers were categorized as good, 6 teachers as adequate, and 7 teachers as less. According to the researchers, coaching and mentoring teachers require process and patience to achieve well-rounded and consistent teacher competence. In general, during Cycle I, all teachers designed CBT

questions. The percentage of teachers completing Cycle I is shown in the following figure.

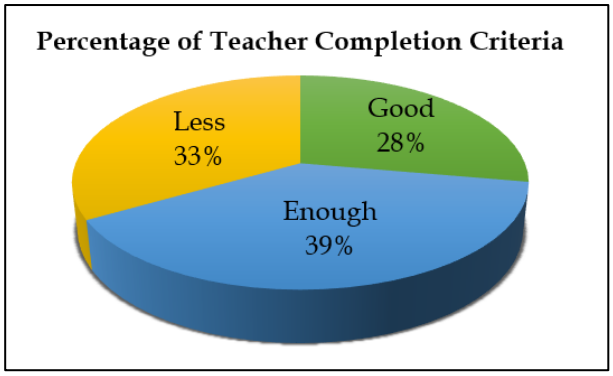

Figure 2. Percentage of Teacher Competence Criteria in Cycle I

Based on the figure above, the percentage of teachers meeting the competence criteria shows that 28% were categorized as good, 39% as adequate, and 33% as less. However, considering the established criteria, 100% of the teachers participated in this activity satisfactorily, although the target of 85% categorized as good in designing CBT questions was not met. Therefore, it is necessary to follow up on the IHT activities in Cycle II.

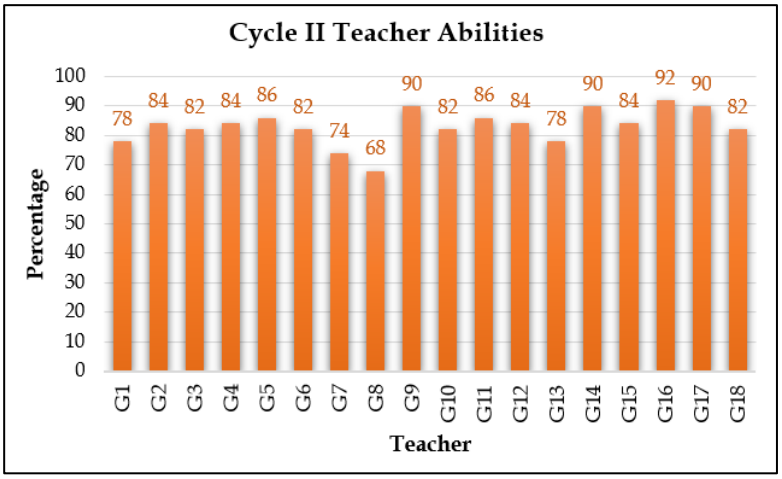

Figure 3. Teachers' Competence in Designing CBT Questions Cycle II

Based on the findings above, Cycle II was conducted to refine the results from Cycle I, which still had some shortcomings based on the established criteria. The gap between the implementation of In-House Training in Cycle I and Cycle II provided an opportunity for teachers to enhance their competence through discussions and learning with peers. In-House Training activities in Cycle II were conducted with the same presenters, focusing on data processing for the creation of CBT questions. It is expected that this will improve teachers' competence according to the established criteria.

Based on Figure 3 above, it is observed that the percentage of teachers' quality has increased, with 17 teachers categorized as very good and 1 teacher categorized as good. All teachers have shown improvement in competence in designing CBT questions. The percentage of teachers completing Cycle II is shown in the following figure.

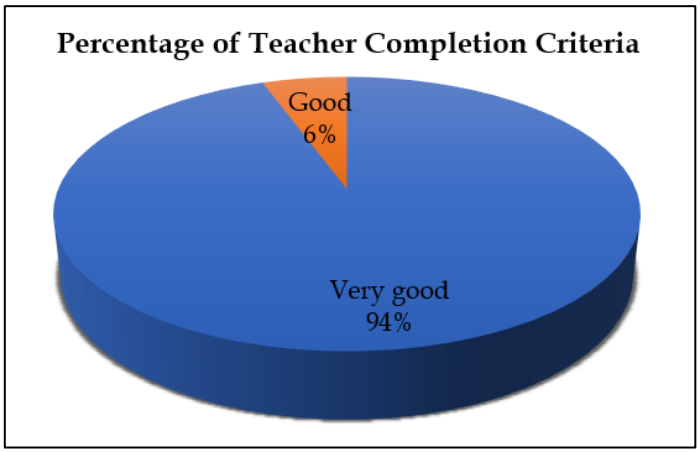

Figure 4. Percentage of Teacher Competence Criteria in Cycle II

Based on the figure above, the percentage of teacher competence criteria in Cycle II shows that 94% of teachers were categorized as very good and 6% as good. Therefore, Cycle II demonstrates an improvement in teachers' competence in designing CBT questions after receiving the materials in IHT. The improvement in teachers' competence in designing CBT questions from Cycle I to Cycle II can be seen in the following figure.

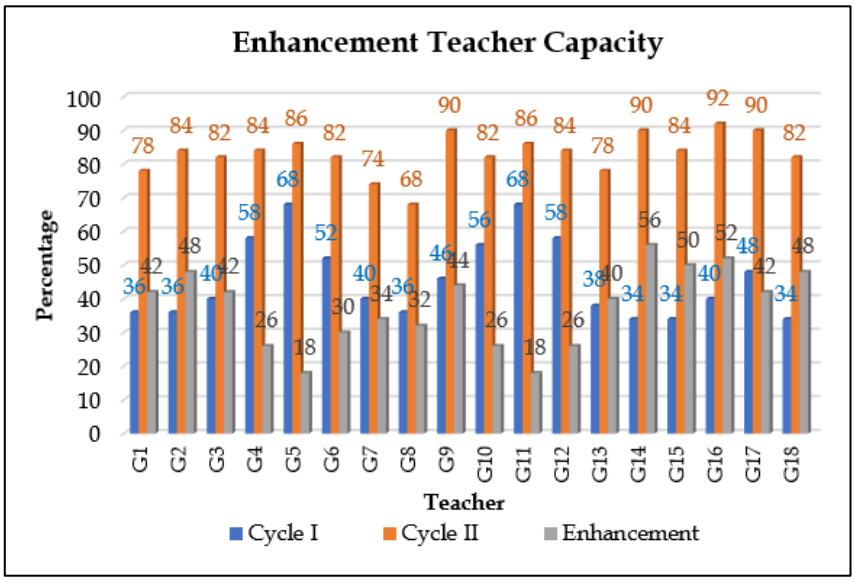

Figure 5. Teachers' Competence in Designing CBT Questions Cycle I and Cycle II

Based on the figure above, it is evident that the highest increase was 56%, and the lowest was 18%. The activities undertaken by teachers to enhance their competence in designing CBT questions encompass several stages as outlined in Table 1. The outcomes of these activities can be seen in Figure 6.

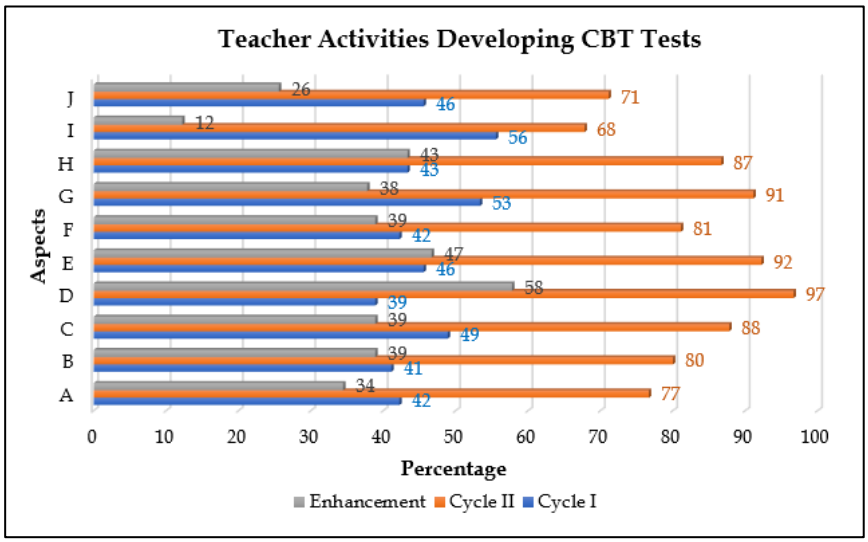

Figure 6. Activities of Teachers in Designing CBT Questions

Based on the figure above, the highest percentage increase in teacher activities was observed in activity D, which involves creating class lists, with an increase of 58%. Activities B and C, which include transferring questions from Microsoft Word to Microsoft Excel and creating supporting files like images, audio, and video, showed a similar increase of 39%. The smallest increase was 12% in activity I, where teachers still encountered confusion in downloading student answer results. Overall, the research findings indicate an improvement in the competence of all teachers in designing CBT questions, as seen in the table above.

However, it was noted that one teacher did not successfully complete the preparation of CBT questions as per the target in Cycle II, accounting for 6%. This finding aligns with studies by Dermawan & Hal (2024), Fidia et al. (2022), and Kurniati & Wiyani (2022), which found that student learning outcomes in archives improved with the use of CBT instruments.

Discussion

Based on the research findings, the use of CBT learning evaluation instruments for archiving is more effective compared to approaches without such instruments. This finding is consistent with Admelia et al. (2022), Hakiki et al. (2022), Zulkifli (2022) and Wahiah et al. (2023). However, most previous studies have not considered In-House Training (IHT) as an alternative training method to enhance teachers' competence in designing CBT questions. Consistent with Rohyaningsih et al. (2023), Sobri et al. (2022) and Virgiyanti et al. (2023), this study affirms that training through IHT can significantly enhance teachers' competence in designing CBT questions.

IHT is conducted by a team of teachers internally at the school or at a designated location (Lau et al., 2023; Miftach, 2023). This approach believes that improving teachers' competence and careers does not always have to rely on external activities but can also be achieved internally by teachers who possess skills that can be shared with their peers. This aligns with Rahmatunisa et al. (2022), Rudi et al. (2022) and Siregar et al. (2023), which state that enhancing teachers' competence is crucial so they can share their knowledge with colleagues. The optimal number of participants in IHT ranges from 4 to 25 individuals.

IHT has several objectives, including: (1) enhancing the quality of Human Resources (HR) within the organization to support the achievement of its vision and mission; (2) facilitating interaction among participants from various divisions for the exchange of information and consistent performance standards; (3) strengthening interpersonal relationships and solidarity among employees, fostering closer collaboration; (4) enhancing motivation and a culture of continuous learning by exploring field challenges related to work effectiveness to find solutions together. Organizers also anticipate various other objectives and benefits from these activities (Siswanto et. al., 2024; Tananda et al., 2023).

4. Conclusions

The research findings reveal that in Cycle I, the percentage of teachers' competence in designing CBT questions showed 28% categorized as good, 39% as adequate, and 33% as poor. In Cycle II, there was a significant improvement with 94% categorized as very good and 6% as good. Specifically, there was a notable increase of 58% in competence related to creating class lists, while transferring questions from Microsoft Word to Microsoft Excel and creating supporting files such as images, audio, and video saw a similar increase of 39%. The smallest increase was 12% in teachers' ability to download student answer results effectively.

In conclusion, the study underscores that competence in designing CBT questions and teacher activities can be enhanced through In-House Training (IHT). As a final note, it is recommended that teachers who have not yet mastered CBT question preparation should receive ongoing computer skills coaching, accompanied by additional time to complete teaching preparations. For teachers who have successfully mastered CBT question preparation, continuous monitoring and mentoring are advised to ensure their skills continue to improve and expand further.

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