

## Improving Teacher Competence in Managing Information Technology-Based Learning Materials

Sagiman<sup>1</sup>, Muksal Mina Putra<sup>2</sup>

<sup>1,2</sup>Faculty of Education, Institut Agama Islam Negeri (IAIN) Curup, Indonesia

<sup>1</sup>[sagiman@iaincurup.ac.id](mailto:sagiman@iaincurup.ac.id), <sup>2</sup>[muksalminaputra@iaincurup.ac.id](mailto:muksalminaputra@iaincurup.ac.id)

### Abstract

*Teacher Competency Standards are measures that determine the competence and professionalism of teachers. Hence, competence in managing learning materials is essential for the learning process. In the era of the Fourth Industrial Revolution (4.0), educators are expected to be proficient in managing information technology-based learning materials, ensuring that the content delivered to students is of higher quality, ultimately leading to expected learning outcomes. This community service program aimed to improve teacher competence in managing information technology-based learning materials through Information and Communication Technology (ICT) training. The contents included basic knowledge regarding ICT, learning material management applications, graphic design, practical training in managing learning materials, internet, and internet-based learning (e-learning). The method employed in the present community service was Participatory Action Research (PAR). The project involved 25 school teachers, resulting in an improvement in teacher competence in managing information technology-based learning materials and fostering strong motivation among teachers to utilize information technology media for gathering materials and implementing the learning process.*

**Keywords:** *competence; teacher; learning materials; information technology*

### Introduction

Teacher Competency Standards serve as a crucial metric for evaluating the competence and professionalism of educators in fulfilling their roles. According to Article 8 of Law Number 14 of 2005, teachers are required to possess academic qualifications, competencies,

and educator certificates, physical and mental well-being, and the ability to contribute to the realization of national educational objectives (Law on Teachers and Lecturers, 2005). These competencies encompass pedagogical competence, personality competence, social competence, and professional competence, as stipulated in Article 10 (Kholiq, 2022). Pedagogical competence pertains to the ability to manage the learning process effectively. Personality competence entails exhibiting steadfastness, noble character, wisdom, and authority and serving as an exemplary role model for students. Professional competence reflects a teacher's mastery of educational materials. Social competence signifies an educator's capacity to engage with students, fellow educators, parents or guardians, and the broader community.

Competency is the holistic acquisition of knowledge, skills, and attitudes demonstrated through performance following an educational program (Situmorang & Winarno, 2008). Echols and Shadly, as cited by Musfah (2012), define competence as the amalgamation of knowledge, behavior, and skills that educators must possess to fulfill their roles and achieve desired learning outcomes effectively. The competencies are cultivated through formal education, training, and independent learning endeavors, leveraging available educational resources. In summary, teacher competency embodies the fusion of knowledge (pedagogical), skills (psychomotor), and attitudes (affective) requisite for carrying out their educational responsibilities.

The Fourth Industrial Revolution represents a progression from the previous era, distinguished by the evolution of computer technology into highly sophisticated digital technology. Notably, this era witnesses significant advancements in e-business, e-commerce, and the Internet of Things (IoT), catalyzing substantial improvements in industry operations, efficiency, and effectiveness. The Fourth Industrial Revolution is an epoch of substantial technological advancement, accompanied by profound social, economic, and cultural transformations (Syamsuar & Reflianto, 2019). Accordingly, the

innovative aspects have revolutionized accessibility and functionality across various sectors.

In the context of the Fourth Industrial Revolution, education reflects diverse methods for integrating cyber technology in physical and virtual learning spaces. Hence, it is expected to respond to the demands by adapting curricula to the contemporary landscape. The curriculum, for instance, can facilitate global connectivity through avenues such as harnessing the Internet of Things (IoT). Moreover, educators benefit from an expanded repertoire of reference materials and teaching methodologies. In this learning environment, interactions extend beyond teacher-student exchanges to encompass student-student and student-material interactions, culminating in effective and efficient learning outcomes (Thefiddy, 2020).

Advances in technology and information in the current era have a profound impact on various aspects of life, including education. Hence, students' character must be cultivated to meet the challenges of the Fourth Industrial Revolution (Prayitno & Tauhidah, 2020). This endeavor should be supported by various stakeholders, including families, schools, and the government (Anwar et al., 2018). Digital literacy is crucial for all parties involved in education, including teachers (Zulaiha et al., 2019). In this regard, the role of educators is indispensable, as they must adapt to avoid being marginalized in the mere transfer of knowledge (Almeida & Simoes, 2019). Their ability to adapt to technology is a key determinant of improving the quality of education (Muhali, 2018).

The use of technology in learning is not just a preference but a necessity to support optimal understanding (Nurpratiwi et al., 2021). Thus, failure to respond to current technological advances in education, especially among teachers, might result in the inability to achieve the quality of learning demanded by the times. Without a change in the approach to teaching and learning, the world will face tremendous difficulties in the next 30 years (Supandi et al., 2020). With the development of Information and Communication Technology (ICT) in

the era of the Fourth Industrial Revolution, the demands on teacher competence have expanded significantly, including their ability to use ICT in teaching and learning activities in schools (König et al., 2020). Information technology suitable for learning can create conducive and efficient learning conditions effectively and efficiently (Syamsuar & Reflianto, 2019). Technology, information, and communication in education can be utilized in various aspects, including the management of teaching materials.

Teacher competence in managing learning materials is crucial to the learning process. It significantly influences learning outcomes and student competencies, which are somehow impacted by effective material management.

Teaching materials can encompass a wide range of resources, including visual aids such as handouts, slides/overheads featuring images, text, diagrams, and photos, as well as other media like audio, video, and animations. These resources can be packaged in various formats, such as print, audiovisual, computer-based technology, or integrated technology (Cahyadi, 2019).

In the digital era, educators can leverage technological advancements to enhance the quality of learning by utilizing technology-based teaching materials (Surani, 2019). Competence in conducting internet-based learning is a vital skill that teachers must possess in today's educational landscape. Hence, overcoming the challenges related to teachers' ICT skills is essential for the successful implementation of digital learning (Arsini, 2018). Melor's research has revealed several advantages of using technology-based teaching materials, including increased student engagement, better learning facilitation, and enhanced student abilities (Melor, 2013). Learning based on technology and information can make the educational experience more engaging, enjoyable, and conducive to improved learning outcomes (Nurdiansyah, 2016).

Based on the initial observations at Madrasah Tsanawiyah Muhammadiyah Curup, the scientific background of exceptionally

qualified teachers in their respective fields has yet to be equipped with the ability to utilize technology in learning activities. The use of technology in learning was limited to using presentation slides to display learning material. At the same time, teachers' teaching materials were still in the traditional forms, such as textbooks. Thus, there were several challenges for teachers in MTs Muhammadiyah related to information technology: 1) Teachers were still unfamiliar with using ICT media in learning management, so they still used conventional methods; 2) Teachers had not been able to use existing application tools for managing learning materials; 3) Teachers had not been able to use the Internet to explore various learning resources.

The availability of textbooks is only sometimes sufficient to be shared by teachers and learners. Moreover, fulfilling the needs of books for all students requires a significant operational costs. In addition, physical teaching materials have limitations in terms of accessibility. If text-based teaching materials are converted into technology-based formats, the reproduction will be more efficient and easily accessible to teachers and students anywhere and anytime. Another advantage not found in printed teaching materials is the flexibility of content. Technology-based teaching materials offer the dynamism to change and add to the range of teaching materials and their reinforcing attributes, such as images and videos.

At Madrasah Tsanawiyah Muhammadiyah Curup, computer laboratories and internet access facilities provided adequate resources for technology and information-based learning. The computer laboratory contained 20 functioning units, all connected to the internet network. Wireless network access was also freely available to teachers. However, the availability of these resources must be accompanied by teacher competence to maximize their use in the learning process.

As one of the private educational institutions, MTs Muhammadiyah Curup had various shortcomings, including limitations in human resources, facilities, and infrastructure. In terms of funding, the implementation of education certainly encountered limitations

compared to state schools. An impact of these constraints was the lack of activities focused on improving teacher competence, including enhancing their skills in information technology.

The existence of an educational institution must be distinct from the role of teachers in the learning process. A quality learning process will undoubtedly produce high-quality graduates. Hence, it must be supported by the educators' competencies, including proficiency in managing information technology-based subject matter.

## **Method**

The model used in this community service program was Participatory Action Research (PAR), in which the process begins with initial research related to the problems experienced by the subjects, influenced by local conditions, and then progresses to offering solutions and empowering subjects to address these issues. In PAR, evaluating the actions carried out is also critical. It involves reflection, in collaboration with the subjects, to inform improvements in subsequent actions, thereby optimizing the expected outcomes without generalizing the findings (Morales, 2016).

The steps for implementing this model in service activities are as follows:

1. Preliminary research

The community service team conducted initial research at MTs Muhammadiyah Curup to observe the management of learning materials by teachers, the integration of ICT in guiding learning materials, and the use of ICT to enhance the quality of learning.

2. Building community trust through inculturation

Community service personnel integrated with the school community (educators and educational staff) to build trust in the program that would be implemented.

3. Organizing target subjects, analyzing problems, and formulating issues  
Target groups were created to receive support. Subsequently, Focus Group Discussions (FGDs) were conducted as a forum to diagnose issues faced by teachers in managing ICT-based teaching materials. Problems were then articulated, prioritized, and planned for immediate or follow-up actions.
4. Planning action steps  
The community service team developed an action plan based on the problem analysis conducted in the previous step in coordination with the school. It involved assessing the school's potential, including the location for activity implementation and the human resources targeted for support, and identifying involved stakeholders. Subsequently, an action strategy was formulated for the mentoring activities.
5. Action  
The previously prepared action plan was implemented, following the designed activity schedule and sequence.
6. Evaluation  
The evaluation verified whether the activities aligned with the prepared implementation strategy and knowledge sharing and met the expected outcomes. It allowed service providers to make necessary improvements to implementation strategies for future activities.
7. Reflection  
Service providers and the subjects reflected on the activities (processes and outcomes). The insights gained from this reflection were used to inform theoretical and practical enhancements.

## **Results and Discussion**

The community service activities aimed at improving teacher competence in the management of information technology-based learning materials to address learning challenges in the era of the Fourth

Industrial Revolution were carried out through training and direct practice (demonstration). The target audience included school principals, teachers, and education staff in the MTs Muhammadiyah Curup environment. The training materials provided in this activity included the following: 1) Basic knowledge of ICT for learning; 2) Application of learning material management; 3) Graphic design; 4) Managing visual-based learning materials; 5) Managing audio-visual-based learning materials; 6) Utilizing the internet as a teaching and learning resource; 7) Internet-based learning (online); 8) Online learning based on *Google Classroom (GCR)*; 9) Social media-based online learning. In addition, the resource persons for this activity were self-service and ICT practitioners.

Prior to the service implementation, research was conducted to determine the teacher competence at MTs Muhammadiyah Curup in utilizing information and communication technology to enhance the learning process. It was carried out by administering questionnaires to the teachers at MTs Muhammadiyah Curup. The questionnaire instrument grid provided to the teachers is as follows:

**Table 1.**

*Questionnaire Instrument Grid*

No	Measured Capabilities	Question Items	Number of Questions	Percentage
1	Teachers have basic knowledge of ICT-based learning	1, 2	2	8.7
2	Teachers understand about the application of learning material management	3, 4	2	8.7
3	Teachers have graphic design skills for learning	5, 6	2	8.7
4	Teachers can manage visual-based learning materials	7, 8	2	8.7
5	Teachers can manage audio-visual-based learning materials	9, 10, 11	3	13
6	Teachers utilize the Internet as a source of teaching and learning materials	12, 13, 14 15	4	17.4
7	Teachers conduct online learning	16, 17, 18	3	13

8	Teachers conduct learning through <i>Google Classroom</i>	19, 20	2	8.7
9	Teachers conduct learning through social media	21, 22, 23	3	13

Based on the questionnaire results regarding teacher competence in managing information technology-based learning. The findings were as follows: 1) Seven statement items (30.43%) were categorized as "excellent," namely items 12, 13, 17, 18, 21, 22, and 23; 2) Thirteen statement items (56.52%) were categorized as "sufficient," including items 1, 2, 3, 4, 6, 7, 8, 10, 11, 14, 15, 16, and 19; 3) Three statement items (13.04%) were categorized as "poor," specifically items 5, 9, and 20. In summary, teacher overall teacher competence in managing information technology-based learning at MTs Muhammadiyah Curup was classified as "sufficient," with a mean score of 59 and a mean percentage score of 66.3%. Therefore, it can be concluded that teacher competence in managing information technology-based teaching materials at MTs Muhammadiyah curup was categorized as "sufficient."

The implementation of this community service program was carried out in the following stages:

### **1. Planning**

Activity planning constitutes the initial stage of the service. It is crucial to ensure that the anticipated targets are met. It involves the readiness of the service and the motivation planning for the service subjects. Preliminary activities related to service include initial discussions on the implementation of community service, such as planning for an initial survey of the school and preparing administrative files for service tracking.

Discussions about service-related activities began with a meeting with the principal of MTs Muhammadiyah Curup, to deliberate on service implementation details. The service team held discussions with the principal to gather initial information about teacher competence in managing ICT-based teaching materials, to assess the completeness of

facilities at MTs Muhammadiyah Curup for ICT skills training activities, and to discuss the implementation plan and schedule. Below is an image of the meeting with the principal of MTs Muhammadiyah Curup, and the school's computer laboratory facilities.

Subsequent activities in this preparatory stage included installing computers in the MTs Muhammadiyah Curup computer laboratory. This step was taken to install the necessary software to support the upcoming training activities. Additionally, the team inspected and repaired several computers with software issues, as some machines in the laboratory had not been used for an extended period. The installations were conducted by the service team, assisted by professional computer technicians.

## 2. Implementing the Activity

The activity implementation stage is where the service activities are executed according to the plans. For the improvement of teacher competencies in managing ICT-based teaching materials at MTs Muhammadiyah Curup, several sessions were conducted per the training materials outlined in the schedule below:

**Table 2.**

*Schedule of Community Service Training Activities*

No	Day/Date	Session	Activity/Training Name	Source
1	Wednesday, July 08, 2020	One	Basic knowledge of ICT for learning	Sagiman
2			Learning Material Management Application	Muksal
3	Thursday, July 22, 2020	Two	Graphic Design Training	Sapta Anugerah
4	Thursday, August 06, 2020	Three	Managing Visual-Based Learning Materials	Muksal
5			Managing Audio Visual (Video)-Based Learning Materials	Sagiman
6	Thursday, August 13, 2020	Four	The Internet as a Source of Teaching and Learning Materials	Sagiman

7			Internet-Based Learning (Online)	Muksal
8	Thursday,		Online Learning Based on <i>Google Classroom (GCR)</i>	Muksal
9	August 20, 2020	Five	Social Media-Based Online Learning	Sagiman

As outlined above, the core activities of this service were conducted over five sessions consisting of nine topics, delivered by the service team and invited IT practitioners.

### 3. Evaluation

The evaluation of activities is carried out to measure the success rate of service. The measurement is performed by testing the performance (actions) in practice given to participants after the community service activities. The practice test was based on nine indicators describing teacher competence in managing technology- and information-based learning materials. The test instrument grid is as follows:

**Table 3.**

*Performance/ Practice Test Instrument Grid*

No	Measured Capabilities	Score Valuation
1	Teachers have basic knowledge of ICT-based learning	5
2	Teachers are familiar with learning material management applications	5
3	Teachers can create graphic designs for learning	15
4	Teachers can manage IT-based visual learning materials	15
5	Teachers can manage audio-visual-based learning materials	15
6	Teachers can use the Internet as a source of teaching and learning materials	15
7	Teachers can conduct online learning	10
8	Teachers can conduct learning through <i>Google Classroom</i>	15
9	Teachers can use social media for learning	5
<b>Total</b>		<b>100</b>

Based on the results of the performance tests in service activities to increase teacher competence in managing technology-based learning materials and information, the following conclusions were drawn: 1) Teacher's basic knowledge of ICT-based learning has improved; 2) Teachers are now familiar with learning material management applications; 3) Teachers have acquired basic skills in using graphic design applications to manage learning materials; 4) Teachers' ability to manage ICT-based visual learning materials has been enhanced; 5) Teachers can now manage ICT-based audiovisual learning materials; 6) Teachers can utilize the Internet as a resource for teaching and learning; 7) Teachers can conduct online learning sessions; 8) Teachers are proficient in using *Google Classroom* for educational purposes; 9) Teachers have successfully incorporated social media into their teaching.

The most significant developments were observed in the teachers' ability to process visual and audio-visual learning materials and use *Google Classroom*. These areas indicated a more prominent improvement in teacher competence. The increase might be attributed to the training's use of familiar platforms accessible via mobile devices, such as *PowerPoint* and *Google Classroom*.

Skills that required further improvement included teachers' abilities to use graphic design applications. Continuous practice and repetition were essential for teachers to become proficient in applications such as *CorelDRAW*. Although it differs from the platforms teachers commonly use, the principles of design learned in the training can still be applied. Moreover, this application allows teachers to design their teaching materials effectively, creating resources that are well-adapted to the learning objectives and the message intended to be conveyed.

## Conclusion

Following the implementation of this community service program, several key outcomes were observed: *Firstly*, teachers' competence in managing information technology-based learning

materials was enhanced through IT skills training; *Secondly*, there was a significant increase in teachers' motivation to employ information technology media for gathering materials and facilitating the learning process; *Thirdly*, it was evident that there is a need for ongoing development of competence in managing technology and information-based learning resources among teachers; *Fourthly*, the utilization of the Internet and mobile-accessible learning applications, such as *Google Classroom* and social media, has become more prevalent and accessible for teachers; *Fifthly*, the availability of facilities, including computer laboratories and mobile phones, substantially supported the enhancement of teachers' technological proficiency and information mastery. As a continuation of the present community service, it is anticipated that these activities could be expanded by incorporating training in the blended learning method, which could help address the disparities in internet access and technology among students.

As a recommendation for future initiatives, it would be beneficial to involve students in these activities, thereby potentially improving the learning process through information technology and ensuring that objectives are met. In addition, providing support in the design, implementation, and evaluation of information technology-based learning could serve as a progressive extension of this community service program.

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*Sagiman, Muksal Mina Putra*