

Implementation of Cloud-Based Applications Training to Strengthen Digital Literacy among Islamic Junior High School Students

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Abstract

This community service initiative was designed to enhance digital literacy among seventh-grade students at SMP Boarding School in Padang City through structured training in cloud-based productivity tools. Amid the demands of the digital era, proficiency in information technology has become a fundamental competency for learners. Preliminary observations, indicated that students predominantly employed digital devices for entertainment rather than educational purposes. In response, the training program introduced Google Workspace and Google Drive as instruments to foster independent learning, collaborative work, creative expression, and responsible digital conduct. Implementation followed three sequential phases: preparation, execution, and evaluation. During the preparation phase, instructional modules were developed alongside an evaluation framework based on pre-test and post-test assessments. The training itself combined interactive lecture sessions with hands-on practical exercises with using an educational-participatory approach. Evaluation results showed an increase in the average cognitive score from 1.57 (31.5%) on the pre-test to 3.27 (65.5%) on the post-test. In terms of practical skills, students achieved an average score of 8.5 out of 11 (77.3%), or the equivalent of 7.7 on a 0-10 scale. These results indicate that the training effectively enhanced students' digital literacy and encouraged a positive attitude toward productive and responsible technology use. This program is recommended for replication in other schools to strengthen students' digital competence from an early stage.

Keywords: Cloude-Based, Digital Literacy, Training, Junior High School Students

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INTRODUCTION

The development of information and communication technology (ICT) in the 21st century has brought fundamental changes to various sectors of life, including education. Digital transformation has not only affected how individuals interact, but also how the learning process is designed, implemented, and evaluated (Putri, 2023). In the context of modern education, digital technology is no longer seen as an additional tool, but as an integral component that can enrich students' learning experiences and expand access to knowledge resources (Asgarov & Badalova, 2024). Therefore, digital literacy skills have become one of the essential competencies that students must have in order to adapt to the demands of an increasingly dynamic era.

Digital literacy encompasses more than just the ability to operate technological devices. According to Naufal (2021) dan Restianty (2018), digital literacy involves the skills of accessing, evaluating, using, and producing information through digital media in a critical and ethical manner. In the world of education, digital literacy contributes greatly to improving the quality of learning because students can develop independent learning, critical thinking skills,

and creativity in completing academic tasks (Judijanto, 2024; Lestari et al., 2024). Various cloud-based platforms have now become the backbone of the digital education ecosystem, as they enable flexible data storage, real-time collaboration, and cross-device accessibility without the constraints of time and space. One of the most widely adopted platforms by educational institutions at all levels is Google Workspace, a suite of cloud-based productivity applications developed by Google to support the learning process. The use of such applications not only serves as an administrative tool but also plays a strategic role in fostering 21st-century skills in students, including critical thinking, communication, collaboration, and digital creativity.

However, the reality in the field shows that there is still a digital divide among students, especially at the junior high school level. A study by Subroto et al. (2023) confirms that many junior high school students in Indonesia still face limitations in both access to and productive use of digital technology. This condition poses a challenge in realizing equal quality of education, especially in the post-pandemic era, which increasingly emphasizes the importance of online technology-based learning and digital applications.

Based on an initial assessment (pre-test) conducted on the cognitive abilities of 7th-grade students at the Arrisalah Boarding School regarding the use of digital productivity applications. The assessment results showed that the students' average initial cognitive score was only 1.6 on a scale of 5 (equivalent to 32%), indicating that their level of understanding of cloud-based applications for learning purposes was in the very low category. This contrasts with the students' proficiency in operating digital devices in general, which is considered quite good for entertainment and social communication purposes. Referring to Ng (2012) framework of digital literacy, these findings indicate that the main issue for the partners does not lie in the basic technical dimension (basic operational skills), but rather in the cognitive dimension, namely, students' inability to identify, evaluate, and utilize digital applications in ways relevant to their academic needs.

In other words, the root of the problem does not lie in limited access (all students already own and are accustomed to using devices and have internet access in the dormitory environment), nor in a lack of basic technical skills in operating devices. The core issue lies in the low level of academic utilization (academic utilization gap), namely students' lack of awareness regarding the existence and functionality of collaborative productivity applications such as Google Workspace and Google Drive, a situation exacerbated by low motivation to shift their technology usage habits from an entertainment-oriented focus to a learning-oriented one, as well as a lack of understanding of digital ethics in the context of online collaboration, such as file-sharing protocols, access permission management, and communication etiquette in shared workspaces.

Based on this assessment, the selection of Google Workspace and Google Drive as the primary training materials was based on three practical and strategic considerations. First, both applications are free, cloud-based, and already integrated with Google accounts which the majority of students already have, thereby eliminating the need for financial investment or the burdensome process of installing additional software for partners. Second, the nature of cloud-based applications allows students to access and edit documents across devices without relying on specific computer specifications or the availability of local storage, a highly relevant advantage given the limited number of personal computers or laptops in a boarding school setting. Third, the real-time collaboration features in Google Docs and the centralized storage system in Google Drive directly address the identified service gap, namely, students' limited ability to use technology for independent and collaborative learning, while also serving as a means to foster digital ethics through simulations of collaborative document management. Thus, this training is designed not merely as an introduction to new applications, but as an intervention that specifically targets the cognitive and academic utilization weaknesses identified in the partners' initial assessments.

Thus, the objective of this community service activity is to provide digital literacy training through the mastery of cloud-based applications (Google Workspace: Google Docs, Google Sheets, Google Slides, and Google Drive) to seventh-grade students at Arrisalah Boarding School. This program is expected to increase students' independence in learning, familiarize them with the use of technology for academic purposes, and develop collaboration and creativity skills that are relevant to current educational needs.

METHOD

This community service activity was carried out using an educational-participatory approach that emphasized direct interaction between the implementation team and participants. This approach was chosen because it was in line with the characteristics of the target audience, namely junior high school students who tend to understand material more easily through direct learning experiences (learning by doing). With this method, students not only receive theoretical explanations, but are also actively involved in the practical use of digital applications, making the learning process more meaningful, contextual, and applicable.

The target audience for this community service activity is the 40 seventh-grade students at Arrisalah Boarding School. The selection of seventh-grade students as the target audience was based on the consideration that this grade level marks a transitional period from elementary school to junior high school, making it a strategic opportunity to foster the habit of using digital technology productively from an early age, before inappropriate technology usage patterns become deeply ingrained. Based on the results of an initial assessment using a pre-activity questionnaire covering five aspects that is access, technical skills, motivation, digital ethics, and academic use, the majority of students already had adequate access to devices and basic technical skills, but scored low on the academic utilization aspect; therefore, this group was deemed an appropriate target for an intervention focused on strengthening the cognitive and social-emotional dimensions of digital literacy. The implementation method for this activity consists of several stages, namely: (1) the preparation stage, (2) the training implementation stage, and (3) the evaluation and follow-up stage.

Preparation Stage

The preparation phase began with coordination between the implementation team and the management of Arrisalah Boarding School to agree on the schedule, target participants, and technical requirements for the training. Next, the implementation team conducted a needs assessment by distributing a pre-activity questionnaire developed based on five diagnostic aspects: access, technical skills, motivation, digital ethics, and academic utilization, which served as an empirical basis for formulating targeted training materials. At this stage, training modules on using Google Workspace (Google Docs, Sheets, Slides) and Google Drive were also developed, along with evaluation instruments consisting of pre- and post-tests covering cognitive aspects and a rubric for assessing practical skills.

Training Implementation Stage

The training was held for two consecutive days in the school's computer lab. Each day consisted of two main sessions, namely a theory session and a hands-on practice session, with the details of each session as follows:

- Day-1
1. The first session began with an introduction to the concept of digital literacy, basic concepts of cloud computing and its benefits in education. This material was delivered in the form of an interactive presentation with a brief discussion.
 2. The second session focused on the use of Google Docs, Google Sheets and Google Slides. Students are trained to create documents, write short essays,

- organize simple data, and prepare simple summaries in the form of presentations. They also learn to use collaboration features to work in groups.
- Day-2
1. The first session focuses on file management through Google Drive, including how to save, organize folders, and share documents with friends and teachers.
 2. The second session on real-time document collaboration simulations among participants, including hands-on practice with sharing permissions as part of strengthening digital ethics; and then discussion and reflection sessions on using the application to support daily academic tasks.

The material was delivered through demonstrations and live tutorials, where the instructor showed how to use the applications, and then the students tried it themselves with the team's assistance. The activities were designed so that students could work both individually and in groups, thereby improving not only their technical skills but also their digital collaboration skills. The training material covered:

- a. Introduction to the concepts of digital literacy and internet ethics
- b. Using Google Workspace to create and organize school assignments
- c. File management using Google Drive (storage and sharing)

Evaluation and Follow-up Stage

To The training evaluation was conducted in two ways: quantitative evaluation and qualitative evaluation. Quantitative evaluation used pre-tests and post-tests. Pre-tests were given before the training began, while post-tests were conducted after the last session. Qualitative evaluation was conducted through informal observations and interviews with teachers. From the results of the observations, it was seen that students were increasingly active in using digital applications to complete school assignments. Teachers also reported a change in attitude, whereby students began to shift their use of digital devices from mere entertainment to more productive activities.

As a follow-up, the implementation team compiled an activity report and provided recommendations to the school so that similar training could be carried out regularly or integrated into the ICT learning curriculum. Thus, the sustainability of the program can be ensured, and the impact of this community service does not only stop at short training activities but continues to be part of the school's learning system. Overall, this community service method follows these steps:

1. Identify participants' needs through initial observation and discussion with teachers.
2. Design the program in the form of training modules, evaluation instruments, and equipment preparation.
3. Implementation of training using an interactive approach, demonstrations, and hands-on practice based on digital applications.
4. Evaluation of learning through pre-tests, post-tests and practical assessments
5. Follow-up in the form of recommendations for the sustainable application of digital literacy in schools.

This method not only results in an increase in students' cognitive knowledge, but also fosters practical skills, creativity, and a positive attitude towards the use of digital technology. With an educational-participatory approach, this activity is able to connect the real needs of students with relevant cloud-based learning solutions, thus being in line with the community service objectives oriented towards empowering students in facing the challenges of the digital era.

RESULT AND DISCUSSION

The digitalization training activity carried out at Arrisalah Junior High School has run smoothly according to the predetermined plan. The implementation of this community service activity went through several structured stages, starting from the preparation stage to the evaluation of the training results. In the preparation stage, the community service team coordinated with Arrisalah Islamic Junior High School to agree on the activity schedule, target participants, and material to be delivered. The activity was attended by 40 seventh-grade students selected based on teacher recommendations, taking into account the students' needs and readiness to participate in the training. In addition, the team also prepared cognitive pre-test and post-test instruments, practice observation sheets, and cloud-based digital application training modules (Google Workspace such as Google Docs, Sheets, Slides, and Google Drive).

The assessment criteria for students' knowledge and skills are based on the guidelines outlined by Waizah (2021) and Zehroh (2026) with the indicators further adapted to the scope of the training content delivered to the partners. Each indicator item is rated using a 5-point Likert scale (1 = Very Poor, 2 = Poor, 3 = Fair, 4 = Good, 5 = Very Good) are show on Table 1. The participants' enthusiasm was very high, as seen from the 100% attendance rate and active participation during the training sessions. Based on the results of data analysis, an overview of students' knowledge (before and after training) and skills, as determined by the results of the practical exercises conducted, is presented in Table 2 and Table 3.

Table 1. Coqnitif Assessment Rubric (Pre-test and Post-test Multiple Choice)

Score	Assesment Criteria	Indicators of Success
5	Very Good	Correctly answered all questions (100%)
4	Good	Correctly answered 4 question ($\geq 80\%$)
3	Fair	Correctly answered 3 question ($\geq 60\%$)
2	Poor	Correctly answered 2 question ($\geq 40\%$)
1	Very Poor	Correctly answered 1 question ($\geq 20\%$)

Table 2. Result of Student Coqnitif Data (Pre-test and Post-test)

Student ID	Pre-test			Post-test		
	Pre-test Score	Pre-tes Value (%)	Category	Pre-test Score	Post-test Values (%)	Category
1	2	40	Poor	3	60	Fair
2	1	20	Very Poor	2	60	Fair
3	2	40	Poor	4	80	Good
4	2	40	Poor	3	60	Fair
5	1	20	Very Poor	2	40	Poor
6	1	20	Very Poor	3	60	Fair
7	1	20	Very Poor	2	40	Poor
8	2	40	Poor	4	80	Good
9	1	20	Very Poor	3	60	Fair
10	2	40	Poor	3	60	Fair

11	2	40	Poor	4	80	Good
12	1	20	Very Poor	3	60	Fair
13	3	60	Fair	5	100	Very Good
14	1	20	Very Poor	2	40	Poor
15	2	40	Poor	4	80	Good
16	2	40	Poor	4	80	Good
17	1	20	Very Poor	4	80	Good
18	1	20	Very Poor	4	80	Good
19	2	40	Poor	3	60	Fair
20	2	40	Poor	4	80	Good
21	2	40	Poor	4	80	Good
22	1	20	Very Poor	3	60	Fair
23	1	20	Very Poor	2	40	Poor
24	1	20	Very Poor	2	40	Poor
25	2	40	Poor	4	80	Good
26	1	20	Very Poor	2	40	Poor
27	1	20	Very Poor	3	60	Fair
28	2	40	Poor	4	80	Good
29	1	20	Very Poor	4	80	Good
30	1	20	Very Poor	3	60	Fair
31	3	60	Fair	5	100	Very Good
32	2	40	Poor	4	80	Good
33	2	40	Poor	5	100	Very Good
34	1	20	Very Poor	2	40	Poor
35	1	20	Very Poor	3	60	Fair
36	1	20	Very Poor	4	80	Good
37	2	40	Poor	4	80	Good
38	2	40	Poor	4	80	Good
39	3	60	Fair	5	100	Very Good
40	1	20	Very Poor	2	40	Poor
Average	1.575	31.5		3.375	68	

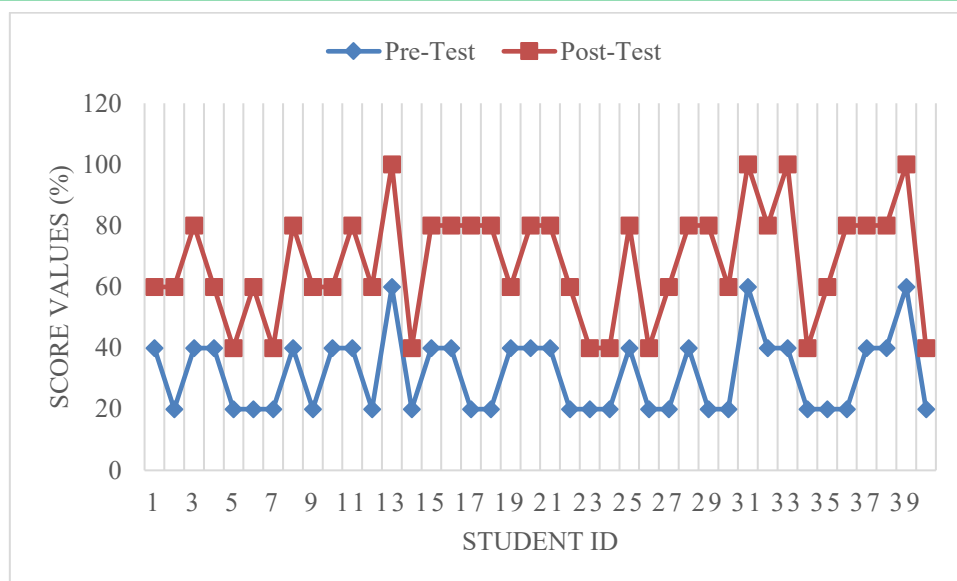


Figure 1. Comparison of Students' Knowledge Assessment Results Before and After Training

Table 3. Result of Student Practical Skills

Indicator (Aspect)	Maximum Score	Score Average	Percentage of Achievement	Category
1. Creating a document in Google Docs	2	1.7	85.0	Good
2. Processing simple data in Google Sheets	2	1.4	70.0	Fair
3. Prepare a simple report in the form of a presentation	2	1.5	75.0	Fair
4. Saving and sharing the document	2	1.8	90.0	Good
5. Understanding digital ethics (written/oral)	3	2.1	70.0	Fair
Total	11	8.5	77.3	Good

Analysis of the pre-test and post-test scores showed an increase in students' cognitive understanding after participating in the training. The average pre-test score of 1.57 (equivalent to 31.5%) increased to 3.27 (equivalent to 65.5%) on the post-test. This category indicates that the training was sufficiently effective in promoting changes in students' conceptual understanding of the functions and benefits of cloud-based applications. When viewed through the lens of Ng (2012) framework of digital literacy, this improvement in the cognitive dimension indicates that students are not only acquiring operational skills but are also beginning to develop a conceptual understanding of why and when cloud-based applications are relevant in an academic context, an important indicator that the intervention has addressed aspects that go

beyond mere technical literacy. These results indicate a digital literacy gap among students, particularly in the context of using technology to support the learning process, confirming the initial finding that students are still limited in their understanding and skills in utilizing digital applications for academic needs.

After the pre-test, the first session continued with an introduction to digital literacy in conceptual terms. Students were given an understanding of the importance of digital literacy, ethics in the use of technology, and the positive potential of using cloud-based applications. The material was delivered interactively through group discussions so that students could relate the concepts to their daily experiences.

The second meeting focused on technical training in the use of Google Docs, Google Sheets, Google Slides and Google Drive. In the technical training session on Google Workspace and Google Drive, students were guided in creating simple documents, sharing document links, processing simple data, prepare a simple report and securely storing data in cloud storage. Practical activities were carried out in groups so that students could learn to collaborate in completing tasks together. The students' enthusiasm was evident in their eagerness to try out features they had never used before. This activity also trained visual communication skills, which are very much needed in today's learning environment.

The results of the post-training practical skills assessment showed an average score of 8.5 out of a maximum of 11 (77.3%), or the equivalent of 7.7 on a 0-10 scale. However, upon closer examination by aspect (Table 3), there were clear variations in performance across indicators. The technical-operational skills aspect specifically, saving and sharing documents (90.0%) and creating documents in Google Docs (85.0%) achieved a "good" rating, while aspects requiring conceptual and reflective understanding, namely, processing data in Google Sheets (70.0%), preparing presentation reports (75.0%), and, in particular, understanding digital ethics (70.0%), fell into the "adequate" category, which is relatively lower compared to the technical aspects.

The effectiveness of outcomes in technical aspects (document creation and file sharing) can also be explained by the training approach that was implemented. As demonstrated by (Foci et al., 2026; Perdana, et al., 2025) research on experiential learning, procedural-motor skills, such as operating application features tend to develop more effectively through cycles of concrete experience and active experimentation applied during hands-on practice sessions in this training, rather than through conceptual explanations alone. This explains why the "saving and sharing documents" aspect, which is procedural and repetitive in nature, achieved the highest score, while the "understanding digital ethics" aspect, which is reflective and evaluative received a relatively lower score, although it still fell within the "adequate" category. This is in line with the findings of Wutun & Mas amah (2025), which confirm that practice-based digital literacy strengthening programs can improve students' understanding and technical skills in managing digital media productively and responsibly.

The success of this program is not only evident in the improvement of cognitive and practical skills, but also in the change in students' attitudes towards the use of technology. Based on observations, students began to realize that digital devices can be used not only for entertainment, but also to support independent learning. The accompanying teachers also stated that students became more active in using digital applications to complete school assignments after participating in the training.

The results of this activity are in line with previous studies which state that digital training interventions in adolescence can significantly improve students' technological literacy and learning productivity (Sudriyanto, et al., 2024; Ayuningtyas et al., 2025) . The digital literacy acquired by students is not only technical in nature, but also touches on cognitive and ethical aspects, which are very important in technology-based character education.

Overall, the implementation of this community service program can be considered successful because it was able to improve students' digital literacy in terms of cognitive aspects, practical skills, and positive attitudes towards the use of technology. This is also supported by Yeyendra et al. (2024) dan Yuniarty et al., (2023) who stated that students showed better abilities in identifying reliable sources of information, using effective digital tools, and managing their online security. The impact on students in general and teachers who participated in the training activities in particular was an increase in knowledge, changes in attitudes and habits of students in using technology more productively and responsibly. The impact is not limited to short-term skill improvement, but is also expected to become an important foundation for students in facing the challenges of digital-based learning in the future.

CONCLUSION AND RECOMMENDATIONS

The community service activity a training program on the cloud-based Google Workspace and Google Drive applications for seventh-grade students at Arrisalah Boarding School proved effective in improving students' digital literacy, both in terms of cognitive aspects and practical skills. Evaluation results showed an increase in the average cognitive score from 1.57 (31.5%) on the pre-test to 3.27 (65.5%) on the post-test. In terms of practical skills, students achieved an average score of 8.5 out of 11 (77.3%), or the equivalent of 7.7 on a 0-10 scale, with the highest achievement in technical-operational skills such as creating and sharing documents, and relatively lower achievement in data processing and understanding digital ethics.

These findings confirm that the training successfully addressed the partners' challenges namely, the low level of academic utilization of digital technology, while also highlighting the cognitive and social-emotional aspects of digital literacy, particularly digital ethics and data processing skills. Thus, the success of this program is reflected not only in improved quantitative scores but also in a clearer identification of competency areas that still require ongoing development by the school. Consequently, this cloud-based application training program is recommended for replication in other boarding schools as a model for strengthening digital literacy starting in junior high school, provided that ongoing guidance is provided that focuses on continuously strengthening students' digital ethics and data processing skills, rather than relying solely on one-off training activities, it is recommended that schools integrate basic digital skills into the Information and Communication Technology (ICT) learning curriculum and conduct advanced training for intermediate digital skills development. It is also hoped that this community service activity can be replicated in other schools with similar needs to support the continuous strengthening of students' digital literacy from an early age.

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