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Empowering Teachers to Develop Digital Teaching Materials: Training and Mentoring in Infographic and Flipbook E-Module Design

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Abstract: This community service activity aims to enhance teachers' knowledge and skills in creating digital teaching materials, including infographics and flipbook e-modules. The implementation method for this community service program involved training and mentoring for 23 teachers at SMP Muhammadiyah 2 Pekanbaru. The training was conducted over a two-hour session and focused on the use of Canva for designing digital learning materials and Heyzine Flipbook for converting digital documents into interactive flipbooks. The instruments used were a questionnaire on the percentage of technology use in learning and another on teachers' ability to use applications to create digital teaching materials; both were analyzed descriptively. The results of this community service project indicate an increase in teachers' understanding of the role of technology in learning and in their ability to produce digital learning resources. Of the 23 teachers who participated in the training, 14 completed both the pre-test and post-test, and the results were analyzed based on these 14 respondents. Before the training, the majority of respondents demonstrated a poor level of understanding (71.42%), followed by a fair level (14.28%), a very good level (7.14%), and a very poor level (7.14%). After the training, 64.28% of respondents demonstrated a very good level of understanding, 28.57% demonstrated a good level, and 7.14% demonstrated a fair level. No respondents were classified in the poor or very poor categories after the training. These findings suggest an improvement in teachers' understanding of digital learning applications following the training. In practical terms, the skills acquired in using Canva to design digital learning materials and Heyzine Flipbook to create interactive digital resources can support teachers in developing engaging learning materials independently. To sustain these practices at SMP Muhammadiyah 2 Pekanbaru, teachers can integrate these applications into regular classroom activities, update and reuse digital materials, and share their resources and experiences with colleagues. Continued institutional support and collaboration among teachers may further encourage the consistent integration of digital learning resources into teaching practices.

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Introduction

The digital age has significantly transformed the landscape of education, creating both challenges and opportunities for educators worldwide. Rapid technological advancements have introduced various digital platforms and tools that can be leveraged to enhance the quality of learning and teaching in schools. One key aspect of digital transformation in education is teachers' ability to integrate technology into their teaching and learning

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processes (Mursalin, Ali, and Armita, 2024). Technology and learning media are now almost inseparable; technology benefits students, and it can also enhance teachers' creativity.

In today's era, technological advancements are rapid, and people must be able to apply them, especially since all systems are now technology-based. Education must keep pace with technological developments, so the use of technology as a learning medium is a necessity (Yulis et al. 2024). Teachers in today's digital age face different challenges. They have students who are part of the digital generation, having been familiar with internet technology since birth. With this new era, teachers must adapt and remain professional in this fast-paced age of technology and information; thus, the skills a teacher must possess in the digital age are crucial to supporting learning that is accelerating alongside the progress of the times (Al Ghifari 2024).

The gap between teachers and students in the use of technology presents a challenge that needs to be addressed immediately. Students are the younger generation born in the digital age, so they are accustomed to using the internet in their daily lives. Their communication patterns and knowledge management are also mediated by technology (Al Ghifari 2024). Given these issues, the era of digitalization requires teachers to apply their professionalism in using educational technology, meaning teachers must be able to grow, adapt, and learn new things in line with the digital age—particularly rapidly evolving technology and information, such as a teacher's ability to create and operate various learning media, thereby enhancing interaction and communication with students, which will also positively impact students' future learning outcomes.

Based on interviews with the partner institution, SMP Muhammadiyah 2 Pekanbaru faces four main challenges in integrating digital technology into teaching and learning: limited teacher motivation to utilize information technology, insufficient creativity in developing digital learning resources that meet students' needs, limited digital literacy for instructional purposes, and inadequate technical assistance in developing infographics and electronic learning modules (e-modules). These challenges indicate the need for practical support to strengthen teachers' competencies in creating varied and engaging digital learning resources. Canva and Heyzine Flipbook were selected as accessible tools to support the development of visual learning materials and interactive digital resources, respectively.

In response to these challenges, the community service team from the Chemistry Education Program, Faculty of Teacher Training and Education, Universitas Islam Riau (FKIP UIR), organized this training to strengthen teachers' digital literacy and practical competencies in developing digital teaching materials. The intended outcomes were to improve teachers' understanding of educational technology, enable them to produce digital learning resources, and encourage the integration of these materials into classroom instruction. In the longer term, the activity was expected to promote more engaging learning experiences and support the sustainable use of digital technology in teaching and learning at SMP Muhammadiyah 2 Pekanbaru.

Method

The implementation of this community service activity was designed using a participatory and collaborative approach, actively involving faculty members, students, and 23 teachers from SMP Muhammadiyah 2 Pekanbaru. The activity was conducted on February 3, 2026, with a total training duration of two hours. The training focused on the use of Canva to design digital learning materials and Heyzine Flipbook to develop interactive digital learning resources. The activity was carried out through five main phases as follows:

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a) Program Socialization Phase

The objective of this phase is to introduce the goals, benefits, and plans for the community service activities to the school administration and all teachers to foster a shared understanding and commitment to the activities. Initial coordination between the PKM implementation team and the school principal along with the Vice Principal. This activity discussed the challenges faced by teachers at the school, followed by a presentation of the community service plan to be carried out by the PKM team. At this stage, a commitment from the partner regarding the implementation of the activities was agreed upon through the signing of a partnership agreement, along with the schedule for the activities and the necessary requirements during their implementation.

b) Training Phase

The objective of the second phase—which is the core phase of the PKM program—is to enhance teachers' knowledge and practical skills in creating infographics and digital e-modules based on Heyzine through hands-on workshops. Before proceeding to the phase of introducing various applications that teachers can use, a presentation was first given regarding the importance of teachers' understanding of digital competencies today to support the development of 21st-century skills that students must possess. Following this presentation, the second educational session covered the basics of designing educational infographics and e-modules using Canva, combined with Heyzine flipbooks. The training on creating interactive digital e-modules based on Heyzine covered:

- o Concepts of interactive digital media design
- o Integration of text, images, videos, and quizzes into e-modules
- o Techniques for publishing and sharing digital media (embed links / QR codes)
- o Simulation of applying training outcomes to participants' respective lesson materials.

c) Technology Implementation Phase

This phase was conducted using a "learning by doing" approach, where participants directly practiced each step and produced initial prototypes in the form of digital learning infographics and Heyzine-based e-module prototypes tailored to each teacher's specific subject area. In this phase, the service team directly guides or assists teachers one by one in trying out technologies that can serve as tools to create more innovative and interactive learning resources.

d) Mentoring and Evaluation Phase

Evaluation Phase

In this phase, the service team provided mentoring to refine and improve teachers' work, including infographic designs and electronic learning modules (e-modules). Technical guidance was also provided to help teachers optimize interactive features, such as videos, hyperlinks, and digital assessments. The evaluation focused on teachers' understanding of digital technology and their ability to develop digital learning materials using Canva and Heyzine Flipbook. Data were collected through pre-test and post-test questionnaires completed by 14 teachers who participated in both assessments, as well as an assessment of the digital learning products developed during the activity. Descriptive statistical analysis was used to calculate the frequency and percentage of responses in each understanding category before and after the training. The results were compared to identify changes in teachers' understanding, while the products were reviewed to examine their development of digital teaching materials. These evaluation findings were used to assess the achievement of the

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training objectives and identify opportunities to sustain digital learning practices at SMP Muhammadiyah 2 Pekanbaru.

e) Program Sustainability Phase

The sustainability phase is intended to ensure that the outcomes of the community service initiative do not end once the activities are completed, but rather become a sustainable program within the school. Some actions that can be taken include: Schools can establish a school digital media bank (a repository based on Google Drive/Heyzine Library). Additionally, young teachers who have successfully developed learning resources such as infographics or e-modules can serve as internal trainers to continue training for other teachers who have not yet participated in the activities or to assist if other teachers encounter difficulties.

Result and Discussion

Outreach and Training Activities on Creating Infographic Prototypes and E-Learning Modules Based on Heyzine Flipbooks

Providing information through educational sessions for teachers regarding the importance of understanding digital competencies today to bridge the gap between teachers' technological skills and those of students, who are closely tied to technological advancements. The activity was conducted in February 2026 at SMP Muhammadiyah 2 Pekanbaru and was attended by teachers from the school. The community service program was officially opened by a partner, represented by the Vice Principal, and was then continued by the community service team consisting of Putri Ade Rahma Yulis, S.Pd, M.Si, from the Chemistry Education Program, and Dr. Iffa Ichwani Putri, S.Pd, M.Pd, from the Biology Education Program. Each community service team has conducted several research and community service activities related to the use of technology, one of which was to produce teaching materials, including (Desti et al. 2020), (Desti et al. 2021), (Fitriani et al. 2023), (4), (Yulis and Oktariani 2024), (Yulis and Fauziah 2024), (Fauziah, Ade Rahma Yulis, et al. 2025), (Fauziah, Ade, et al. 2025).



Figure 1. Presentation of the material by the Community Service Team

The team began by educating participants on the importance of using technology in today's learning process. As educators, teachers must keep pace with these developments to avoid falling behind and to adapt to the current needs of their students. Afterward, the community service team also presented several technology applications that teachers can utilize in the learning process, including Canva, Heyzine, Kahoot, Padlet, Phet Simulations, and others. During this community service activity, the team explained how to use Canva and

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Heyzine Flipbooks as applications that teachers can use to create infographic prototypes and e-modules.

Following the educational phase, the process moved on to the hands-on practical guidance stage, which focused on how to utilize various applications that support teachers in developing more innovative learning resources through infographics or e-modules. This stage was conducted using a "learning by doing" approach, in which participants directly practiced each step and produced initial prototypes in the form of digital learning infographics and Heyzine-based e-module prototypes tailored to the subjects they teach. During this phase, the community service team directly guided or assisted each teacher individually as they experimented with technologies that could serve as tools for creating more innovative and interactive learning resources.

After receiving training on general technology use and the use of the Canva app, the teachers proceeded to practice using the app directly. Regarding Canva, most teachers had heard of the app but had not yet utilized it to its full potential, while the Heyzine Flipbooks app had never been used by these teachers before. The session combined hands-on practice with group discussions among the teachers. The hands-on practice and discussions proved quite effective, as evidenced by the high level of enthusiasm shown by the participants from the partner institution, who asked for further information on how to utilize these technologies and applications in developing teaching materials—especially after seeing several e-module samples created by students from the Chemistry Education Program.



Figure 2. Practical Process of Creating Infographic Prototypes and E-Learning Modules Based on Heyzine Flipbooks

The outcomes of this community service activity were well-received by the entire school community, from the principal to the teachers. Some of the key takeaways from this activity include:

a) An increase in educators' knowledge, which helps foster a technology-savvy mindset that supports the learning process, as evidenced by pre- and post-training survey results
b) Improved skills and creativity among teachers in utilizing various applications that support the learning process, as evidenced by the results of practical exercises conducted after the training
c) Enhanced knowledge and creativity among teachers regarding the development of more creative and innovative learning resources tailored to students' current needs, as evidenced by the results of practical exercises following the completion of the mentoring process and by pre- and post-activity surveys on application proficiency

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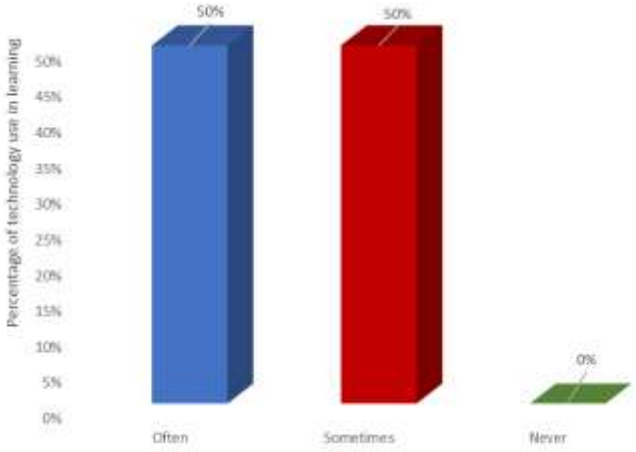


Figure 3. Percentage of Technology Use in Learning

The graph in Figure 3 shows that the use of technology in learning is evenly divided between the "often" (50%) and "sometimes" (50%) categories, while the "never" category stands at 0%. This distribution indicates that all respondents have used technology in learning, with a relatively high frequency.

The "frequently" category, at 50%, indicates that half of the respondents have integrated technology routinely and consistently into the learning process. This reflects a shift toward digital-based learning that is more adaptable to the demands of the 21st century. According to (Fan, Wang, and Wang 2020) the consistent integration of technology is a key component in developing 21st-century skills such as critical thinking, creativity, communication, and collaboration.

On the other hand, the "sometimes" percentage—which also reaches 50%—indicates that the other half of the respondents are still at the situational usage stage. This means that technology has not yet become a fully integrated part of instructional design but is used only under specific conditions or to meet particular needs. From the perspective of the Diffusion of Innovations model by (Dearing and Cox 2018) this situation reflects varying levels of innovation adoption, where some educators are already in the "early adopters" stage, while others remain in the "early majority" stage and tend to be more cautious about integrating technology.

When analyzed using the TPACK framework (Schmid, Brianza, and Petko 2020) the "often" group can generally be assumed to possess strong integrative skills involving technology, pedagogy, and content. Conversely, the "sometimes" group indicates that this integration is not yet optimal, meaning technology is not being fully leveraged to support meaningful learning processes.

The absence of the "never" (0%) category is a positive indicator suggesting that barriers to accessing technology (first-order barriers) have been relatively overcome. However, differences in the intensity of use indicate that internal barriers—such as pedagogical readiness, confidence in technology, and digital competence—remain distinguishing factors. This aligns with the perspective (Voogt and Knezek 2021) that emphasizes how the primary barriers to technology integration are often non-technical in nature (second-order barriers).

Furthermore, within the DigCompEdu framework (Redecker and Punie 2017) groups can often be categorized as being at the "integrator" level, while some groups are still at the "explorer" or "adopter" levels. This indicates that although technology has been used by all

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respondents, the quality of its integration still needs to be improved to reach the "innovator" stage.

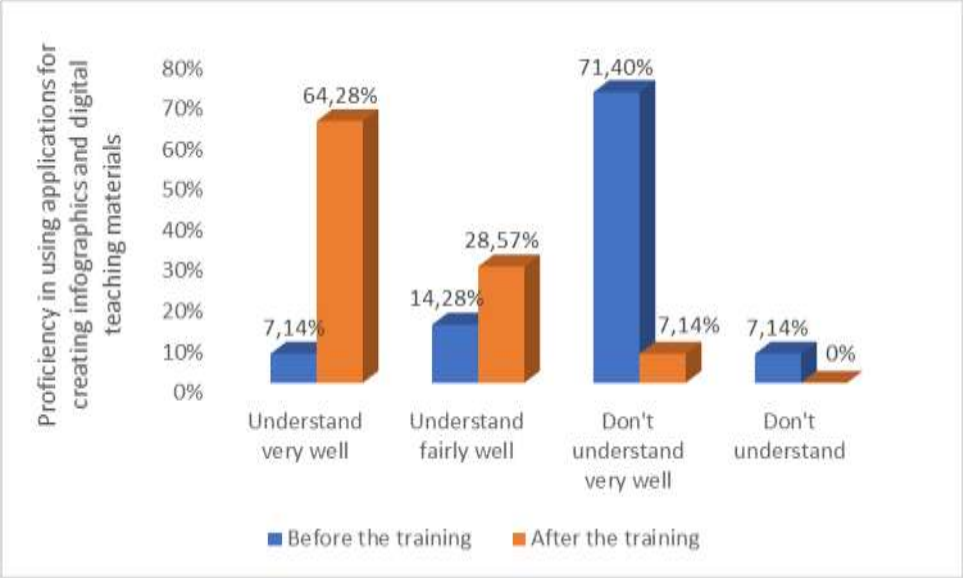


Figure 4. Graph showing changes in proficiency with digital applications

Figure 4 illustrates the changes in teachers' proficiency in creating infographics and digital teaching materials before and after the training. Before the training, the majority of respondents were classified as Less Proficient (71.42%), followed by Moderately Proficient (14.28%), Highly Proficient (7.14%), and Not Proficient (7.14%). After the training, 64.28% of respondents were classified as Highly Proficient, 28.57% as Proficient, and 7.14% as Moderately Proficient, while no respondents remained in the Less Proficient or Not Proficient categories. These findings indicate a positive shift in the distribution of teachers' self-reported proficiency following the training.

This change indicates that the educational intervention provided was highly effective in improving the respondents' digital competencies, particularly in the creation of infographics and digital teaching materials. Theoretically, this improvement aligns with the concept of "learning gain" in education, which refers to an increase in cognitive abilities following a learning intervention or treatment (Theobald et al. 2020).

Furthermore, the significant increase in the "fully understand" category reflects the success of the learning process in building competencies at a higher level—not merely understanding but also being able to apply the knowledge. This aligns with Bloom's Revised Cognitive Taxonomy (Morla-Folch et al. 2022) in which learners progress from the "understanding" level to "applying" and even "creating," particularly in the context of creating digital products such as infographics.

From a digital literacy perspective, these results indicate an improvement in the aspect of digital content creation, which is one of the core competencies within the DigComp framework (Redecker and Punie 2017). The ability to create infographics requires not only technical skills but also the ability to think visually, simplify information, and communicate concepts effectively.

The drastic decrease in the "poor understanding" category (from 71.42% to 7.14%) and the elimination of the "no understanding" category indicate that the education provided successfully addressed the initial competency gap. This aligns with Vygotsky's scaffolding

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theory, in which appropriate learning support can help students move from the zone of actual development to the zone of proximal development.

Furthermore, this success can also be explained through an active and contextual technology-based learning approach. According to (Mayer 2024) in Multimedia Learning theory, the use of visual media such as infographics can enhance understanding by simultaneously combining verbal and visual representations.

In the final step, as evidence of their commitment to participating in the training, the teachers compiled the instructional materials they created using the Canva app and continued the process using the Heyzine Flipbook app. Although this did not yet result in a complete textbook, it represents a first step toward fostering technological awareness among teachers and keeping pace with current developments in education. The following are examples of the media produced by the teachers.



Figure 5. Example of Teacher Performance Results Using the Heyzine Flipbook

Figure 5 presents the digital learning products developed by teachers during the training, including infographics and interactive e-learning modules. The product evaluation focused on visual presentation, content organization, ease of navigation, and the functionality of interactive features. Navigation links were checked to determine whether users could access the intended sections, while interactive quizzes and digital assessments were examined to ensure that they functioned as intended. Other features, including embedded videos, hyperlinks, text readability, and compatibility across devices, were also considered where applicable. This evaluation was intended to identify technical issues and determine whether the products could be used effectively as digital learning resources. The assessment results provide a basis for refining the products and improving their usability in classroom instruction.

Conclusion

From the community service activities that have been carried out, it can be seen that there has been an increase in teachers' understanding of the role of technology in learning, and that they are now able to produce digital learning resources such as infographics and flipbook-style modules. Before the training, the majority of respondents were classified as

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having a Poor level of understanding (71.42%), followed by a Fair level (14.28%), a Very Good level (7.14%), and a Very Poor level (7.14%). After the training, 64.28% of respondents achieved a Very Good level of understanding, 28.57% achieved a Good level, and 7.14% remained at a Fair level. No respondents were classified in the Poor or Very Poor categories after the training. These findings indicate a positive shift in the distribution of teachers' understanding following the training. To ensure the program's sustainability, the community service team also followed up with the teachers by creating a WhatsApp group where they shared the steps for creating digital teaching materials, including examples of digital flipbook teaching materials.

Recommendation

The school management is encouraged to organize internal follow-up sessions to share the knowledge and skills acquired during the training with teachers who have not yet participated. Teachers should also be encouraged to apply the training outcomes by developing infographics and interactive digital learning materials using Canva and Heyzine Flipbook for classroom instruction. Providing opportunities for collaboration and sharing digital teaching resources among teachers may help sustain the integration of technology into teaching and learning practices.

The Muhammadiyah Council for Primary and Secondary Education and the relevant Education Office are encouraged to support the continuous professional development of teachers in digital learning. This support could include facilitating digital literacy training, providing access to relevant technological resources, and encouraging collaboration among schools to share good practices in developing digital teaching materials. These initiatives may contribute to the broader and more sustainable integration of digital technology into school education.

The follow-up community service team is encouraged to provide continued mentoring and additional training to address technical difficulties encountered by teachers during the development of digital learning materials. Future activities could focus on improving the quality of infographics and e-learning modules, optimizing interactive features, and evaluating the usability of the resulting products. Such support would help teachers strengthen their practical digital competencies and improve the quality of the learning resources they develop.

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