



Elevating Teachers' Competence through the Development of Instructional Media Oriented to Problem-solving Skills with the Aid of Articulate Storyline

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Abstract: With rapid technological advancement, integrating technology into education becomes increasingly important. It is thus imperative for teachers to master satisfactory competence in improving students' problem-solving skills. Fundamentally, as a community service, this study aims to increase teacher competence in developing instructional media oriented to problem-solving skills assisted by Articulate Storyline. It involved training and mentoring sessions that encompassed observation, knowledge sharing, and evaluation. These measures are aimed at improving teachers' understanding and skills in using Articulate Storyline to develop interactive instructional media for improving students' problem-solving skills. As evidenced by a 2-tailed paired sample test, the training and mentoring have been proven effective in improving teacher competence to augment students' problem-solving skills ($p < 0.000$).



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Introduction

Technological development significantly impacts education. Likewise, the use of information technology and interactive instructional media has become an integral part of the learning process in this digital age since these have been integrated into modern learning approaches and are widely used by educators and students for a more interactive, engaging, and effective learning process. As such, teachers are required to gain qualified competence in dealing with technology-induced changes while taking advantage of these changes (Law No. 14 of 2005 pertinent to teachers and lecturers). One essential competence in this respect is the ability to develop students' problem-solving

skills¹.

Rismi states that problem-solving should be the focus of the curriculum. NCTM further states that students' problem-solving skill will positively influence their performance due to their relevance to interdisciplinary and authentic contexts. Problem-solving is an individual's effort to address unclear or incomplete understanding. It also deals with students' ability to solve problems by finding answers in a staged fashion, namely understanding the problem, planning a solution, solving the problem based on the plan, and re-examining the results. Furthermore, this skill relates to the ability to seek information, analyze situations, identify problems, and generate alternative solutions as the precursor to achieving goals. One measure to improve such complex skills is to engage students by integrating interactive instructional media.

Interactive media has a significant impact on students' problem-solving skills by raising their learning engagement and exposing students to hands-on experience in solving problems. The media often presents realistic simulations, allowing students to practice in a real-life context². In addition, it also provides direct feedback, which will enable students to evaluate their crafted strategies and solutions. Thus, it plays a crucial role in improving students' problem-solving skills through experiential learning, realistic simulations, and direct feedback. In this direction, Alberida et al. contend that interactive media can enhance elementary school students' problem-solving skills in grade VII. Interactive media affords an interesting and engaging learning experience, therefore empowering junior high school students to be actively involved in the problem-solving process³. Simply put, it offers the scaffolding to improve their problem-solving skills. Another line of inquiry acknowledges that interactive media can improve students' problem-solving skills, including the needs analysis of interactive instructional media to improve students' problem-solving skills⁴ through computer-based media in learning mathematics at Public Vocational School 1 of Ngawen⁵. One of the applications for creating interactive instructional media is Articulate Storyline, which allows teachers to create interactive learning content effortlessly⁶. It offers flexibility in integrating various multimodal elements, such as text, images, audio, and video, each of which constitutes

¹ K Anam et al., "Peran Kompetensi Guru Terhadap Problem Solving Siswa," *JOEAI (Journal of Education and Instruction)* 4, no. 2 (2021): 364-72.

² O D Rismi, "A Learning Design to Improve Higher Order Thinking Skills (HOTS)," *Jurnal Riset Pendidikan Matematika Jakarta* 3, no. 2 (2021): 34-41.

³ H Alberida and R Fitri Arsih, "Media Interaktif Untuk Melatih Kemampuan Problem Solving Siswa SMP Kelas VII," *SEMIRATA 2015* 4, no. 1 (2015).

⁴ M E Marhaeni, N H Wulanningtyas, "Analisis Kebutuhan Media Pembelajaran Interaktif Untuk Meningkatkan Kemampuan Pemecahan Masalah Siswa," *KoPeN: Konferensi Pendidikan Nasional* 3, no. 2 (2021): 173-79.

⁵ U Haryanto, "Peningkatan Kemampuan Memecahkan Masalah Melalui Media Komputer Dalam Pembelajaran Matematika Pada Siswa SMKN 1 Ngawen," *Jurnal Pendidikan Teknologi Dan Kejuruan* 22, no. 4 (2015): 432-42.

⁶ N Khusnah et al., "Pengembangan Media Pembelajaran Jimat Menggunakan Articulate Storyline. Jurnal Analisa" 6, no. 2 (2020): 197-208.

interactive and engaging learning experiences for students⁷. It also provides the possibility of creating scenarios for problem-solving⁸.

Other articles related to community service regarding interactive media can be seen at Training and assistance in creating interactive multimedia-based learning media⁹, Training, and assistance in creating interactive learning media based on Macromedia Flash¹⁰, Assistance and training in the development of interactive learning media and video editing at SMKN 7 Bandar Lampung¹¹, Assistance in Using PhET Simulation as an Interactive Virtual Laboratory Media at Mts Tarbiyatussibyan¹², and Training and Assistance in Creating Interactive Multimedia-Based Learning Media for Teachers of SMP Negeri 1 Sungai Kakap¹³.

A preliminary observation in this present study underscored several impeding factors to the development of interactive instructional media at Public Elementary School 2 of Kaliwining. These involved limited infrastructure and limited introduction of ICT-based media. Successful development of instructional media by teachers can be attained through training and mentoring oriented towards improving students' problem-solving skills through Articulate Storyline. As one bedrock to this present study, research by Putri documents her assistance for teachers in developing interactive multimedia with the aid of Articulate Storyline for augmented student motivation. Her mentoring has proven that almost all teachers can create interactive instructional media¹⁴. Fernando also reported training on the use of Articulate Storyline as the basis for Android-based online

⁷ A Satriawan, S Sutiarso, and U Rosidin, "Pengembangan Media Pembelajaran Interaktif Terintegrasi Soft Skills Dalam Meningkatkan Kemampuan Pemecahan Masalah," *Jurnal Cendekia: Jurnal Pendidikan Matematika* 4, no. 2 (2020): 950–63.

⁸ J Juhaeni, S Safaruddin, and Z P Salsabila, "Articulate Storyline Sebagai Media Pembelajaran Interaktif Untuk Peserta Didik Madrasah Ibtidaiyah," *AULADUNA: Jurnal Pendidikan Dasar Islam* 8, no. 2 (2021): 150–59.

⁹ Hartono, Hartono, et al. "Pelatihan dan pendampingan pembuatan media pembelajaran berbasis multimedia interaktif." *Transformasi: Jurnal Pengabdian Masyarakat* 14.2 (2018): 139-147.

¹⁰ Lubis, Baihaqi Siddik, and Eko Febri Syahputra Siregar. "Pelatihan dan pendampingan pembuatan media pembelajaran interaktif berbasis macromedia flash." *SELAPARANG: Jurnal Pengabdian Masyarakat Berkemajuan* 4.1 (2020): 396-401.

¹¹ Sulistiani, Heni, et al. "Pendampingan dan pelatihan pengembangan media pembelajaran interaktif dan video editing di SMKN 7 Bandar Lampung." *Journal of Social Sciences and Technology for Community Service (JSSTCS)* 2.2 (2021): 160-166.

¹² Laksono, Pandujati, Anggun Wicaksono, and Ummi Hiras Habisukan. "Pendampingan Pemanfaatan Simulasi PhET Sebagai Media Interaktif Virtual Laboratorium Di Mts Tarbiyatussibyan." *Jurnal Anugerah* 4.2 (2022): 179-192.

¹³ Lesmana, Chandra, et al. "Pelatihan dan Pendampingan Pembuatan Media Pembelajaran Berbasis Multimedia Interaktif Untuk Guru Smp Negeri 1 Sungai Kakap." *Al-khidmah* 1.2 (2018): 61-66.

¹⁴ R F Putri, R Yulinda, and N Laili, "Pendampingan Guru Melalui Pengembangan Multimedia Pembelajaran Interaktif Dengan Aplikasi Articulate Storyline," *Jurnal Warta Desa (JWD)* 4, no. 1 (2022): 46–53.

¹⁵ A Fernando, D Sarkity, and B Irawan, "Pelatihan Penggunaan Aplikasi Articulate Storyline Sebagai Dasar Media Pembelajaran Online Berbasis Android Untuk Guru-Guru Di Sman 1 Bintang Timur Kabupaten Bintang," *Bubungan Tinggi: Jurnal Pengabdian Masyarakat* 5, no. 2 (2023): 948–57.

instructional media for teachers at Public Senior High School 1 of Bintan Timur, in Bintan Regency. He confirmed that the training was valuable to help teachers develop the required skills. The teachers also voiced positive responses and acknowledged the benefits of taking part in the training. The use of TTG books has made it easier for teachers to produce innovative Android-based instructional media¹⁵.

This research aims to improve teacher competence in developing students' problem-solving skills through the development of Articulate Storyline-assisted instructional media. It is also devoted to improving educational praxis. The following is an overview of science and technology integration in the present study.

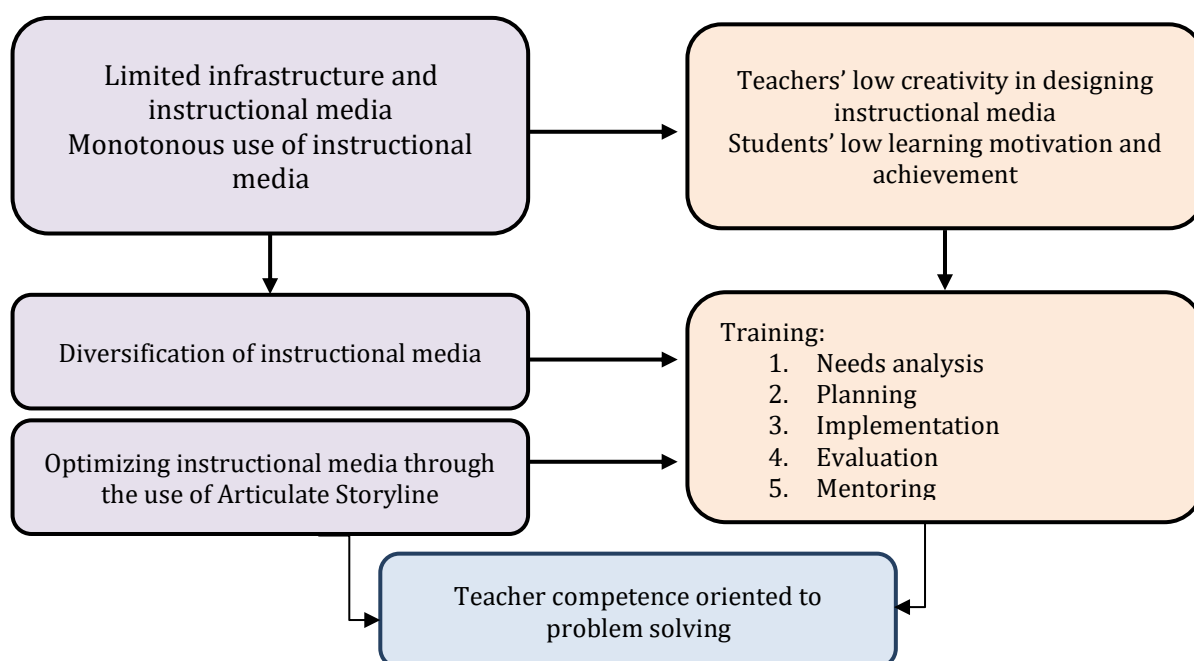


Figure 1. The Science and Technology Element in the Present study (Community Service)

Method

Based on the analysis of the problem, the present study engaged teachers in a sharing session that involved lectures, demonstrations (simulations), and practice. The training cycle consists of 1) observation, 2) sharing knowledge, and 3) Evaluation of training and mentoring.

Observation

Before the community service was conducted, initial preparations were made at Public Elementary School 2 of Kaliwining. The research team began by observing the school and interviewing teachers and the principal to understand their needs and the challenges they faced, particularly regarding the school's infrastructure. The information gathered from both the teachers and the principal provided crucial insights for designing

relevant solutions.

Based on the observations and interviews, the team proceeded to design instructional media that would address the identified needs. This design process involved consulting relevant literature to ensure that the developed teaching materials would effectively meet the requirements and help overcome the challenges faced by the school's teachers.

Sharing Knowledge

At this stage, the team conducted training and mentoring in developing problem-solving-oriented instructional media. These two activities included lectures, demonstrations (simulations), and practice.

Evaluation

At this stage, the team evaluated the success rate of community service by comparing the participants' knowledge before and after the training and mentoring, corresponding to a set of pre-tests and post-tests, respectively. Both tests tapped into the participants' knowledge and skills in developing instructional media oriented to problem-solving skills. The ordinal data were converted into interval data prior to the analyses. The resultant data were analyzed through a normality test, homogeneity test, hypothesis test, and paired sample t-test using SPSS. This range of tests was ultimately geared toward identifying potential gains in teacher skills after training. The whole procedure is displayed in Figure 2.

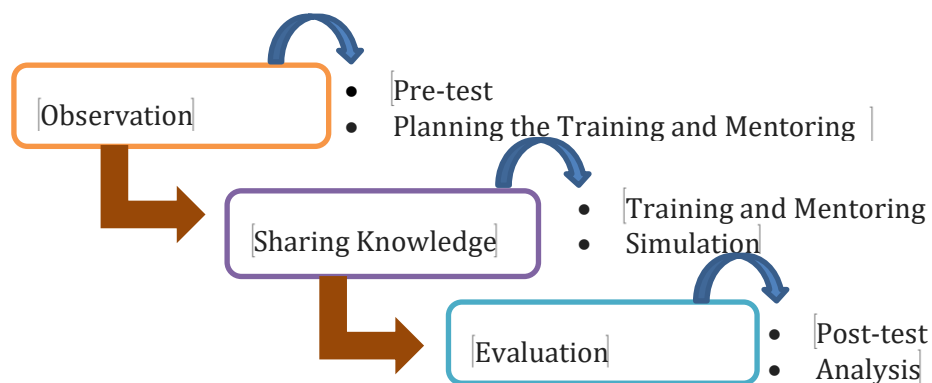


Figure 2. The Stages in Training and Mentoring

Result

Training and mentoring were aimed at increasing teacher competence in developing problem-solving skill-oriented instructional media using Articulate Storyline. This training consisted of observation, sharing knowledge, and implementation evaluation. At the observation stage, the team assessed the teachers' understanding and

needs in developing instructional media. This stage aided in designing relevant training materials for the teachers. The observation results indicated that the majority of the teachers had never received training on how to develop instructional media, presumably as the school is far from the city center. As a corollary, it was arduous to access recent information on teacher training. Limited accessibility and lack of adequate information were also other issues in this regard. This situation indicated the need for teachers to receive accessible training and assistance. In response, the team compiled a guidebook for using Articulate Storylines to develop interactive instructional media, coupled with examples of instructional media developed using Articulate Storylines. This guidebook is published online at <https://unej.id/BukuPanduanArticulate>, thus ensuring easier access for participants. Figure 3 shows the printed version of the book. The importance of guidebooks in implementing training was also expressed by Sahali et al. 16 and Wahyuniar et al. 17.

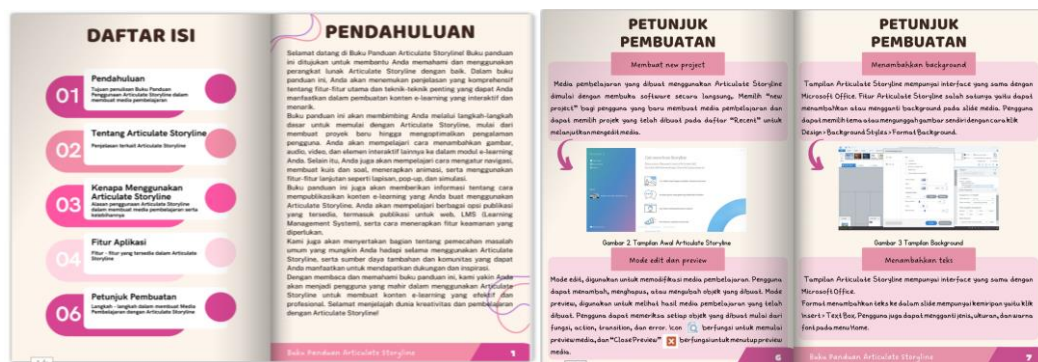


Figure 3. The Guidebook on How to Use Articulate Storyline

In addition, the team also provided examples of instructional media created using Articulate Storylines, and these samples were adapted to indicate students' problem-solving skills. These samples were meant to put the teachers at ease throughout the training, enabling them to grasp important details of the application. Figure 4 is an instructional media: "Vobar Star (Volume Bangun Ruang dan Sisi Datar—the volume of a polyhedron)."



Figure 4. The User Interface of "Vobar Star"

¹⁷ Wahyuniar, Wahyuniar, Desy Kumala Sari, and Rezky Uspayanti. "Pelatihan Komputer Dasar Berbasis Aplikasi Microsoft Office bagi Siswa SMK Negeri 3 Merauke Provinsi Papua." Jurnal Pengabdian UNDIKMA 2.2 (2021): 195-202.

The sharing knowledge session was carried out through lectures, discussions, and the exchange of information between the team and the teachers. This session addressed the basic knowledge about Articulate Storyline-based instructional media and the importance of integrating problem-solving skills in learning. The session also highlighted the concepts and principles of developing effective instructional media. Prior to the session, a questionnaire via Google had been distributed to the teachers to measure their use of Articulate Storyline and the extent to which they facilitated students to play an active role during the learning process. The responses to the survey are shown in Table 1. Several pieces of training that implement the knowledge sharing stage, among others: Increasing teacher pedagogical competence through training on 21st-century learning tools based on independent learning in Pelalawan Regency, Riau.¹⁸ and Training on Preparing Literacy-Based Mathematics Questions and Assistance with Evaluation Practices to Improve the Competency of Middle School Teachers in Tulungagung Regency¹⁹.

Table. 1 The Survey Responses on Training and Mentoring on The Development of Interactive Media with the Aid of Articulate Storyline

Questions	Responses				
	1	2	3	4	5
How often do you use Articulate Storyline-aided instructional media?	46	-	-	3	-
How often do you use Articulate Storyline-aided instructional media to teach problem-solving skills to your students?	45	1	1	2	-
Have you developed your own Articulate Storyline-aided instructional media?	40	-	-	-	-
Do you struggle when using Articulate Storyline?	47	-	-	2	-

The responses are presented on a Likert scale with the following scores: score 1 (never), score 2 (very rarely), score 3 (sometimes), score 4 (often), and score 5 (very usually). The responses demonstrate that 93% of respondents have never used Articulate Storyline for developing instructional media or using it during teaching and learning activities, which implies limited knowledge and experience in using Articulate Storyline. Next, data related to the teacher's ability to improve students' problem-solving skills will be presented. Table 2 presents the questions adapted to the indicators of problem-solving

¹⁸ Ahmal, Ahmal, et al. "Peningkatan kompetensi pedagogik guru melalui pelatihan perangkat pembelajaran abad-21 berbasis merdeka belajar di Kabupaten Pelalawan Riau." Unri Conference Series: Community Engagement. Vol. 2. 2020.

¹⁹ Nafi'an, Muhammad Iman, Mohammad Gufron, and Dian Septi Nur Afifah. "Pelatihan Penyusunan Soal Matematika Berbasis Literasi dan Pendampingan Praktek Evaluasi Untuk Meningkatkan Kompetensi Guru SMP di Kabupaten Tulungagung." J-ADIMAS (Jurnal Pengabdian Kepada Masyarakat) 7.2 (2019): 80-85.

skills.

Table. 2 Questions Adapted to the Indicators of Students' Problem-Solving Skills Solving

Problem Identification	Problem Formulation	Strategy Implementation	Solution Verification
To what extent do teachers help students identify complex problems?	To what extent do the teachers help students formulate problems accurately?	To what extent do teachers guide and support students upon implementing planned strategies?	To what extent do teachers encourage students to evaluate the solutions proposed?
How well do teachers teach students to identify the underlying factors of a problem?	How well do the teachers teach students to formulate goals in solving problems?	How well do teachers facilitate student collaboration in solving problems?	How well do teachers assist students in communicating and explaining their solutions?
To what extent do teachers encourage students to find relevant information related to a problem?	To what extent do teachers provide opportunities for students to discuss and share ideas in formulating problems?	To what extent do teachers encourage students to develop creativity in finding solutions?	To what extent do teachers help students understand and appreciate the variety of possible solutions?

The evaluation focused on the teachers' understanding and skills subsequent to the training. It also assessed the instructional media developed using Articulate Storyline. Teachers were given constructive feedback on how to improve their instructional press, with the ultimate objective of helping them to enhance instructional media with the aid of Articulate Storylines as a springboard for escalating students' problem-solving skills. The pre-test and post-test data were ordinal data on the Likert scale, which accounted for why the conversion to interval data using the Successive Interval Method was necessary. After the conversion, data analysis was performed using SPSS.

Table 3. The Results of the Normality Test

Tests of Normality		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Tests	Statistic	df	Sig.	Statistic	df	Sig.
Results	Pre-test results	.121	49	.069	.964	49	.133
	Post-test results	.087	49	.200*	.988	49	.881

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

As can be appreciated in Table 3, the number of samples (N) is 49 (≤ 50), so the team consulted the Shapiro-Wilk table. From the table, the p values (Sig.) for the pretest and posttest results are 0.133 and 0.881, which means $p > 0.05$, respectively, so the data are considered normally distributed.

Table. 4 The Results of the Homogeneity Test

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
Results	Based on Mean	2.360	1	96	.128
	Based on Median	1.552	1	96	.216
	Based on the Median and with adjusted df	1.552	1	91.484	.216
	Based on trimmed mean	2.319	1	96	.131

In Table 4, $p = 0.128$ ($p > 0.05$) implies that the data is homogeneous.

Table. 5 The Results of Paired Samples Statistics

Paired Samples Statistics					
		Mean	N	Std. Deviation (SD)	Std. Error Mean (SEM)
Pair 1	Pre-test	32.7106	49	1.90931	.27276
	Post-test	35.9199	49	1.59862	.22837

The pre-test results mark an average of 32.71 (SD= 1.909, SEM=0.272). The post-test results have an average of 35.91 (SD= 1.598, SEM= 0.228). This shows that the post-test results on the data are higher than the pretest results, with a smaller SE marked in the latter.

Table 6. The Results of Paired Sample Correlations

Paired Samples Correlations					
			N	Correlation	Sig.
Pair 1	Pre-test & Post-test		49	.794	.000

Table 6 shows a correlation coefficient of 0.794 with $p = 0.000$ ($p < 0.05$). This confirms that the scores between before and after training are significantly related.

Table. 7 The Results of the Paired Sample Test

Paired Samples Test									
		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre-test – Post-test	-3.20922	1.16356	.16622	-3.54344	-2.87501	-19.307	48	.000

The (2-tailed) analysis reports p 0.000 ($p < 0.05$), so the pre-test and post-test results experienced significant changes, with the latter being higher than the former. It can be concluded that training and mentoring in developing Articulate Storyline-aided instructional media can improve teacher competence in improving students' problem-solving skills.

Discussion

During the training, teachers delve into basic knowledge and skills in using Articulate Storyline as a tool to develop instructional media. This stage is pivotal for them to gain an understanding of the features and functionality of Articulate Storyline and how to integrate interactive elements to encourage student problem-solving. Cahdriyana stated that Learning evaluation is one way to determine the level of success of a student's learning process. One of the authoring tools used to develop Android-based interactive evaluations/quizzes is Articulate Storyline.²⁰ Syamsidar carries out articulate storyline assistance to MI teachers in Watampone, which aims to develop teachers' abilities in creating Android-based learning media that can increase students' interest in learning inside or outside the classroom²¹.

After attending the training, teachers are given the opportunity to develop instructional media using Articulate Storylines. During mentoring, the team provides guidance and feedback to teachers to ensure the effective and creative use of this application. Evaluation is carried out to see the extent of teacher competence in developing problem-solving-oriented instructional media.

²⁰ Cahdriyana, Rima Aksen, Rostien Puput Anggoro, and Burhanudin Arif Nurnugroho. "Pelatihan penyusunan kuis interaktif berbasis android." *GERVASI: Jurnal Pengabdian kepada Masyarakat* 5.3 (2021): 468-476.

²¹ Syamsidar carries out articulate storyline assistance to MI teachers in Watampone which aims to develop teachers' abilities in creating Android-based learning media that can increase students' interest in learning inside or outside the classroom.

The results of the mentoring show that teachers can produce more interactive, engaging, and supportive instructional media to amplify students' problem-solving skills. The mentoring aims to provide guidance, support, and learning to teachers so that they can improve their skills in developing effective instructional media. This was reviewed in research conducted by Poerwanti et al.²², Sukmanasa et al.²³, and Nurhayati et al.²⁴. Articulate Storyline-aided instructional media is an interactive instructional media. This was revealed in the research of Khusnah, et al.²⁵ and Putri et al.²⁶. Teachers can integrate interactive features, such as multiple-choice questions, simulations, and problem-based assignments, which enable students to be actively involved in the learning process and improve their problem-solving skills. This is shown by the results of (2-tailed) data analysis with resultant $p = 0.000$ ($p < 0.05$), implying significant improvement from pre-test to post-test. The results are coherent with Saluza et al.²⁷. The evaluation results conclude that Observation, Sharing knowledge, and Evaluation can effectively help teachers increase their knowledge and skills in developing interactive learning videos. This is reported by 30 teachers who managed to improve their knowledge and skills in employing the application. Another research written by Nurcahyanto entitled Interactive Learning Multimedia Development Training in Quality Middle Schools Using Articulate Storyline concluded that the evaluation results showed that teachers' mastery of the training material ranged from 67.85 to 100²⁸.

In addition, teachers reported improved skills in designing assignments and activities that spark students' critical, analytical, and creative thinking. They are also able to create an inviting environment that encourages collaboration between students in solving problems. Teachers subsequently feel more confident and satisfied with their enhanced skills in using Articulate Storyline to develop instructional media focusing on problem-solving skills.

²² J I S Poerwanti and R Winarni, "Pelatihan Dan Pendampingan Merancang Instrumen Assessment for Learning Berbasis Portofolio Pada Guru-Guru Sekolah," *WIDYA LAKSANA* 10, no. 1 (2021): 44–51.

²³ E Sukmanasa, L Novita, and A Maesya, "Analisis Respon Guru Terhadap Pelatihan Dan Pendampingan Media Pembelajaran Berbasis Powtoon Pada Guru Gugus 1 Kota Bogor," *Indonesian Journal of Primary Education* 4 (2020): 111–17.

²⁴ N Nurhayati et al., "Pelatihan Dan Pendampingan Desain Dan Produksi Media Pembelajaran Berbasis Aplikasi Canva for Education Bagi Guru Bahasa Di Kota Palembang," *Dinamisia: Jurnal Pengabdian Kepada Masyarakat* 6, no. 1 (2022): 171–80.

²⁵ Khusnah et al., "Pengembangan Media Pembelajaran Jimat Menggunakan Articulate Storyline. Jurnal Analisa."

²⁶ Putri, Yulinda, and Laili, "Pendampingan Guru Melalui Pengembangan Multimedia Pembelajaran Interaktif Dengan Aplikasi Articulate Storyline."

²⁷ I Saluza et al., "Workshop Pembuatan Video Pembelajaran Interaktif Menggunakan Microsoft Powerpoint Dan Editing Menggunakan Video Editor," *Dinamisia: Jurnal Pengabdian Kepada Masyarakat* 6, no. 6 (2022).

²⁸ Nurcahyanto, Guntur, et al. "Pelatihan Pengembangan Multimedia Pembelajaran Interaktif di SMP Mutu Menggunakan Articulate Storyline." *Sasambo: Jurnal Abdimas (Journal of Community Service)* 5.1 (2023): 102-114.

Conclusion

Training and mentoring in using Articulate Storyline effectively increase teacher competence to develop instructional media oriented to problem-solving skills. Teachers can produce interactive instructional media to support the development of students' problem-solving skills by designing tasks that trigger students' critical, analytical, and creative thinking, which also increases. This training creates a motivating and collaborative learning environment, increasing teachers' confidence in using Articulate Storyline. The use of interactive instructional media positively impacts the learning process in a meaningful fashion. In view of improved teachers' skills and understanding from the pre-test to post-test (p 0.000), the Articulate Storyline can be a practical resource in increasing teacher competency and student problem-solving skills.

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