Digital Training in Building Chatbot-based Online Learning Media: Action Research for Teachers in Semarang City through the "Train The Teachers" Training

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Abstract. The lack of student learning motivation and teacher difficulties in monitoring student learning progress is considered to be the main problems in distance learning, especially during the COVID-19 pandemic. This research employed action research methods by involving 20 teachers in several elementary schools in Semarang City spread across several sub-districts. The research results obtained: First, six steps to determine the increase in teachers' creativity and understanding, namely the introduction of chatbot and chatbot templates as digital learning media in schools; the implementation of the first training session; the assignment of creating and designing chatbots from templates; the implementation of the second training session and finale chatbot feedback. Second, during digital chatbot training, Acita template was used to see an increase in teachers' creativity and understanding of chatbots. The result revealed that, in the aspect of teachers' creativity, the point of chatbot design creativity had increased by 41%, creativity in material integration had increased by 46%, and interactive creativity in chatbots had increased by 33%. In addition, in the aspect of teachers' understanding, the points of understanding of chatbot structure and understanding of chatbot development had increased by 47%.

Keywords: chatbot, digital training, teacher training, teachers' creativity, teachers' understanding

INTRODUCTION ~ The lack of student learning motivation and teacher difficulties in monitoring student learning progress are considered to be the main problems in distance learning, especially during the COVID-19 pandemic. With the recent changes in education caused by the pandemic, teachers are considering alternatives to conventional learning environments (Erturk & Reynolds, 2020). Although there are already many digital-based learning media that can be accessed by teachers and adequate devices, the inability of teachers to face the industrial revolution is actual when the pandemic occurs. Since the industrial revolution is denoted by technological developments, in the world of education, the use of technology can be an exciting innovation and increase interest in learning. In addition, it can also make students aware of the importance of technology literacy (Fitriyah et al., 2021). This can also be seen in the survey results from Festival Revolusi Edukasi (2021), in which the results show that out of 75 teachers, 64% of the teachers agreed that the lack of interest and motivation in student learning during the pandemic was influenced by the use of monotonous and less varied

learning media. Thus, it cannot increase students' interest in learning during distance learning. From these results, it is hoped that teachers can improve their creativity in using learning media during distance learning, especially in the industrial revolution where technology is like being friends with humans. They are also expected to be able to monitor student learning progress anytime or anywhere without network or other obstacles. However, teachers still encounter obstacles during distance learning because of unequal access and facilities of each school, especially for schools with limited access. Additionally, many teachers are still not skilled at using technology.

The obstacles encountered by the teachers can have a negative effect on students' mastery of material which cannot be expected to occur in a short time. Kustandi & Darmawan (2020) argue that students need to do a repetition of learning. Therefore, the teachers must do something in the learning process to make students do a repetition of learning. Some students revealed that the tedious learning materials made them not interested in learning them. To avoid these symptoms, teachers must select and integrate the material into learning media that can stimulate and challenge students to learn it. The implementation of the 2013 Curriculum also requires teachers and students to be skilled in using technology in learning (Astuti et al., 2021). Several aspects must be considered to encourage the growth of competitiveness, namely the innovatively prepared learning system and the competence of graduates with Industrial Revolution 4.0 skills (Learning and Innovations Skills) to be improved. In this case, a professional teachers competency role is needed to educate students as expected (Supandi et al., 2020). Previous research conducted by Ali et al. (2021) shows that teachers have never received training related to technology use in learning. Thus, during the pandemic, schools have difficulty in carrying out learning from home. This problem is caused by teachers who cannot design learning media, videos, and teaching materials to support more effective learning, and teachers are still unable to compile an evaluation of student learning based on information technology so that students can think critically and creatively. Since the teacher cannot adapt to technological advances so that the learning process is still carried out conventionally. Therefore, this research is conducted to find out: (1) What are the problems or obstacles faced by teachers when conducting distance learning?; and(2) How does the creativity and understanding of teachers in developing chatbots increase after being given digital chatbot training?

This research used action research to find out the teachers' creativity in digital learning media based on chatbot to support distance learning and overcome these problems. Furthermore, this research presents literature review, methodology, results, and discussion to answer research questions and conclusions.

THEORETICAL FRAMEWORK

Several researchers in the community service field also carry out training for teachers regarding online learning, as in Slamet et al. (2020) who revealed that skills in creating or utilizing digital content on the internet are one of the easiest ways to do it. The introduction of open-source materials will motivate students and teachers to make contributions to technological developments. Another study conducted by Suhendri et al. (2021) stated that the teachers and the team of operators must show their determination in managing LMS (Learning Management System) in a precise, measurable, and planned manners. Furthermore, the research conducted by Suntoro & Widoro (2020) revealed that teachers should be able to improve their skills independently in designing learning media during the COVID-19 pandemic. In a literature review on developing and assessing TPACK-ready teachers, Mouza (2016) concluded that there is still little research on effective pre-service teacher preparation. As Teresa Foulger explained at the December 2016 Summit hosted by the U.S. Department of Education's Office of Educational Technology, the vision to integrate technology into teacher activities requires technology that is sustainable throughout teacher training programs, not just at the introductory level of a stand-alone technology training program. "Technology integration methods will allow the technology integration curriculum to circulate across student teaching and methods courses—that is, over two years." Faculty involvement throughout teacher preparation programs broadens the scope of who—which teacher educators—must be competent. Considering the importance of using appropriate technology and its affordability can improve learning in certain areas (Herring et al., 2016).

It cannot be denied that the existence of learning media in the learning system is essential. In general, the purpose of teacher training stated by Moekijat (1993) is to increase the knowledge and skills and improve the attitudes of the trainees. Train The Teachers is a continuous program of the Education Revolution in the form of training for teachers and educators on how to use chatbots as online and offline learning media (*Festival Revolusi Edukasi*, 2021). This program can later be used directly in the classroom and has a vision of supporting the *Merdeka Learning* program in the form of developing digital skills for teachers throughout Indonesia, both from IT and non-IT circles, to create a national teacher ecosystem that is creative, innovative and digitally capable. Reported from Tirto.id, one of the automation and AI technology applications is through Chatbot technology (Bhaskara, 2018). Chatbots in the education field can be used to develop learning media for students as presenters of interactive and interesting materials and quizzes (Wijaya et al., 2018). Along with the times and seeing the various impacts of online learning, Chabot is widely implemented in the education world as one of the learning media considered quite effective (Wijaya et al., 2018; Zulkarnain et al., 2020). Chatbots in education have been developed for various purposes. A number of research institutions suggest that chatbots can be used as a tool to

retrieve information on a particular topic (Bickmore et al., 2010, 2013; Fonte et al., 2016; Griol et al., 2017; Mikic et al., 2009; Ranoliya et al., 2017; Rossi & Carletti, 2011), to offer test questions to students (Bickmore et al., 2010; Crockett et al., 2017; Dutta, 2017; Fonte et al., 2016; Gehl, 2014; Griol et al., 2017; Mikic et al., 2009; Pereira, 2016), to practice the language (Ayedoun, E, et al 2015; Jia, J, 2009), to increase student motivation (Heller, R., & Procter, M. 2009), or to enhance student creativity. Based on these problems and opportunities, the researcher together with mentors in a certified internship program held a digital training called Train The Teachers in which the core of the training activity was that teachers were given chatbot templates and were free to be creative in modifying chatbots in accordance with the needs in the classroom with applicable programming, especially for teachers who do not even have an IT background. To contribute to previous research, this research focuses on increasing the creativity of teachers in developing digital learning media using chatbot templates by taking actions in the form of digital training called the Train The Teachers. This action research is expected to produce digital learning media that can be used as a solution to the problems of students and teachers during Distance Learning and help teachers who have difficulty with technology in the classroom.

METHODS

Research Design

This research employed action research methods to explore problems to find solutions (Creswell, 2012). This research is similar to the learning problems experienced by students in participating in teaching and learning activities, especially during a pandemic in which teachers have not been able to implement the industrial revolution, particularly in learning media during distance learning. In addition, action research provides the researcher with a broad space to find innovations in order to create changes that are in accordance with existing needs and problems (Darwis, 2016). By using action research, it is believed that teachers can increase morale and self-confidence through training (Jenkins & Crawford, 2016; Pelton, 2010), practice (Amin et al., 2019; Vo et al., 2018) to develop self-identity, and foster a sense of belonging to the school community, especially for prospective teachers who can easily facilitate integration when placed in schools (Almahdi, 2019; Amin et al., 2019).

Participants

The participants of this research were primary school teachers in Semarang City who have experience in teaching. The teachers came from several sub-districts, such as four teachers from Tembalang (20%), three teachers from Mijen (15%), three teachers from Gunung Pati (15%), two teachers from Banyumanik (10%), two teachers from East Semarang (10%), one teacher from Pedurungan (5%), one teacher from West Semarang (5%), one teacher from Central Semarang (5%), one teacher from North Semarang (5%), one teacher from Gayamsari (5%), and one teacher from Gajah Mungkur (5%). In this research, the purposive sampling

technique was used to determine the sample with certain considerations and criteria in accordance with the research objectives (Sugiyono, 2008). The sample criteria are teachers with more than six months of teaching experience. This research also involved other parties, namely mentors from the researcher in a certified internship program. The researcher is a Primary School Teacher Education student who was carrying out a certified internship program while completing a final project in collaboration with a mentor who is a facilitator of the Artificial Intelligence community-based in Singapore named ai4impact. The community was currently implementing a teacher training project in developing chatbot-based digital learning media that has received cooperation from various parties, such as the Minister of Education and Culture, the West Jakarta Education Board, and several universities in Indonesia.

Procedure

This research was conducted online for three weeks, from 7 January 2022 to 21 January 2022. The procedure in this research combined the steps in AR design with the theory developed by Kern (2000) known as 3R, namely Responding, Revising, and Reflecting.

The 3R procedure shows a reciprocal relationship between mentors and participants who are teachers. In the first R (Responding), the teacher listened to the training provided by the researcher and other mentors. Meanwhile, the mentor responded by providing feedback in the form of a question and answer session and the assignment of the first week of developing a chatbot in groups to find the extent of the participant's understanding of the first training material carried out. In the second R (Revising), a feedback session was conducted by the mentor on the tasks previously collected. In addition to the material feedback, the second session of training is still ongoing with re-assignment to finalize the chatbot from the beginning to the end of the training. In the third R (Reflecting), the mentor evaluates the entire chatbot submitted by the participants. Meanwhile, pitching is also held for the selected group based on the assessments of several mentors. In this reflection, the mentors and the researcher also asked questions orally about what they felt during the training in the form of (1) How useful is the Train the Teachers training? (2) Do you think chatbots can be a solution to the learning problems above? (3) How satisfied are you with the chatbot you have developed?

Data Collection

The data were collected by conducting a survey using a questionnaire made with Google Form, the survey using the ordinal scale, and the Likert scale. Some questions allowed respondents to write down their personal opinions on the list of questions or statements listed. Subsequently, the answer results were distributed using Google Sheets. Therefore, the research instrument used consisted of surveys and insight tests about LMS and chatbot before and after

the Train The Teachers training (pre-and post-test). Questionnaires were used to collect quantitative data by comparing the skills of teachers before and after the training.

The collected data were then tested for the N-Gain Score by looking at the percentage, then the normality test. If there are significant differences in the results, the Train The Teachers digital training process was effective in increasing teachers' creativity and understanding of chatbots. The N-Gain formula is:

$$\text{N-Gain} = \frac{\text{Post Test Score} - \text{Pretest Score}}{\text{Ideal Score} - \text{Pretest Score}}$$

Table 1. N-Gain Level Criteria

Average	Criteria
g > 0.7	High
0.3 ≤ g ≤ 0.7	Adequate
0 < g < 0.3	Low
g ≤ 0	Fail

(Hake, 1999)

Table 2. Indicators of Development of Teachers' Aspects of Creativity and Understanding of Chatbots

No	Aspect of Creativity	Information	Indicator	Target
1.	Chatbot Design Creativity	Being able to modify chatbot from chatbot name, avatar, and description when chatbot link is shared. Avatars, backgrounds, bubble chat & font colors, fonts, fonts, and emojis on chatbot.	1. Being able to modify chatbot name, avatar, and chatbot description when chatbot link is shared. 2. Being able to modify the name, avatar, and description for the chatbot link when shared as well as the avatar and background on the chatbot. 3. Being able to modify avatar, background, chat bubble color & font on chatbot. 4. Being able to modify chatbot from the avatar, background, bubble chat color & font, font, and emoji on chatbot. 5. Being able to modify all points and intro on the chatbot.	75%

[193]

| 2. | Content Integration Creativity on Chatbot | Being able to integrate learning materials on chatbots according to the curriculum and primary school materials into chatbot content. | 1. Being able to distinguish folders for material and practice questions. 2. Being able to insert material or practice questions on the chatbot. 3. Being able to insert material or practice questions on the chatbot. 4. Being able to summarize material into bullet points and design answer choices for exercises on chatbots. 5. Being able to summarize PowerPoint material according to the elementary school curriculum, design answer choices in practice questions, and add pictures/videos to the chatbot. | 75% |
| 3. | Interactive Creativity on Chatbot | Being able to make chatbots as interactive game learning media can increase student learning motivation. | 1. Being able to find a folder to change the button on the main menu & other menus. 2. Being able to change the writing on the button on the main menu. 3. Being able to change and design the text on the button on the main menu. 4. Being able to change and design the text on the button on the main menu & other menus. 5. Being able to change, design text, and add and remove buttons on the main menu and other menus. | 75% |

Table 3. Indicator of Teachers' Understanding Aspect

No	Aspect	Information	Indicator	Target
1.	Teachers' understanding of chatbot structure	Being able to understand what things are in the chatbot.	1. Having heard of or seen a chatbot. 2. Knowing what a chatbot is. 3. Knowing how chatbots work in general. 4. Understanding the role of chatbots as online/offline learning media. 5. Understanding the role of chatbots as learning media and what aspects must exist in chatbots.	75%

2.	Teachers' understanding of chatbot structure	Being able to develop/modify chatbot until the end of the lesson with/without learning books & videos	1. Being able to create your chatbot account on the Autocaffe platform.	75%
			2. Being able to publish your chatbot account on the Autocaffe platform.	
			3. Being able to modify the chatbot template that has been given into the appropriate material chosen by the teacher from the main menu-modify practice.	
			4. Being able to modify the chatbot template that has been given into the appropriate material chosen by the teacher from the main menu-creating class and user IDs on the chatbot.	
			5. Being able to modify and design the chatbot as a whole from materials, exercises, class and user IDs, and buttons to UI-UX designs on chatbots.	

RESULT

Pre-Action Analysis

A total of 20 teachers (100%) were surveyed to find out a number of discussions related to the most important problems encountered in student learning at school or in the classroom, teachers' views on chatbots, the effectiveness of using chatbots, and teachers' interest in offline-based chatbot training. When teachers were given several choices regarding the most important problems in learning, there were 16 teachers (80%) who found it difficult to monitor students' learning progress, 15 teachers (75%) answered the lack of interactive media (e.g., quizzes, questions, and answers) among students and teachers, 13 teachers (65%) answered a lack of online learning materials to use in online classes, and 12 teachers (60%) answered that students' lack of interest and motivation in learning. Based on these conditions, the researcher re-traced learning problems, and nine teachers (45%) answered the lack of student learning facilities including cellphones and uneven internet access.

The researcher tried to identify teachers' views on chatbots, the effectiveness of using chatbots, and teacher's interest in offline-based chatbot training through a Likert scale survey (1 "Strongly Disagree" – 2 "Disagree" – 3 "Slightly Disagree" –4. "Agree" – 5 "Strongly Agree") (Julia et al., 2020).

The teachers were asked whether chatbots could be a solution to educational problems. A total of 15 teachers (75%) answered agree, three teachers (15%) answered disagree, and two

teachers (10%) answered strongly agree. The researcher also surveyed teachers' knowledge of how difficult it was to develop their chatbot. A total of four teachers (70%) responded agree, five teachers (25%) answered strongly agree, and only one teacher (5%) answered disagree. Seeing the average response from teachers who answered that it was difficult to develop a chatbot, the researcher also explored how interested teachers were in the "Train the Teachers" digital training by asking teachers whether digital chatbot training should be carried out offline. The teachers responded that ten teachers (50%) answered strongly agree, five teachers (25%) answered strongly agree, four teachers (20%) disagreed, and there was one teacher (5%) who answered strongly disagree if the "Train The Teachers" digital training was done offline.

These results conclude that most teachers already knew the effectiveness and had an interest in the development and use of chatbots as learning media innovations but are still disturbed by the thought of the difficulty of developing chatbots. These results also indicated that when teaching distance learning, teachers only used learning media that are very common, such as WhatsApp groups, Zoom, Google Meet, etc. However, the teachers' high motivation and interest to learn to develop chatbots for learning media innovations that can be applied in schools make teachers involved in digital chatbot training to develop teachers' creativity while increasing teachers' understanding of chatbots.

Action Implementation

In attempting to achieve this target, several steps were taken to improve the aspects of teachers' creativity and understanding of chatbots. The steps refer to the theory proposed by Kern (2000), namely Responding, Revising, and Reflecting (3R). The first R (Responding) is carried out at the pre-action stage by capturing the teacher's initial ability to creativity and understanding of chatbots. Therefore, the second R (Revising) is carried out to determine the authenticity of training at the action stage. This stage includes various activities in designing improvement efforts based on problems, starting from planning, the media used, and implementing improvements in learning.

Step 1: Introducing Chatbots as Digital Learning Media in Schools

At this stage, the teachers were given material related to the description of a chatbot, which is a computer program designed to perform certain tasks through communication with humans via text messages and combined with artificial intelligence (AI) (Hwang et al., 2019); the advantages of chatbots as learning media; advantages possessed by chatbots; how to create an engaging and interactive chatbot; and how chatbots in education are also a solution to learning problems. This research reveals that implementing chatbots in education is a growing trend. Consideration of the use of chatbots in education turned out to be beneficial for some time. Chatbots can be used as media that support the learning process like on mobile

(Alepis & Virvou, 2011; Dutta, 2017; Fonte et al., 2016; Griol et al., 2017; Pereira, 2016; Ranoliya et al., 2017), and on the web (Ayedoun et al., 2015; Crockett et al., 2017; Gehl, 2014; Rossi & Carletti, 2011).

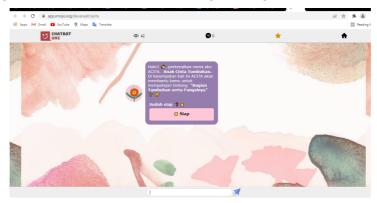***Step 2: Introducing Chatbot Templates Used During Training***

Figure 1. Acita, Chatbot Template

At this stage, the mentor introduces a chatbot template called Acita (*Aku Cinta Tanaman* – I Love Plants). The Acita chatbot in Figure 1 is a biology chatbot that is literate in nature but can also be used for numeracy subjects. In addition, issues related to the teachers' ability to creativity and understanding of chatbots have also been studied before the training. This step was carried out to obtain an idea of the teachers' initial abilities in the scope of creativity and basic understanding based on the developed indicators. The indicators for the scope of creativity are (1) Chatbot Design Creativity, which is the ability to modify the chatbot from the chatbot name, avatar, and description when the chatbot link is shared. Avatar, background, bubble chat & font colors, fonts, and emojis on chatbot; (2) Creativity of Material Integration on Chatbots, which is the ability to integrate learning materials on chatbots in accordance with curriculum and primary school materials into chatbot content and (3) Interactive Creativity on Chatbots, which is the ability to make chatbots as interactive game learning media that can increase learning motivation student.

Table 4. Pre-Test on Aspects of Teachers' Creativity and Understanding

Pre-Test	Aspect	Indicator (%)				
		1	2	3	4	5
Pre-Test on Teachers' Creativity	1. Chatbot Design Creativity	100	65	20	0	0
	2. Content Integration Creativity on Chatbot	100	50	0	0	0
	3. Interactive Creativity on Chatbot	100	90	35	0	0

		100	80	10	0	0
Pre-Test on Teachers' Understanding	1. Teachers' understanding of chatbot structure	100	80	10	0	0
	2. Teachers' understanding of chatbot development	100	80	15	0	0

Table 4 shows the results of the pre-test on teachers participating in the chatbot training in Semarang City. By using the indicators previously made with the mentor, the pre-test results of the aspect of the teachers' creativity were obtained in the Creativity Design Chatbot points. There was only one indicator that could be represented by all participants, namely 20 teachers (100%) who were able to modify the chatbot name, avatar, and chatbot description when the chatbot link was shared. As for the second indicator, there were 13 teachers (65%) who were able to modify the name, avatar, and description for the chatbot link when it was shared as well as the avatar and background on the chatbot. In the third indicator, the four teachers (20%) were only able to modify the avatar, background, and bubble chat and font colors on chatbots.

Furthermore, on the point of Content Integration Creativity on Chatbot, there were 20 teachers (100%) who were able to distinguish folders for material and practice questions, and ten teachers (50%) who were able to enter material or practice questions on the chatbot.

The last point on the teachers' creativity aspect is Interactive Creativity on Chatbot in which 20 teachers (100%) managed to find a folder to change the main menu buttons & other menus, and 18 teachers (90%) were able to change the writing on the buttons on the main menu. Meanwhile, in the last indicator, there were only seven (35%) teachers who were able to change and design the writing on the main menu button. Therefore, these results indicate that from several indicators, only the first indicator out of three points could be carried out by teachers. In addition, there was one additional indicator of Interactive Creativity points on Chatbot in which successful teachers reached more than 80%.

By using the same indicators made with the mentor and the first and second supervisors, the pre-test results on the aspect of the teachers' understanding of the chatbot were obtained. At the point of the teachers' understanding of the chatbot structure, the results reveal that there was only one indicator represented by all participants, namely teachers who have heard or know about chatbots, with a total of 20 teachers (100%). Then, in the second indicator, 16 teachers (80%) knew about chatbots. Whereas, in the third indicator, only two teachers (10%) understood the role of chatbots as online/offline learning media.

The second point explains the teachers' understanding of chatbot development. There were 20 teachers (100%) who were able to create their chatbot accounts on the Autocaffe

platform. Furthermore, in the second indicator, 16 teachers (80%) were able to publish their chatbot accounts on the Autocaffe platform. Meanwhile, in the last indicator, only three teachers (15%) were able to modify the chatbot template given into the appropriate material chosen by the teacher from the main menu-modify exercises. Based on the pre-test results on the teacher's understanding aspect, from several indicators, only the first indicator out of two points was able to be carried out by all teachers. Meanwhile, the second indicator successfully reached 80%, which means that the value exceeded the target as shown in Table 2.

Step 3: Implementing the First Session of the Training

In the third step, the mentor would demonstrate how to modify the Acita chatbot divided into several sessions. In the first session, the mentor demonstrated how to change the Acita design and change the materials/questions contained in the chatbot. The teachers had previously been given a technical guide to the Acita chatbot so that if they were left behind or did not understand the demonstration, the teacher could open the guidebook. As mentors as well, learning videos have been made so that teachers can watch videos, read guidebooks, and take part in demonstrations during the training.

Step 4: Assigning the Creation and Design of a Chatbot from a Template for a Week

In the fourth step, the teachers were given an assignment with a period of one week to develop their chatbot in groups with three to five members. They could develop chatbots from what had been demonstrated by previous mentors, guidebooks, and learning videos made by mentors. In this case, the mentor as an AI expert conveyed several tips, including integrating learning videos into chatbots and displaying interactive games. This is in line with Checa & Bustillo (2020), which showed that a balanced learning method could be through virtual tours with video clips and using game elements to attract students' attention and complement it by watching videos more effectively.

Step 5: Implementing the Second Session of the Training

In step 5, the implementation of the second training session was carried out the day after the deadline for collecting the first chatbot. The second session of the training discussed the chatbots that the teachers had created by providing feedback on the five best chatbots. The teachers have succeeded in designing and customizing the chatbot in one week. The formation of groups of three to five people when developing a chatbot turned out to be significant in the chatbots made by the teachers. In addition to feedback, the mentor also provided material in the form of how to create a class version of the chatbot. This version of the class was when the chatbot was added with a User ID or Class ID in order to filter students who could access the chatbot. This version would greatly facilitate teachers in monitoring students in accordance with their respective classes. In addition to adding classes, this class version of the chatbot could record the students' grades who had taken quizzes on the

chatbot. With easy programming, the teachers could monitor and see student learning progress and find out how students' cognitive development was when given quiz questions based on their respective chatbot material.

Step 6: Giving Feedback for Finale Chatbot and Choosing the Best Chatbot

This last step shows in action that the teachers re-collected the previously fixed chatbot results. By presenting the five best chatbots in order to motivate teachers and choosing the best chatbot that will get a Certificate of Excellence, two chatbots named G-G (Chatbot about Energy) and ASTRO_BOT (Chatbot about outer space) were selected. Both chatbots succeeded in obtaining international certificates and were able to present their chatbots to be introduced to the Indonesian Minister of Education and Culture.

Table 5. Post-Test on Aspects of Teachers' Creativity and Understanding

Post-Test	Aspect	Indicator (%)				
		1	2	3	4	5
Post-Test on Teachers' Creativity	1. Chatbot Design Creativity	100	100	100	75	25
	2. Content Integration Creativity on Chatbot	100	100	100	70	10
	3. Interactive Creativity on Chatbot	100	100	100	65	25
Post-Test on Teachers' Understanding	1. Teachers' understanding of chatbot structure	100	100	100	80	20
	2. Teachers' understanding of chatbot development	100	100	100	100	30

Table 5 shows the post-test results for teachers who participated in chatbot training in Semarang City. The results for the aspect of teachers' creativity on the Creativity Design Chatbot points were obtained by using the indicators previously created with the mentor. There were three indicators were able to be represented by all participants, namely the teachers were able to modify the chatbot name, avatar, and chatbot description when the chatbot link was shared; the teachers were able to modify the name, avatar, and description for the chatbot link when shared as well as the avatar and background on the chatbot; and the teachers were able to modify avatar, background, and bubble chat & font colors on chatbot. In addition, in the indicator 4, there were 15 teachers (75%) who were able to modify the chatbot from the avatar, background, bubble chat and font colors, fonts, and emojis on the chatbot, and finally, on indicator 5, only five teachers (25%) were able to modify all points, and introduce to the chatbot.

Then, at the point of Material Integration Creativity on the Chatbot, three indicators were able to be represented by all participants, namely 20 (100%); namely, the teacher is able to distinguish folders for material and practice questions, able to enter the material or practice questions on the chatbot, and able to enter the material and practice questions on the chatbot. In indicator 4, 14 teachers (70%) responded that they were able to summarize the material into points and design the answer choices for exercises on the chatbot. In addition, in indicator 5, there were only two teachers (10%) who were able to summarize point material according to the primary school curriculum, design answer choices in practice questions, and add pictures/videos to the chatbot.

Then on the third point, namely Interactive Creativity on Chatbot, similar to the previous points, there were three indicators in which all teachers (100%) had mastered, namely teachers are able to find folders to change main menu buttons & other menus, able to change the text on the buttons on the main menu, and able to change and design the text on the buttons on the main menu. Meanwhile, in indicator 4, 13 teachers (65%) responded that they were able to change and design the writing on the main menu button and other menus. Whereas, in indicator 5, only five (25%) teachers were able to change, design writing, and add and subtract buttons on the main menu and other menus.

Furthermore, the researcher observed the post-test results on the teachers' understanding of the chatbot in Table 5. Based on the indicators on the point of understanding the chatbot structure, three indicators could be represented by all participants, namely 20 teachers (100%) who had heard or seen chatbots; knew what chatbots are, and understood the role of chatbots as online/offline learning media. Meanwhile, 16 teachers (80%) responded that they understood the role of chatbots as online/offline learning media. In indicator 5, only four teachers (20%) responded that they understood the role of chatbots as learning media and what aspects should be included in chatbots.

Based on the second point, namely the teachers' understanding of chatbot development, the four indicators were able to be represented by all participants. In other words, 20 teachers (100%) responded positively to these four indicators, namely, teachers were able to create their chatbot account on the Autocaffe platform; teachers were able to publish their chatbot account on the Autocaffe platform; teachers were able to modify the chatbot template given into the appropriate material selected by the teacher from the main menu-modify exercises; teachers were able to modify the chatbot template given into the appropriate material chosen by the teacher from the main menu-creating class IDs and user IDs on the chatbot. Meanwhile, in the fifth indicator, only six teachers (30%) responded that they were able to modify and design the chatbot completely from materials, exercises, class and user IDs, and buttons to UI-UX design on the chatbot.

Post-Action Evaluation

This stage is the implementation of the third R (Reflecting), which evaluates the entire series of actions taken in research activities. This last stage aimed at getting an idea of the extent to which improvements have been achieved in solving research problems. The data from the pre-test and post-test results are presented in the tables, then the N-Gain Test and Normality Test are analyzed using the SPSS computer program. In other words, there are differences in the creativity and understanding of teachers after being given training in a digital chatbot or the Train the Teachers.

After conducting the N-Gain Test contained in the table in the appendix, the average result for the Teacher's Creativity Aspect was 64.38%, while the Teacher's Comprehension Aspect was 46%. Meanwhile, based on the criteria of the N-Gain, there was an effective increase in both aspects after the implementation of the Train the Teachers training. As an illustration of this improvement, the comparison of aspects of teachers' creativity and understanding at the pre-test and post-test stages is presented in Figure 2 and Figure 3.
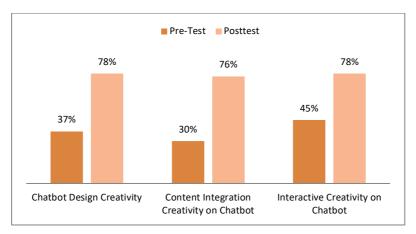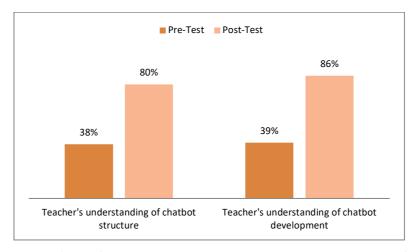

Figure 2. Comparison of the Pre-Test and Post-Test Results on Aspects of Teachers' Creativity

Figure 3. Comparison of the Pre-Test and Post-Test Results on Aspects of Teachers' Understanding

Figure 2 shows an increase in the results of the pre-and post-test aspects of creativity. At the point of creativity in chatbot design, the participants' ability was 37% in the pre-test and then increased to 78% in the post-test, indicating that the data of creativity in chatbot design increased by 41%. At the point of creativity in integrating material on the chatbot, the participants' ability in the pre-test was 30% and increased to 76%, indicating that the data of creativity in integrating material increased by 46%. Similarly, the point of interactive creativity on the chatbot showed an increase from the pre-test results by 45% to 78% in the post-test, indicating that the data of interactive creativity on the chatbot increased by 33%. Moreover, on the aspects of the teachers' understanding, the data on the teachers' understanding of the chatbot structure was 38% in the pre-test and then increased to 80% in the post-test, indicating that the data of the teachers' understanding of chatbot structure increased by 42%. In addition, the pre-test results on the point of the teachers' understanding of chatbot development obtained 39% in the pre-test, and 86% in the post-test, indicating that the data on the teachers' understanding of chatbot development increased by 47%. Based on the above results, it can be concluded that through digital training, teachers had increased their creativity and understanding of chatbots through pre-test and post-test.

Several studies have expressed similar results. Singh (2018) believed that technology for education today can change students' learning methods. Meanwhile, Havenstein (2008) stated that the technology used for education has benefits for helping students learn better with a broader perspective. Ellison et al. (2007) expressed that it can increase the effectiveness of teacher learning. Moreover, Vanichvasin (2021) stated that the use of technology in education can offer guidance and be used as an information retrieval tool to provide a positive and enjoyable digital learning experience for students with a good digital learning experience. Thus, it can nurture technology-based learning.

DISCUSSION

There are many possible means with technical support that can be integrated as digital learning media to help increase student knowledge through modified learning support. With integrated artificial intelligence, chatbots can be used as digital learning tools to ask questions, provide answers to questions, retrieve information (Abu Shawar & Atwell, 2007), explore online content (James, 2016), provide useful information (Brandtzaeg & Følstad, 2017), and propose possible solutions to individual students (Singh, 2018) as several studies have shown that poor personal support can lead to weak student learning outcomes while good personal support can improve student learning outcomes (Brinton et al., 2015; Eom et al., 2006; Hone & El Said, 2016; Pane et al., 2017).

By providing digital chatbot training for teachers, it turns out that problems in teaching and learning activities can be minimized. In addition, this digital training can trigger creativity

among teachers to make their chatbot a top chatbot and get an international standard certificate of excellence and will increase the opportunity to be recognized by the Minister of Education and Culture for their chatbot. Teachers can also learn basic coding easily using a partner-made platform called Autocaffe, which is extremely supportive in creating chatbots for teachers who do not come from an IT background. This research shows the application of the Responding, Revising, and Reflecting model succeeded in increasing teachers' creativity and understanding of chatbots after being given digital chatbot training or the Train the Teachers. This increase could be seen from the post-test results tested for normality. There was an increase in the results of the pre-and post-test on the aspect of creativity. This increase is inseparable from the steps taken. In the Revision stage, there were six reflective action steps, namely introducing chatbots as digital learning media in schools, introducing chatbot templates used during training, implementing the first training session, assigning one week to create and design chatbots from templates, implementing the second training session, and providing feedback finale chatbot and choosing the best chatbot.

CONCLUSION

This research found that several learning problems currently needed to be a concern for teachers. In addition, these problems can also be studied as further research on the effect of primary school level learning problems in Indonesia. The main learning problems can be seen in the difficulty of monitoring the learning progress of students and the lack of interactive media (e.g., quizzes, questions, and answers) between students and teachers. After carrying out the N-Gain Test, the average results on the aspects of the teacher's creativity and the teachers' understanding show that the participants' ability in the pre-test increased after conducting the post-test. At the point of creativity in integrating material on the chatbot, the participants' abilities increased in the pre-and post-test results. Likewise, at the point of interactive creativity on the chatbot, there was an increase in the results of the pre-and post-test. Then, on the aspect of teachers' understanding, data on teachers' understanding of the chatbot structure increased by 42%. There was also an increase in teachers' understanding of chatbot development by 47%. Based on the results of the N-Gain test, there was a significant increase in the aspects of the teachers' creativity and understanding of chatbots after being given the Train The Teachers training. Therefore, this training can make teachers understand technology better and increase their creativity in building learning media, especially digital ones.

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