Disaster Mitigation Learning Using Katumbiri Model in Early Childhood Education

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***Abstract*—Currently, many disasters occur in all corners of the world, and no one can avoid it, including children. Children are individuals who are still weak and need protection, and the provision of knowledge and skills so that they can protect themselves from every disaster that befalls them. Children's resilience to disasters must be physically and mentally strong, so disaster mitigation teaching is needed for children who integrate Islamic values so that children can become individuals who have mental strength and are aware that every disaster has various life lessons to make every human always be grateful and better. Therefore, the model used in teaching is the Katumbiri disaster mitigation model, which is a disaster mitigation learning model that is in accordance with children's development and integrates Islamic values. The method used in this research is a pre-experiment, and a one group pretest-posttest design. The method started with a pretest activity to determine children's understanding of disaster mitigation and ended with a posttest that was conducted to determine the level of understanding of children after using the Katumbiri disaster mitigation learning model. The results of the research prove that there is a significant difference between the children's abilities on the pretest results and the children's abilities on the posttest results. This showed that there is a significant effect of teaching disaster mitigation using the Katumbiri model on children's understanding and skills related to disaster mitigation.**

Keywords—disaster mitigation, katumbiri learning model, children

I. INTRODUCTION

Indonesia's geographical position in the ring of fire with 187 volcanoes lined up from the west to the east makes it natural potential for dangerous and destructive disasters. It contains the potential for Tsunamis, volcanic eruptions, earthquakes, landslides, and floods. In addition to natural factors, the potential for disasters is also caused by community factors, making them vulnerable to disasters. The impact of the disaster as reported on the BNPB website is, in 2020, a total of 4,650 disasters were recorded, with details of 376 people dying, 42 people missing, 6,796,707 people suffering and displaced, and 619 people being injured. In addition, there is also an impact on buildings and other facilities, 13,240 houses, 713 educational facilities, 824 places of worship, and 146 health facilities were damaged. In addition to the impact of the natural disaster, the impact of non-natural disasters was also reported for the COVID-19 Epidemic, 743,198 confirmed, 22,138 died, and 611,097 recovered [1,2].

Based on the data above, things that need to be thought about and done regarding potential disasters in Indonesia are not only limited to before and during a disaster, but also after the disaster or until the recovery period. Prior to the incident, physical and mental readiness of mind will reduce panic in the community when an unwanted disaster occurs. Preparedness in dealing with disasters will reduce vulnerability and the severity and negative effects of disasters.

Disasters that occurred never choose who will be the victims. Anyone can be exposed to disasters, both adults and children, both men and women. Unfortunately, children are vulnerable to being victims because of their physical factors, their understanding, and their emotions. However, children have the right to be protected. Considering that children are the nation's assets that need to be protected as an investment for future generations. School is a place where children spend most of their time so it must be a safe place against disasters as well as a place where children learn knowledge about how to save themselves and reduce disaster risk in their environment. During a disaster there are many risks that occur not only from the physical aspect but also from the psychological aspect: anxiety, fear, worry and make children unable to live normally, therefore disaster mitigation that is delivered as early as possible is very useful to reduce these risks [3]. Moreover, based on the results of research conducted by Agustin [4], the obstacles for PAUD teachers in delivering learning during a pandemic are 80% confusion in determining the right teaching method, 84% difficulty in making lesson plans, and 91% confusion in determining teaching media that can be used by teachers, parents, and children.

The occurrence of a disaster not only results in damage to infrastructure, loss of life, and physical injury. More than that, it can also cause psychological disturbances to some victims. In this case, the victims who are affected are not only adults, but children are also one of them. For children, disasters often cause psychological vulnerabilities. They can become very frightened, confused, lost, traumatized, and sad. This can disturb the process of their development. Children who

experience emotional discomfort can certainly resulted in stunted growth and development. Children who are happy and supported in all aspects of their development will grow optimally. Especially during this pandemic, parents have enough time to carry out activities with their children at home, only sometimes, this can cause violence to children due to the inability of parents to carry out their roles as parents, caregivers, and teachers while at home. So, to prevent violence against children because all activities are at home, government action is needed to open schools immediately but still pay attention to health protocols or schools that can be done in a healthy manner from home [5]. Disasters, whatever their forms, are a form of God's love for humans. Various events that befell humans are essentially tests and trials of faith and behavior that have been carried out by humans [6]. Natural disasters are part of the *sunnatullah* (natural laws) that God gave to the universe. The *sunnatullah* impact of nature is certainly attached to its inhabitants. The effort to avoid the ugliness of the existing *sunnatullah* is to choose a place that is considered harmless. Behind every disaster, there is a lesson in it and the experience of being affected by a disaster can be a potential for resilience for a person. Resilience helps someone in dealing with pressure or adapting to something new with various challenges, one of which is disaster [7].

In this research, it is considered important to adopt a religious approach. Remembering that religious moral values are the key to the basic mental and moral development of a person in dealing with disasters wisely. It is necessary to understand the right religious moral attitude so that natural damage does not occur which results in disaster. The values that can be instilled are *tafakuh fil ardi*, *tafakuh fiddin*, and patience in dealing with disasters. Anyone can experience a disaster but understanding and awareness of divinity makes a person resilient when exposed to disasters. It is the same for children. The results of the research proved that 57.4% of *madrasah* teachers had difficulty in delivering Koran learning and religious materials to children during a pandemic [8]. Therefore, PAUD as the basis of the foundation of education for children is hereby deemed important to carry out Islamic value-based disaster mitigation learning in PAUD institutions, so that in addition to knowing the knowledge and skills related to disasters, children will also have mental resilience, become grateful servants, and become members of the community, a better human being for everything that happens.

II. METHODOLOGY

This research uses an experimental method and the research design used is a pre-experimental one group pre-test-posttest design. This design involves one group being given a pre-test (O), given treatment (X), and given a post-test. The success of the treatment is determined by comparing the pre-test and post-test scores.

The research stages include determining the research sample, namely RA Al-Muqoddasah Cimaung, Bandung Regency. The second stage is the implementation of the pre-test to see an overview or initial ability of children related to disaster mitigation knowledge and skills. The third stage of implementing the action is using the Katumbiri disaster mitigation model in teaching mitigation for children. The fourth stage is the post-test to see the results of increasing children's knowledge and skills related to disaster mitigation, the fifth stage is data analysis, and the sixth stage is the conclusion of the research results.

The instrument used is observation to see the children's early abilities, performance tests to see the children's final ability, and documentation to see the children's work during the learning process. Indicators of achievement that are expected from children include able to understand the concept of flood and COVID-19 properly and correctly, able to understand the causes of floods and COVID-19 correctly, able to recite verses/hadith/*mahfudzot* related to the flood and COVID-19 disasters properly and correctly, able to identify and demonstrate efforts to prevent floods and COVID-19 well, and able to identify and demonstrate how to protect themselves during floods and COVID-19 well. While the scale of assessment used is BB (Not yet developed), MB (Starting to develop), BSH (Developing according to expectations), and BSB (Developing very well).

For data analysis, the normality test in this research used the Kolmogorov-Smirnov test with the help of SPSS software version 22. The different test used paired sample t-test with the help of SPSS software version 22. The test hypothesis is as follows:

- H0: There is no difference in the average pre-test score and post-test score.
- H1: There is a difference in the average pre-test score and post-test score.

From the test criteria, if the number is $p > 0.05$, then Hypothesis H0 is accepted and H1 is rejected. Testing the level of significance can be done by comparing the probabilities of sig. with alpha value (α). If the probability value of sig. > alpha value, then it is not significant. Otherwise, if the probability value of sig. < alpha value, then it can be considered as significant. Then, the Gain test is carried out to determine the difference in the increase (Gain) of the ability of Al Muqoddasah Kindergarten children after the action was taken.

III. RESULTS AND DISCUSSION

In the first stage, a normality test on the data from the pre-test and post-test results was conducted. The normality test used in this research is the Kolmogorov-Smirnov test with the help of SPSS software version 22. This was done to see the distribution of the pre-test and post-test scores of children's abilities in Al Muqadasah Kindergarten. The test is done by comparing the probability (sig.) with the alpha value (α). The test criteria are, if (Sig.) > alpha (α), then the test results are said to be normally distributed. The conditions of the normality testing using the Kolmogorov-Smirnov are, if the significant number (Sig.) < 0.05, then the distribution is not normal, but if the significant number (Sig.) > 0.05 then the distribution is

normal. In this normality test, the Asymp. Sig. (2-tailed) 0.200 > 0.05 data was obtained. From this data, it can be explained that the data is normally distributed.

After performing the normality test, the next step is to perform the homogeneity test. Homogeneity test is intended to determine the distribution of data, whether it is homogeneous or not homogeneous. However, in this research there was no control class, so the homogeneity test was not carried out. Then, the next step was immediately taken, which was a different test using paired sample t-test with the help of SPSS version 22 software. The test hypothesis is as follows:

- H0: There is no difference in the average pre-test and post-test scores.
- H1: There is a difference in the average pre-test score and post-test score.

In the test criteria, if the number is p > 0.05, then the H0 hypothesis is accepted and H1 is rejected. Testing the level of significance can be done by comparing the probabilities of Sig. with alpha value (α). If the probability value > alpha value, then it is not significant. The results of the t-test prove that there is a significant difference in children's abilities related to disaster mitigation knowledge and skills. Otherwise, if the Sig. probability value is < alpha value, then it is significant. The test results with the complete t-test are presented in Table 1 below.

TABLE I. AVERAGE TEST RESULTS OF PRE-TEST AND POST-TEST DATA ON THE ABILITY OF AL MUQODDASAH KINDERGARTEN CHILDREN

Paired Samples Statistics					
		Mean	**N**	**Std. Deviation**	**Std. Error Mean**
Pair 1	Pre-test	10.60	10	.966	.306
	Post-test	17.10	10	.994	.314

The data above showed that the average pre-test or mean test results are 10.60. Meanwhile, the average post-test results are 17.10 for the number of respondents of 10 children. The standard deviation value for the pre-test was 0.966 and the post-test was 0.994, while the mean standard error value was 0.306 for the pre-test and 0.314 for the post-test. From the data obtained above, it can be concluded that there is an average difference between the results of the pre-test and the results of the post-test descriptively. To determine the effect of the Katumbiri model disaster mitigation in Al Muqoddasah Kindergarten, an average difference test was carried out. The explanation is in Table 2.

TABLE II. THE RESULTS OF THE AVERAGE PRE-TEST AND POST-TEST OF CHILDREN'S ABILITY IN DISASTER MITIGATION LEARNING THROUGH THE KATUMBIRI MITIGATION MODEL AT AL MUQODDASAH KINDERGARTEN

Paired Samples Test									
		Paired Differences					T	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	*Std. Deviation*	*Std. Error Mean*	*Lower*	*Upper*			
Pair 1	Pre-test-Posttest	-6.500	1.434	.453	-7.526	-5.474	-14.337	9	.000

The table above explained the average difference test on the pre-test and post-test of children's abilities in Al Muqadasah Kindergarten at a significance level of 0.05 that was obtained, which is p (sig.2-tailed) = 0.000. From the data above, it is also concluded that there is a significant difference between the children's abilities on the pre-test results and the children's abilities on the post-test results. This showed that there is a significant effect of teaching disaster mitigation through the Katumbiri model in Al Muqadasah Kindergarten. To identify the increase, the difference in the increase (Gain) of the ability of Al Muqadasah Kindergarten children can be calculated as follows:

$$Gain = \frac{171-106}{200-106} = 0,69$$

As for the gain value category, if g > 0.7, then the significant level of gain is stated in the high category. If 0.03 ≤ g ≤ 0.7, then the gain level is stated in the medium category, and if g < 0.3, then the gain level is in the low category. From the data above, it can be concluded that the gain level is in the medium category because the level is 0.69 and it is 0.03 ≤ g ≤ 0.7. This states that there is an increase in children's knowledge and skills related to disaster mitigation. The increase (gain) for each child in Al Muqadasah Kindergarten is depicted in figure 1 below.

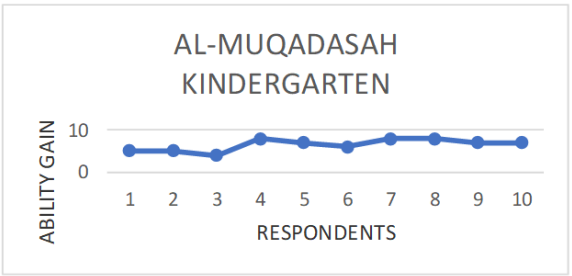

Fig. 1. Ability gain.

An overview of children's knowledge and skills related to disaster mitigation, both natural disasters such as floods and extraordinary disasters or non-natural disasters, such as COVID-19 pandemic, before acquiring the disaster mitigation learning using the Katumbiri model showed that 80% of children were in the MB category or starting to develop. The data obtained through the pre-test on the first achievement

indicator, namely, the children can understand the concept of floods and COVID-19 properly and correctly, showed that all children are in the MB position. This explained that the children are just starting to understand, and a method and activity is needed so that children can be directly involved. This aims at maturing the understanding that each child has. In the second indicator, which is children can understand the causes of floods and COVID-19 correctly, all children are in the BSH category. This can be a bright spot if the material is related to various things that have been experienced by the children directly since it will give birth to a good understanding of one of the reasons for the occurrence of floods and COVID-19. The results showed that children learn through direct experience, and they explore many things than adults to get to know their environment [9].

The results of the pre-test on the third achievement indicator, namely, children can recite verses/hadith/*mahfudzot* related to floods and COVID-19 disasters properly and correctly, showed that 70% of children are in the MB category and 30% are in the BSH category. While in the fourth indicator, namely, children can know and demonstrate efforts to prevent floods and COVID-19 well, showed that all children are in the MB category, which is starting to develop. Moreover, in the fifth achievement indicator, which is children can know and demonstrate how to protect themselves during floods and COVID-19 well, showed that all children are still in the MB category.

Based on the data from the pre-test results, the children's ability to use the material that has been understood in the application stage or the use of skills has become clear. For example, children know and understand the meaning, causes, and methods of prevention, but they are still unable to apply this knowledge in a real context or actual practice, especially for the stage of protecting themselves in disasters, which are still lacking. This could be because children are given more knowledge material but less application and involvement in the process. Direct involvement of children in various activities will encourage children to get used to doing something good and provide a rich experience of real skills that are useful for their life [10]. Therefore, it is necessary to have a learning model that involves children directly in learning but is still in accordance with the developmental characteristics and ways of early childhood learning.

The Katumbiri disaster mitigation model is a learning model used for teaching disaster mitigation to early childhood through three methods: singing, telling stories, and playing, and integrating Islamic values into the material [7]. The Katumbiri mitigation learning model has characteristics that are in line with DAP and the characteristics of children, namely; interesting, can foster children's interest in learning materials, not only memorizing but also understanding the meaning of the things they learn, safe learning atmosphere, free from threats, provide challenges who can develop their curiosity, deliver learning materials by involving concrete experiences through problem solving, raise disaster topics that often occurred around children where children must know and be able to deal with these, and integrate Islamic values so that the learning process can be carried out with full values including divinity value.

This learning model used three methods where each method is interconnected, namely at the early learning stage, children are introduced to concepts related to disasters through lectures and songs containing song lyrics related to the concepts that have been taught. At the core stage, the learning process is carried out through the storytelling method. This method aims at strengthening the concepts that have been understood by children through the involvement of children in stories. The stories told are adapted to the concept of disaster that has been taught at the beginning and verses, hadiths, or short *mahfudzot* related to disasters are added. Therefore, besides listening and being involved in a story, the children know and can recite the divine verse well. At the final learning stage or closing stage, the method used is the playing method. This method aims at strengthening children's memories of the materials that have been conveyed at the initial and core stages. The playing activities can be conducted in the form of experiments or puzzle games.

Based on the post-test results related to teaching disaster mitigation for children through the Katumbiri model, it was found that the average results of children were in the BSB category, which was very well developed. This is proven for the first achievement indicator that children can understand the concept of floods and COVID-19 properly and correctly. The results showed that 40% of children are in the BSH category and 60% of children are in the BSB category, which is developing very well. Meanwhile, in the indicator of children can understand the causes of floods and COVID-19 correctly, 100% of children are in the very well-developed category. This is an indication that learning at the early childhood level cannot be done only through the delivery of material with the lecture or discussion method and or only learn in class, but to enrich children's understanding of the material that has been delivered, children must also be included in various learning activities as well. Learning materials are based on the experiences that children have experienced during their lives. And it takes the ability of parents to make variations of learning methods when studying at home. Based on the results of the study on the resilience of children and families in the face of disasters, it is necessary for parents to be able to integrate models, findings, and defense methods for a better, healthier life and children remain safe in care [11]. Children show limited exploration when learning tasks that are only cognitive in nature, but children show high enthusiasm and exploration when learning involves them and gestures [12].

On the indicator of children can recite verses/hadith/*mahfudzot* related to the floods and COVID-19 disasters properly and correctly, 30% of the children are in the BSH category and 70% of the children are in the BSB category. The teaching of Koran verses, hadith, and *mahfudzot* is an abstract concept for children, but it can become clear and easily understood by children if the delivery is done through involvement and body movements that symbolize the meaning

of what they say and the repetition of these words through various activities such as story. The storytelling method can convey complex language that is difficult for children to understand through oral story activities that direct attention, such as eye contact and hand movements and other body movements so that children feel interested and feel comfortable during learning [13].

For indicator of children can identify and demonstrate efforts to prevent floods and COVID-19 well, 10% of children are in the BSH category and 90% of children are in the BSB category and on the fifth indicator, which is children are able to identify and demonstrate how to protect themselves during floods and COVID-19, 30% of children thrive as expected and 70% of children are developing very well. 63.1% of PAUD teachers need to carry out a strategy that is appropriate, flexible, using varied methods, and oriented to the development of children's potential, especially when children must learn from home. This aims at keeping the children move and enthusiastic in learning. Children are individuals who are very at risk of being affected by disasters based on research results aged 0-18 years are individuals who are vulnerable to the risks and effects of COVID-19. And children are individuals who are affected by anxiety and other psychological symptoms; therefore, an integrated strategy and approach is needed to be able to help children overcome the impact of the pandemic [14].

After using the Katumbiri disaster mitigation model, the children looked more enthusiastic and happier to participate in the learning process because the children liked the method used. Beginning with singing, the children seemed enthusiastic and could follow it because the Katumbiri song had a pleasant rhythm, and the lyrics were simple and repetitive so that children could easily remember it. Through simple song lyrics, educators can easily introduce various basic concepts of knowledge for children. Research showed that 51.5% of children can master a language through motion and song [8]. Likewise with the storytelling method, children look enthusiastically involved in playing the characters in the story and they are seen trying to recite and follow the movement according to the meaning of the verse, hadith, or *mahfudzot* that the teacher teaches, so that apart from memorizing, the children also understand the meaning of the verses they are learning.

On the playing activities, especially on floods and COVID-19 simulation and demonstration activities, the children really like these activities because through these activities, children are directly involved, such as during a flood, children are taken directly to a flooded place, and they try to protect themselves when the water comes. Likewise with the topic of COVID-19, they seem to be serious about simulating activities such as washing hands, wearing masks, keeping a distance even when learning is carried out online, the children follow it happily and parents are involved. This is because in the Katumbiri disaster mitigation model, teachers are also introduced to teach disaster mitigation to children when learning online. These results suggest that interventions and policies designed to increase family involvement in early childhood learning opportunities at school and at home can have a positive and independent effect on a child's later development [15].

On the other hand, the influence of the Katumbiri disaster mitigation model in addition to increasing children's understanding and skills related to disaster mitigation, there is also an influence on institutions and parents. The survey results stated that institutions and schools have begun to improve their preparedness for disaster mitigation by involving teachers in mitigation training, by adding facilities and infrastructure related to mitigation and adding exposures related to mitigation around schools. While the influence that occurred on their parents is the parents became more active in explaining various things related to disaster mitigation to children through singing, playing, and telling stories and preparing disaster-alert bags at home. The results of the research showed that playing and storytelling activities require mothers to innovate and be creative in carrying out the children through this and the attachment between mothers and children become more intertwined [8].

Therefore, it can be clearly seen that there is an increase in children's understanding and skills related to disaster mitigation after learning to use the Katumbiri disaster mitigation model as well as the influence of the Katumbiri model on the preparedness of institutions, schools, and parents in disaster mitigation.

IV. Conclusion

Disasters come unexpectedly and unpredictably at the outset, and children are the weakest individuals and the biggest victims in every disaster. There is a need for a learning model that is suitable for children's development and integrates Islamic values so that in addition to children understanding and skilled about disasters, they also remain strong servants and are always grateful for all disasters that befall them. Based on the research above, the Katumbiri disaster mitigation learning model can be used as an alternative disaster mitigation model for early childhood.

Acknowledgment

Our gratitude goes to LPPM Universitas Islam Bandung, which has provided a very valuable opportunity and funds to carry out this research to completion. We also thank all partners and PAUD teachers throughout West Java who have contributed to providing inspiration and suggestions to make this research better.

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