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Research Article

The Implementation of Disaster Curriculum Toward Disaster Preparedness Campus at Syiah Kuala University

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ABSTRACT

The earthquake and tsunami disasters in Aceh Province, Indonesia led to several injuries, deaths, unfound bodies, and high property losses on 26 December 2004. This hazardous period has reportedly become a valuable case for Syiah Kuala University, where various solutions are being considered for eradicating subsequent occurrences. Therefore, this study aims to determine the implementation patterns of the disaster curriculum developed and applied at Syiah Kuala University, to achieve a DPC (Disaster Preparedness Campus) reputation and enhance DP (Disaster Preparedness) among community members, especially students. A qualitative verification method outlined as a description was used, due to being an inductive approach to the entire experimental process. Data collection was also carried out through observation and literature review, as well as several interviews with the following, (1) The head of the technical implementation unit general course of Syiah Kuala University, (2) The coordinator and lecturer of disaster and environmental knowledge course, and (3) The students of Syiah Kuala University studying the course. After this process, a Delphi method was used to analyze the data obtained, with the outcomes confirmed by a competent expert. Based on the results, three important steps were found to improve disaster preparedness among the people of Aceh and Syiah Kuala University students, namely (1) The establishment of the Tsunami Disaster Mitigation Research Center in 2006, (2) The establishment of the Master Program Study of Disaster Science in the university's Postgraduate Program in 2010, and (3) Development of the general course of disaster knowledge and environment in 2016, which was a compulsory requirement for all students from various faculties, departments, and programs. This indicated that Syiah Kuala University was the first campus to mandate a disaster science course in Indonesia. These results are expected to improve disaster preparedness for students, with Syiah Kuala University becoming a DPC (Disaster Preparedness Campus) in Indonesia.

Keywords : Implementation; Disaster Curriculum; Disaster Preparedness Campus

1. Introduction

Aceh Province is one of the 37 cities located in the western part of Indonesia, with its capital being Banda Aceh. This province geologically lies on the Eurasian and Pacific Plates, as well as the ring of fire exactly part of the circum-Mediterranean (Murtianto, 2010; Banowati, 2013; Hermon, 2015; Gadeng, 2017). Based on this condition, Aceh is very prone to various geological disasters, which have reportedly occurred thrice from 2004 to 2016. This includes the earthquake and tsunami occurrences on 26-12-2004, which were caused by the movement of the Eurasian and Indo-Australian Plates. The fatalities were more than 237,448 people, with the complete estimation not less than 300,000 (Tejakusuma, 2005; Rofi et al., 2006; Shofiyati, 2005). An earthquake disaster also occurred in Central Aceh and Bener Meriah on 02-07-2013, caused by an active fault in Peusangan. Since the epicentre was located 53 km Southwest of Bener Meriah Regency, the fatalities incurred were 42 people (Tagana, 2013). Additionally, an earthquake occurred in Pidie Jaya, Pidie, and Bireun on 07-12-2016, caused by the movement of the active Samalanga-Sipopok fault. From this condition, the fatalities incurred reached 102 people (Tagana, 2016). Besides these hazardous conditions, Aceh Province was also prone to hydrometeorological and social disasters.

Based on the various disaster phenomena in this province, the Acehnese people and students need to have a good level of disaster preparedness. However, these expectations had not been fully realized, according to several previous studies, such as Febriana et al. (2015). This showed that community preparedness was in a good category (69%), with disaster knowledge requiring serious attention (63%). In this case, the training and socialization related to preparedness need to be carried out regularly in the community. Besides community occurrences, inadequate disaster preparedness is also observed within several school environments in Aceh Province. This was in line with Khairuddin, et al. (2011), where the school communities in Aceh Jaya, Aceh Tengah, and Pidie Jaya were only at the level of understanding of various rescue actions, with no good skills observed for disaster preparedness. For Susanti et al. (2014), the community at the Disaster Preparedness School at SDN 02 Banda Aceh City was at a very ready level to handle sudden hazardous phenomena. Subsequently, Nuranda, et al. (2014) also showed that students' attitudes toward handling disasters were not as expected in related mitigation measures at SMPN Banda Aceh City. Table 1 comprehensively shows the disaster information and location prone to disaster in Aceh Province, Indonesia.

Table 1. Disaster information and location which is prone to disaster in Aceh

Disaster Type	Location
Earthquake	All Regencies/Cities in Aceh Province
Tsunami	Sabang, Banda Aceh, Aceh Besar, Pidie, Pidie Jaya, Bireun, North Aceh, Lhokseumawe, East Aceh, Langsa, Aceh Tamiang, Aceh Jaya, West Aceh, Nagan Raya, Southwest Aceh, South Aceh, Aceh Singkil, Simeulue.
Volcanic Eruption	Aceh Besar, Pidie, Pidie Jaya, Bireun, Bener Meriah, Central Aceh.
Tornadoes/extreme weather	All Regencies/Cities in Aceh Province
Extreme Waves and Abrasion	Simeulue, Aceh Singkil, South Aceh, East Aceh, West Aceh, Aceh Besar, Pidie, Bireun, North Aceh, Southwest Aceh, Aceh Tamiang, Nagan Raya, Aceh Jaya, Pidie Jaya, Banda Aceh, Sabang, Langsa, Lhokseumawe.
Epidemic of a disease	All Regencies/Cities in Aceh Province
flood	All Regencies/Cities in Aceh Province
Landslide	All Regencies/Cities in Aceh Province Except Banda Aceh.
Flash floods	Aceh Besar, Pidie, Pidie Jaya, Bireun, Bener Meriah, Central Aceh, Gayo Lues, Southeast Aceh, Subulussalam.

Disaster Type	Location
Drought	All Regencies/Cities in Aceh Province
Forest and Land Fires	All Regencies/Cities in Aceh Province Except Banda Aceh and Lhokseumawe.
Starving	All Regencies/Cities in Aceh Province
Conflict	All Regencies/Cities in Aceh Province

Source: Aceh Disaster Management Agency (2019)

Based on Table 1, all the regencies/cities in this province were very prone to natural disasters, although great knowledge was often obtained from various occurrences with high casualties. This showed a low preparedness level, indicating that the Aceh community was very unprepared for the sudden occurrence of any disastrous phenomena. According to Kurniawati & Suwito (2017), inadequate community disaster preparedness was a factor influencing greater hazardous risk. This was in line with Adiyoso & Kanegae (2013), where a high number of fatalities were caused by the unavailability of an early warning system and inadequate preparedness. These results were subsequently supported by Daud et al. (2014), where fatalities were highly and mainly incurred by a lack of disaster knowledge and preparedness.

Regarding this provincial experience, special efforts need to be provided in enhancing disaster knowledge and attitude as a parameter of DP (disaster preparedness). Besides this, the enhancement should also be possessed by the students of Syiah Kuala University, as the main asset in handling disastrous occurrences. Based on Handoyo et al. (2020), education was an important medium used to prepare and alert communities against the occurrence of disasters. This was due to its provision of a life skill foundation for humans, indicating that individuals living in disaster-prone regions need to be prepared for sudden hazardous conditions (Petal & Izadkhah, 2008). Mutarrak & Pothisiri (2013) also stated that disaster education provided adequate awareness and reduced helplessness. Additionally, Shiwaku et al. (2007) proved that the implementation of disaster education was expected to develop an understanding of DM (Disaster Mitigation).

According to Indonesian Law 24/2007 concerning Disaster Management, Article 47 clause 2 stated that mitigation activity was carried out through the implementation of education, counselling, as well as conventional and modern training. Disaster education should also be applied in the formal educational systems in Indonesia, to achieve the maximum learning outcome. For Sukoco (2021), students were guided to play an active role in enhancing cognitive, psychomotor, and affective ability in disaster management awareness. Chen & Lee (2012) also stated that disaster education should be applied in formal educational systems.

Based on initial observations, Syiah Kuala University has reportedly started to apply disaster curricula and programs to all its students without exceptions. These actions emphasize the institution's aim to become a disaster preparedness campus (DPC), whose difference to DPS (Disaster Preparedness School) only prioritizes level. This shows that DPS starts from kindergarten to the levels of elementary, as well as junior and senior high schools, with DPC only considered for higher education. DPC is the empowerment and enhancement of higher education in disaster risk preparedness and mitigation, through planning, implementation, monitoring, and evaluation (Widiamurti et al., 2012). This is to enhance students' disaster preparedness toward the provision of direct and indirect assistance to the community members. According to Widiamurti et al. (2012), the goals of DPC emphasized the enhancement of higher education and community capacities for disaster preparedness, risk reduction, and emergency response.

This was in line with Lanni (2019), regarding the role of higher education in disaster management in Indonesia. These performances were accompanied by Maryati (2016), which focused on the synergy of higher education, government, and community members in disaster risk reduction.

Ilham et al. (2016) also prioritized the evaluation of disaster education participation among the Medical Faculty students of Syiah Kuala University, after following BDM (Block Disaster Management). Additionally, Kurniawati & Suwito (2017) emphasized the influence of disaster knowledge on preparedness attitude, among the students of the Geography Study Program at Kanjuruhan Malang University.

Irrespective of these reports, no analysis has specially explained the concrete and real steps performed by Syiah Kuala University toward becoming a DPC, to enhance students' preparedness as community change agents. Therefore, this study aims to determine the implementation patterns of the disaster curriculum developed and applied at Syiah Kuala University, Aceh Province, Indonesia, to achieve a DPC reputation and enhance DP among community members, especially students.

2. Methods

This study was conducted from April to June 2019 at Syiah Kuala Darussalam University, Banda Aceh City, Aceh Province, Indonesia. A qualitative verification method outlined as a description was used, due to being an inductive approach to the entire experimental process. According to Bungin (2010), the verificative qualitative method highly considered the development of formats and strategies for field data collection through an inductive model. Creswell (2010) also stated that the method was used for exploring and understanding some individuals ascribed to social or humanitarian problems. This involved important efforts, such as question and procedure assessments, as well as data collection.

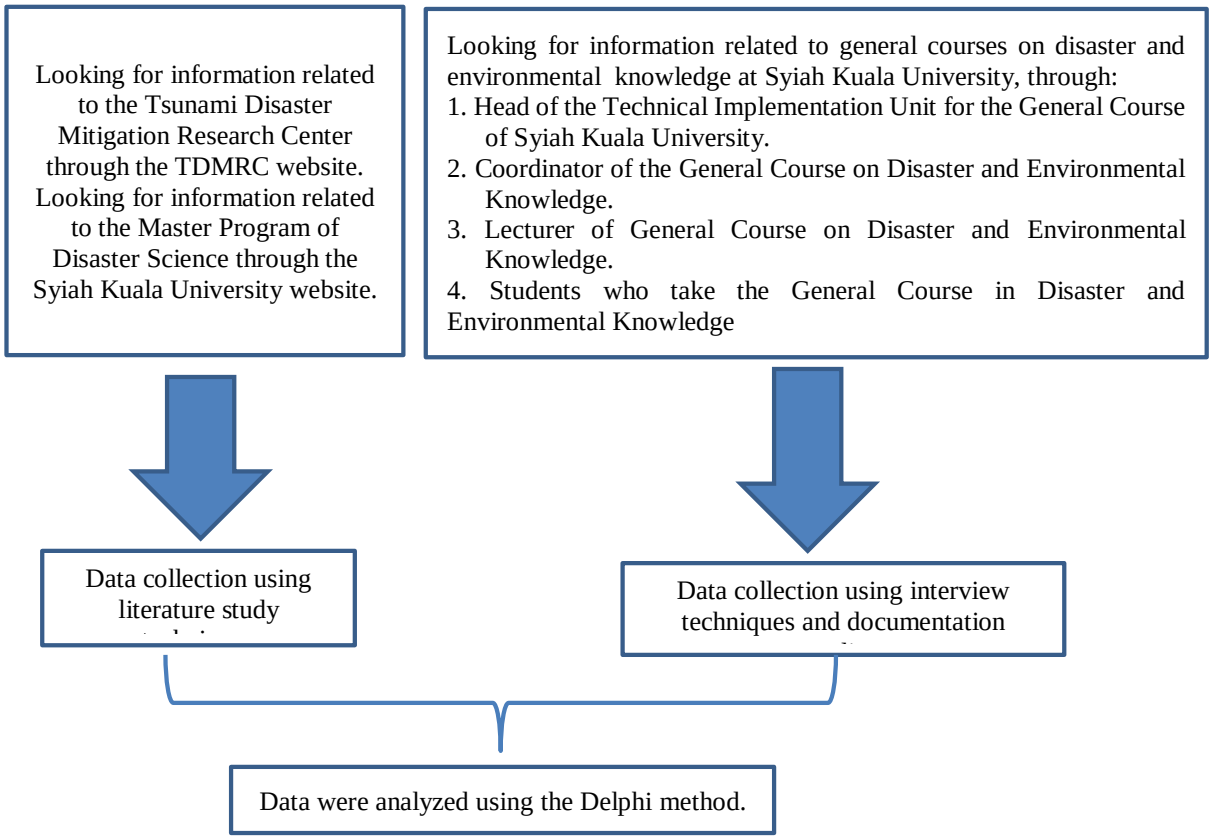

Figure 1. Data Collection Process

Furthermore, the data collection techniques used were direct field observations and literature reviews, as well as interviews with some important informants, such as (1) The head of the technical implementation unit general course of Syiah Kuala University, (2) The Coordinator of Disaster and Environmental Knowledge Course, (3) 11 Lecturers of the General Disaster Knowledge Course, and

(4) 20 students of Syiah Kuala University, studying Disaster and Environment Course. Fig. 2 comprehensively shows the teaching of general disaster and environmental knowledge courses.

After these processes, the analysis of data used the Delphi method, which is a systematic technique for obtaining opinions from a group of experts. This is often carried out through a series of structured questionnaires, where a feedback mechanism is observed via a round of questions held while maintaining the anonymity of the participant's responses. The technique was also originally developed as an interactive forecasting method, which depended on various experts (Foley, 1972; Linstone, 1975). In this method, interviews and questionnaires were addressed to the experts and informants, which appropriately determined the study's information details to obtain the best and perfect answers. For more clarity, Fig. 1 shows the experimental data collection process.

Figure 2. The teaching of general disaster and environmental knowledge courses

3. Results

Based on the results, three disaster-curriculum implementation steps were carried out by Syiah Kuala University to enhance preparedness among Aceh community members, especially the students. These steps included, (1) The establishment of the Tsunami Disaster Mitigation Research Center (TDMRC) in 2006, (2) The development of the Master of Disaster Science within Syiah Kuala University's Postgraduate Program in 2011, and (3) The founding of the General Course of Disaster and Environment Knowledge in 2016. Figure 3 presents the journey of Syiah Kuala University toward a disaster preparedness campus in Indonesia.

Figure 3. The Journey of Syiah Kuala University Toward Disaster Preparedness Campus

3.1 TDMRC (Tsunami Disaster Mitigation Research Center) of the Disaster Mitigation Technical Implementation Unit at Syiah Kuala University

To be a disaster preparedness campus, the establishment of TDMRC (Tsunami Disaster Mitigation Research Center) was initially carried out. This is one of the centres under the technical implementation unit of Syiah Kuala University's Disaster Mitigation. The history of TDMRC establishment in this institution emphasized the response to the occurrence of a tsunami in the Indian

Ocean, which devastated Aceh Province and Nias Islands in South Sumatera Indonesia on Sunday, December 26, 2004. In this case, the institution developed a special program through the Rector Decree of Syiah Kuala University No. 1, 2005. This was known as "Syiah Kuala University for Aceh Reconstruction", which was used to facilitate the Indonesian government and local community members in developing rehabilitation blueprints after the occurrences of earthquake and tsunami disasters. As the oldest and biggest campus in Aceh Province, Syiah Kuala University has rebuilding obligations, which had been completely paralyzed in entire sectors, such as government, education, health, and economics. This was due to the destruction of infrastructural facilities by the 2004 tsunami disasters. Besides helping the government to design rehabilitation and reconstruction blueprints, the university also established TRC (Tsunami Research Centre) and MC (Mitigation Centre) through the Rector Decree of Syiah Kuala University No. 24 and 215, 2005. The program and activity of TRC and MC is overlapping, hence they were merged to become one institution, which is presently known as the Tsunami Disaster Mitigation Research Centre (TDMRC). This development was carried out through the Rector Degree of Syiah Kuala University No. 418 (TDMRC, 2021).

As a special forum for SKU (Syiah Kuala University), TDMRC also collaborated with various experts from other domestic and international universities, to run Tri Dharma of higher education, especially in community dedication and the field of R&D (Research and Development). From its inception in 2006 to the present, TDMRC had been influential, and it played a big role in promoting and disseminating experts' analytical outcomes. The role and contribution of TDMRC were also generally felt by the community members of Aceh Province, especially in Banda Aceh City and Aceh Besar Regency, regarding the disaster risk reduction in The Republic of Indonesia and several disaster-prone neighbouring countries (TDMRC, 2021). Besides this, it also became the focal point of the South-South Cooperation and Triangular (SSCT) for Disaster Mitigation Program in 2011. Then, since 2013, TDMRC was asked by National Disaster Management Authority to provide a scientific study for Indonesian Tsunami Management from 2015 to 2019 (TDMRC, 2021).

According to TDMRC (2021), the centre's vision was to become the best for tsunami and disaster mitigation studies in the Indian Ocean region by 2025. Its mission also involved the following, (1) Providing the outcome and product of an innovative scientific study in disaster risk reduction, (2) Giving some services, advocation, education, and training in disaster science and community, regarding risk mitigation, (3) Developing and enhancing productive and continuous network, as well as cooperation with various parties in risk reduction, (4) Developing the capacity of the institution and human resource in experimental performance, and (5) Applying accountable, transparent, professional, and efficient organizational governance.

Moreover, the study group contained in TDMRC included the following, (1) Tsunami Hazard Team, (2) Hydrometeorology Hazard Cluster, (3) Geologic Hazard Cluster, (4) Human Safety Cluster, (5) Education and Management Cluster, and (6) Technology Application Cluster (TDMRC, 2021). The performances within these clusters also emphasized the reduction of sudden disaster impact, to minimize fatalities, injuries, missing bodies, and property losses. This was to ensure the non-occurrence of numerous bad records in the future.

3.2 Master Program of Disaster Science at Syiah Kuala University

Five years after the development of TDMRC (Tsunami Disaster Mitigation Research Centre), Syiah Kuala University subsequently established the Master Program of Disaster Science in Postgraduate Program. In this case, the background of the establishment was very similar to that of TDMRC. This focused on the earthquake and tsunami occurrences in Aceh Province on Sunday, December 26, 2004, which were the biggest scalar disasters impacting the lives of humans and the environment. These occurrences indicated that high vulnerability levels required the strength of all capable humans in handling sudden disasters.

The mobilization of the Master Program of Disaster Science and its resources was required by every country, to anticipate the future occurrence of natural events (Master Program of Disaster Science, 2021). This is to futuristically reduce fatalities and potential losses, as well as effectively recover post-disaster conditions for sustainable national development. In this context, the capacity of disaster science and technology was one of the vital resources required. Science and technology are the main capital that should be prepared by disaster-prone countries when handling hazardous conditions for future generations. This shows that the government need to concurrently build science and technology toward enhancing the community disaster preparedness of a country. When human resources do not possess adequate scientific skills, the implementation of advanced disaster-detecting technology becomes useless. This is similar to the condition of adequate disaster science without advanced technological implementation. This explains that undesirable consequences are bound to happen with the occurrence of natural disasters.

Based on the Master Program of Disaster science (2021), the capacity potential of the Science and Technology possessed by human resources should be used, to reduce disaster risk as the mandate of the global concept of SFDRR (Sendai Framework for Disaster Risk Reduction) 2015-2030 and Indonesian Law 24/2007 about DM (Disaster Management). Moreover, the need for science and technology roles began from understanding threat dynamics, reducing fatalities, and developing human resource capacity for beneficial policy formulation. This proved that the rule applied on an international scale were designed and applied to the entire world, for all countries to be prepared in handling the occurrence of various disasters.

To overcome various demands, diversities, and potential disaster threats, Syiah Kuala University was mandated by the government to establish a Master's Program (S2) in Disaster Study. The multi-discipline feature of this establishment is used to design the effective strategy of disaster assessment, including (1) The reduction of bad disaster effects, (2) The response to various community environment threats, and (3) The recovery process from the community and natural environment disasters (Disaster Science Course, 2021). Therefore, the graduates of this program were capable of helping the government and community to solve disaster problems before, during, and after existence. This confirmed that students are expected to share their scientific experience with the government and community, as part of informal environmental socialization.

Since disasters consecutively occur in Aceh Province and Indonesia, various experts with special competence in DM were needed (Master Program of Disaster Science, 2021). The enhancement of human resource competence in DM was also needed until postgraduate levels, such as masters and doctorate (Disaster Science Course, 2021). Since Indonesia is located in a disaster-prone area, competent human resources are highly needed in solving and eradicating the recurrence of hazardous problems. At Syiah Kuala University, the vision of the Master Program of Disaster Science is to become an innovative, independent, and reputable course in South East Asia in 2026, to reduce disaster risk through education, experiments, and community service activity (Master Program of Disaster Science, 2021). For the mission, the following is observed, (1) Produce the master of science having lifelong learning insight and potential in multidiscipline disaster management, (2) Produce analytical products and community service in DM, with high-quality national and international publications.

The vision, mission, and goal of this educational program are in line with the real condition in Indonesia, especially in Aceh Province, a disaster-prone area. Therefore, the presence of alumni in the community is expected to solve various problems effectively and efficiently. This is because many disastrous community problems are capable of being adequately solved, with several assignments still available for government and private institutions to handle. Based on these descriptions, the alumni of the Master Program of Disaster Science are expected to contribute to Indonesia, especially in Aceh Province.

3.3 The General Course of Disaster Knowledge and Environment in Technical Implementation Unit of Syiah Kuala University

The development of this course has been emphasizing the compulsory participation of all students from various faculties, departments, and study programs since 2016, without exception. These actions portrayed Syiah Kuala University as the first campus to mandate a disaster knowledge course in Indonesia. This was due to its uniqueness in disaster mitigation, as well as its different characteristics from other private and public campuses within the country.

The establishment of DKEC (Disaster Knowledge and Environment Course) began from the historic records of natural disaster occurrence in Aceh Province, from 2004 to 2016. The occurrence of these geological and hydrometeorological disasters caused a high number of casualties and property losses. This led to the development of the General Course of Disaster Knowledge and Environment by SKU (Syiah Kuala University) in 2016, to overcome various problems and increase the understanding of the Aceh community members, regarding natural hazards. As the biggest and oldest campus in this province, SKU is responsible for the expansion of students' insight, for them to become part of the community. In this case, students are expected to share their disaster knowledge and experience with the surrounding community. The development of this course also enhances community disaster preparedness and reduces the number of casualties in future occurrences. As contained in Rector Decree of Syiah Kuala University No. 503 of 2016 concerning guidance book of curriculum arrangement in SKU from 2016-2020, the following policies acted as legal support for the development of the general course, (1) Laws of the Republic of Indonesia Numbers 20 of 2003 and 12 of 2012, (2) Government Regulation of the Republic of Indonesia Number 4 of 2014, (3) Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 44 of 2015, (4) Regulation of the Minister of Research, Technology, and Higher Education of the Republic of Indonesia Number 48 of 2015, (5) Decree of the Minister of National Education of the Republic of Indonesia Number 232/U/2000, (6) Decree of the Minister of National Education of the Republic of Indonesia Number 201/O/2002, (7) Decree of the Minister of National Education of the Republic of Indonesia Number 045/U/2002, and (8) Decree of the Minister of Education and Culture of the Republic of Indonesia Number 83/MPK.A4/KP/2014.

Based on these legal supports, seven general courses were mandatory for the students in Syiah Kuala University (SKU), namely (1) Civic Education, (2) Natural Science, (3) Basic Humanities, (4) Bahasa Indonesia, (5) English, (6) Disaster Knowledge and Environment, and (7) Religious Studies. This was in line with the Rector Decree of Syiah Kuala University No. 409 of 2015. Coded MKS 106 with 2 credits, the General Course of Disaster Knowledge and Environment became compulsory for all active students, especially for the undergraduate (S-1) and diploma (D-3) programs within SKU. This course was studied by students in odd and even semesters at the beginning of lecturing. However, the course is not for advanced students in postgraduate programs for Masters and Doctorate levels.

Of the 12 faculties existing at Syiah Kuala University, only 6 are required to participate in The General Course of Disaster Knowledge and Environment in the first semester (odd semester), with the remaining selected for the next term (even semester). For each faculty, the system of allocation per semester has reportedly been applied since 2016. This allocation was analysed in advance by the technical implementation unit, through the students' data in each faculty, department and study program. It also considered the number of rooms and chairs available in GCRs (General Course Rooms) 1, 2, 3, and 4. Another consideration emphasized the data of teaching staff or lecturers, which should be obeyed by all students for smooth learning processes. The refusal to uphold this rule subsequently leads to insufficient lecturing rooms and lecturers, causing disturbed and non-optimal academic processes.

Based on the twelve faculties existing in Syiah Kuala University SKU, only eight faculty lecturers taught The General Course of Disaster Knowledge and Environment in the odd semester of 2017/2018. Meanwhile, the remaining four lecturers from the faculties of Veterinary, Agriculture, Social and Political Science, as well as Dentistry, did not teach this course. In the even semester, only six faculty lecturers taught this course, with those from the departments of Law, Agriculture, Medicine, Social and Political Science, Nursery, and Dentistry not teaching the program. According to the Rector Decree of Syiah Kuala University No. 108/UN11/2019 and No. 436/UN11/KPT/2019 concerning Lecturer Appointment to Teach in the Odd and Even Semesters of 2018/2019 in the technical implementation unit, a total of 30 and 50 persons were selected to teach The General Course of Disaster Knowledge and Environment, respectively.

Subsequently, the academic background of these lecturers was evaluated. Based on Indonesian Law 14/2005 about teachers and lecturers, Article 46 clause 2 stated that they had a minimum academic qualification of a Master's (Undergraduate and Diploma Program) and Doctoral (Postgraduate Program) Degree. In higher education, literacy for lecturers and teaching staff should be higher than those of their students, for adequate lecture and guidance in the classroom, as well as when finishing the final task of lecturing, such as mini-thesis and scientific papers for undergraduate and diploma levels. Regarding Indonesian Law 14/2005 (Article 46, clause 2), Syiah Kuala University then stated that the lecturers teaching the Disaster Knowledge and Environment Course should be masters and doctors. The teaching staff or lecturers for this course should also originate from various reputable campuses in Indonesia and the world.

In the odd semester of 2018/2019, a total of 19 and 11 lecturers (63.33% and 36.67%) of Disaster Knowledge and Environment Courses had Master's (S-2) and Doctorate (S-3) degrees, respectively. Meanwhile, 26 and 24 lecturers (53% and 47%) had Master's and Doctorate degrees in the even semester, respectively. These staff specifically possessed various knowledge and experience about disaster and the environment, which they were always ready to share with students during the learning processes.

This was then accompanied by the evaluation of the students studying The General Course of Disaster Knowledge and Environment. From 2016 to 2018, the technical implementation unit staff provided 10 classrooms, which were located in general lecture rooms 1, 2, and 3. In this case, the classes within the public lecture rooms were capable of accommodating 60 students, with the learning processes scheduled for 0.8 a.m to 18.00 p.m and used four times daily or per class.

Furthermore, a total of 34 and 61 classes were available for the Disaster Knowledge and Environment Course originating from five and seven faculties in SKU (Syiah Kuala University) during the odd and even semesters of 2018/2019 year, respectively. In comparison, the number of students and lecturers studying and teaching the course during the odd and even semesters were 1.13 (34/30) and 1.22 (61/50), respectively. This showed that one lecturer only taught one class or study group, with a few teaching two classes.

These comparative analyses were very appropriate because the learning services provided to students were less optimal when a lecturer was teaching in many classes. This was mostly caused by fatigue and the teaching period. These results were subsequently similar to the scoring processes, where lecturers often felt fatigued when providing or assessing daily tasks, as well as middle and final exams. This was due to handling many classes and students during the learning process. In this case, lecturers should be provided with the class/study group or teaching period supported by their abilities and reasonableness, for maximum learning outcomes.

Only students of diploma 3 (D-3) from the faculty of veterinary were also required to participate in the Disaster Knowledge and Environment Course, with those from Economics and Business, Engineering, Agriculture, as well as Mathematics and Natural Sciences not obliged to be involved. This was because the number of credits that should be acquired by the students of diploma 3 had achieved

the maximum limit with short study time. Based on consensus, many programs of diploma 3 in SKU were unable to be reduced or replaced by 2 credits of this course, subsequently leading to the non-participation for unsupported departments.

Moreover, the data of teaching and learning in the Disaster Knowledge and Environment Course as applied since 2016 were assessed. These data were subsequently obtained by the technical implementation unit general course of Syiah Kuala University. This condition tightly emphasized three main activities during the learning process, namely (1) the learning plan process, (2) the learning implementation process, and (3) the learning evaluation process. Without these three processes, academic procedures were specifically unable to be smoothly performed. The three processes of the Disaster Knowledge and Environment Course will be discussed below. For more clarity, Figure 4 displays the learning process of this course.

a) The Learning Plan of Disaster Knowledge and Environment Course

Based on chart 1 of Disaster Knowledge and Environment Course Learning in Syiah Kuala University, the learning plan stage was observed. The parameters needed for this stage were the syllabus and the plan being adopted in the technical implementation unit. As contained in these parameters, disaster knowledge and environment course were taught in the odd and even semesters. It was also coded MKS 106 with 2 credits and was under a general study program. This course aimed to provide insight and introduction to basic Disaster Risk Reduction (DRR) principles, as well as their relation with environmental conditions in a disaster-prone area. The main focus on the subject matter also prioritized understanding the important elements that should be calculated within the sustainable development plan.

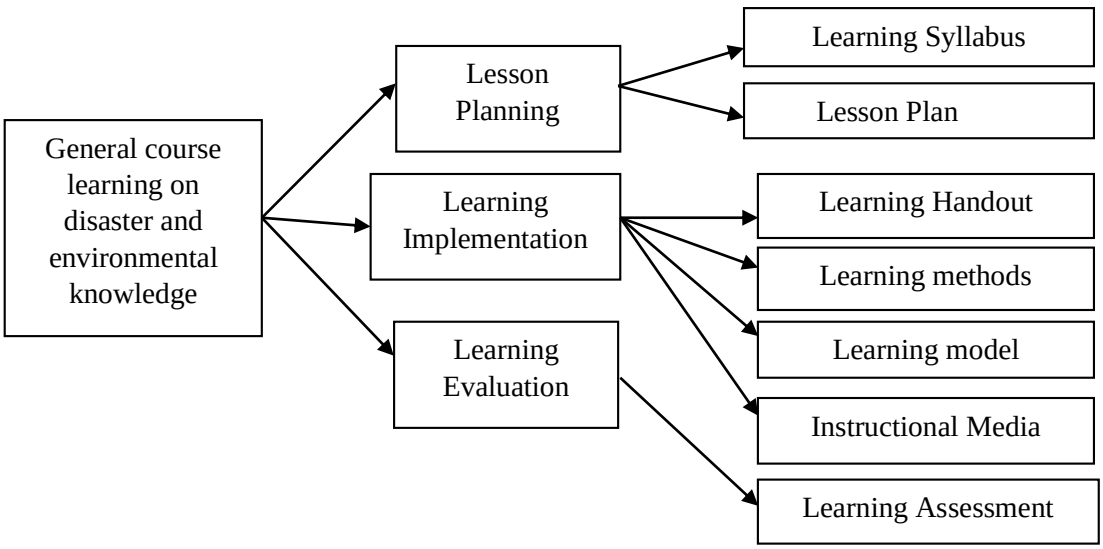

Figure 4. Teaching of General Course on Disaster and Environmental Knowledge at Syiah Kuala University

Regarding RPS (2016-2019), the expected Learning Outcomes of the course (CLO) after the academic process are as follows, (1) The ability to understand the basic principles and paradigm of disaster management in Indonesia, (2) Understanding the theoretical base of disaster risk analysis, (3) Capability to analyze a disaster case from various perspective of disciplines (multi-discipline), and (4) Understand relatedness between disaster and environment. From 2016-2018, 2019-2020, and 2021-

2022, the coordinators of this course were Ella Meilianda, S.T, M.T, Ph.D, Ns.Rachmalia, S.Kep, MNS, and Dr. Rina Suryani Oktari, S.Kep, M.Si, respectively.

Furthermore, the learning outcome of the study program (PLO) indicated that students should understand the theoretical aspects of the disaster and environmental science course, as well as apply the basic principles of DMP (Disaster Management Plan) to reduce risk. Regarding the recent semester plan, the expected learning outcomes of the course are as follows, (1) The ability to design a simple contingency plan as an important stage in handling a disaster, (2) Understanding the characteristics, parameters, and policies of environmental deterioration and climate change in the Republic of Indonesia.

All lecturers teaching this course in SKU (Syiah Kuala University) should also use a similar syllabus, semester learning plan, and subject matter handout, which had been distributed by the coordinator before the commencement of the lecturing process. Additionally, training was provided to the lecturers by the coordinator before the commencement of lectures in the first semester, to equate their perceptions and treatments during the learning process. In this case, all the students are expected to lose similar knowledge regarding the course.

b) The Implementation of The General Course of Disaster Knowledge and Environment

Based on chart 1, the learning implementation was observed. The parameters needed for this stage were the study handout and semester academic plan, which contained the learning method, model, and media used in the course. In this condition, these parameters were synergistically evaluated and approved by all the related teaching staff. This proved that each lecturer should be able to effectively teach and deliver similar materials. Table 2 shows the learning material and outcome of the course, where several sessions were subsequently evaluated.

Table 2. Course outline for disaster and environmental knowledge

Meeting-	Discussion material
1	Conception of Disaster and History of Disaster in Indonesia
2	Paradigm, Disaster Management Cycle
3	Concept of Disaster Risk Reduction (DRR)
4	Parameter of Disaster Risk Analysis and Mapping
5	Disaster Mitigation and Community Preparedness
6	Organization and Institution in Disaster Management
7	Disaster Recovery Phase
8	Middle Exam
9	Community Preparedness in Facing Disaster
10	Introduction to environmental damage & climate change issues
11	Characteristic of Environmental Deterioration and Climate Change
12	Group Task (Case Study)
13	Environmental Protection and Management
14	Climate Change
15	Group Seminar
16	Final Exam

In the first session, the course introduction, as well as the conception and history of disaster in Indonesia were evaluated. The expectations required from the learning process are as follows, (1) The ability to understand the scope of lecturing material, as well as the outcome of the disaster and environment basic knowledge, (2) Understanding the history of big disaster events in the world and Indonesia, and (3) Development and definition of various disaster terminology. This generated a type

of local wisdom known as *smong*, which had been existing among the Simeulue people since 1907. *Smong* is another name for the tsunami in Simeulue, and the local wisdom helped in successfully saving the life of the Simeulue people during the disastrous occurrence on Sunday, December 26, 2004.

Moreover, the second session assessed paradigm and disaster management cycle, with students being expected to carry out the following (1) Understand the momentum of change in paradigm and the world disaster management, and (2) The ability to analyze the disaster management cycle, and its application in Indonesia. The third session also emphasized the concept of disaster risk reduction (DRR), with expectations after the learning process students prioritizing the mastery of the basic principles of DRR, as well as its data formulation and relation. This was accompanied by the fourth session, which focused on the parameter of disaster risk analysis and mapping added with a quiz. In this case, students are expected to carry out the following, (1) Identify the determinant parameters in disaster risk analysis, and (2) Master the quantification method of disaster risk parameter. The fifth session then analyzed the disaster mitigation and preparedness society, with expectations emphasizing the hazard reduction types.

Based on the sixth session, organization and institution were evaluated in DM (disaster management), with the expectation to identify coordination and cooperation in disaster management. The seventh session also prioritized the post-disaster recovery phase, with students required to analyse this process from various aspects of life. This was accompanied by the eighth session focused on the semester middle exam, regarding a written test encompassing the material of the first to seventh phases. Furthermore, the ninth session evaluated community preparedness in handling disasters. This was to identify various kinds of preparedness measures. The tenth session focused on environmental deterioration and climate change issues, with students expected to explain the causes. For the eleventh session, the characteristic of environmental deterioration and climate change was assessed, with the expectation to identify the features and possible relationships.

The twelfth session then emphasized the group task to solve an example of a case. In this case, students should be able to identify and analyse the causal factor, risk level, effort of DRR (disaster risk reduction) and recovery process from several disaster cases, as well as the effect of environmental deterioration. Regarding the thirteenth session, environmental protection and management were evaluated, with students required to identify the set of regulations and legislation related to the preservation of the ecosystem. The fourteenth session also explained climate change, where expectations focus on the identification of agreement and commitment development. From the fifteenth session, a group seminar was assessed, with students expected to identify and analyze the causal factor, risk level, the recovery process, and environmental deterioration effect, as well as stimulate the disaster risk reduction from several cases. Additionally, the sixteenth session was the Semester Final Exam, where a written test encompassed the ninth to fifteenth phases.

c) Evaluation of Disaster Knowledge and Environment Course Learning

The parameter needed for this stage emphasizes the scoring pattern for the Disaster Knowledge and Environment Course. This is observed in the semester learning plan and course credit provided by the lecturer to the students before the commencement of the teaching process in the initial semester. The criteria of scoring (indicator) are objectively measured, regarding the grading rubric of each task. This process is carried out by using attendance, active participation in discussion, task accomplishment, written test and group work, as well as seminar presentation. Moreover, scoring is carried out throughout the semester, regarding task performances, as well as middle and final exams. Based on the final scoring pattern, the score reference implemented in Syiah Kuala University (SKU) is as follows, A 87;78 AB<87;69 B<78;60 BC<69;51 C<60;41 D<51;E <41. The scoring items were also the Semester Middle and Final Exams, Task, and Quiz, accounting for 25% 40%, 25%, and 10%, respectively.

4. Discussion

The various breakthroughs developed by Syiah Kuala University (SKU) from 2005 till the present, is responsible for its unique characteristic. All these breakthroughs aligned with the Tri Dharma of higher education in Indonesia (Lanni, 2019; Tjoetra & Maifizar. 2019). The role of the higher education strategy in disaster management is also academically integrated through educational programs and learning, experiments, and community service. This role is realized by the active participation of lecturers and students through various internal and external programs and activities. These were in line with Widiamurti et al. (2012), where the real example of Higher Education Tri Dharma in supporting disaster risk reduction are as follows, (1) Education and Teachings, such as Integration of disaster risk reduction (DRR) into educational activity, Training and Simulation, as well as Supportive Infrastructure for DRR, (2) Experiment, such as Campus as disaster analytical center, (3) Community services, such as student study service with DRR theme, Training and simulation, and Societal assistance to develop the effort of disaster risk reduction.

These breakthroughs specifically differentiated Syiah Kuala University (SKU) from other public and private institutions in Indonesia. As mandated by the government, each higher institution should have its culture as its identity (Sofia et al, 2019). The various breakthroughs developed by SKU are as follows, Firstly, the TDMRC (Tsunami disaster mitigation research center) owned by the technical implementation unit was established in 2005 and had become a special expert in the detection of disasters. The presence of this establishment is very beneficial for the community as an implementation of higher education Tri Dharma, especially in analytical and societal services. According to Lanni (2019), disaster management was integrated into experimental activity and the scientific publication, when completely conducting various analyses of mitigation and management measures.

The final aim of TDMRC also emphasized disaster risk reduction (DRR), which often occurred within the community. Sofia (2019) also stated that the examples of the activity performed by TDMRC are as follows, (1) Providing training to the young generation to become pioneers and initiators for disaster risk reduction, and (2) The provision of education to community members for DRR. For example, the practice of DRR (simulation, drill) in formal and informal schools led to the development of a community, which is prepared, alert, and tough to disaster. Additionally, Sofia (2019) indicated that TDMRC developed various features, such as leadership, networking, teamwork, and communication.

Based on experience, Syiah Kuala University often sent out groups of students through LPPM (Research institutions and community service), to perform community service for various locations, regarding the occurrence of disasters in Aceh Province. This was observed during earthquake occurrences in Central Aceh and Bener Meriah on 02-07-2013, as well as in Pidie Jaya, Pidie, and Bireun on 07-12-2016. For Lanni (2019), higher education packed community service programs with the theme of disaster, for students to directly implement their knowledge and skills in the community while thinking critically to solve the problem. Besides the various experience, Syiah Kuala University also emphasized the development of disaster education.

Secondly, the seriousness of this institution prioritized the establishment of the Master Study of Disaster Science in the Postgraduate Program. This establishment produced a Science Master, which had competence in the field of DM (disaster management). The human resources possessing disaster knowledge should also be produced in disaster-prone areas, for example, the students. Based on Sofia (2019), higher education was the last stair of educational units, which contributed to building the nation's character, especially a disaster-prepared attitude. Kurniawati & Suwito (2017) also stated that students played various roles in the community, such as change agents and educators of disaster preparedness. They were also able to provide appropriate intervention during the occurrence of

disasters. This was because students were expected to understand disaster for themselves, as well as their family and community members (Lanni, 2019).

Based on Indonesian Law 20/2003 concerning the National Education System, the curriculum is a set of plans, as well as an arrangement of goal, content, and lesson material. It is also used as guidance for learning activity implementation, to achieve specific educational goals. In the curriculum prevailed in an institution, disaster was included to guarantee its implementation process, with the results achieved expected together. Regarding the development of this plan, some principles were observed, namely relevancy and effectivity. According to Khaeruddin (2009) and Desfandi, (2016), the relevancy principle should be relevant to the development of Science and Technology, as well as student/community needs and characteristics. However, the effectivity principle emphasized the amount of curriculum and educational goals achieved through learning processes (curriculum implementation). In this case, disaster knowledge and attitude are very needed by the community during hazardous occurrences, especially for those living in red zone areas. The final goal to be achieved emphasized the enhancement of community disaster preparedness, to reduce the number of fatalities during a bad occurrence. Since knowledge and attitude are parameters of preparedness, the implementation of disaster curricula in an institution should be effectively and efficiently functional.

Education is used to develop an understanding of various human resources, regarding the knowledge of disasters (Honesti & Djali, 2012). Based on Kurniawati & Suwito (2017), the role of education was very influential in the realization of disaster preparedness. Clust et al. (2007) also stated that education was the best media used in community disaster preparedness. This specifically prioritized disaster education, which should be importantly possessed by all the people living in red zone areas.

Moreover, Lanni (2019) stated that this type of education should be highly developed, especially for those living in disaster-prone areas. This led to the emphasis on Syiah Kuala University, which is one of the higher institutions directly affected by the earthquake and tsunami disaster on Sunday, 26 December 2004. Besides this, the institution is also located in a disaster-prone area, leading to the importance of providing disaster education to all its students. In Hidayati (2006), three stakeholders were observed in the reduction of disaster risk, namely individual and household, government, and school community of the school. Ilham et al. (2016) also stated that education was taught in various educational institutions, whether at home, school, workplace, or other public spots. One of the educational vehicles having an important role in disaster prevention and preparedness is higher education (HE). In this case, Syiah Kuala University is very responsible for helping the government and community to reduce disaster risk, as one formal educational institution for the public HE level in Indonesia.

According to Kurniawati & Suwito (2017), the school was the stakeholder playing an important role as the source of knowledge and disaster dissemination understanding. It also played a general role as a practical guide in disaster management, before, during, and after occurrences. Based on this description, disaster-prone countries included disaster education in basic educational curricula, to reduce and manage the effect of natural occurrences, such as India, Japan, Bangladesh, Pakistan, and Fiji Island (Okazaki, 2006; Shaw et al., 2011). Even more, Indonesia areas were very prone to disaster, from Sabang to Merauke and from Miangas to Rote Island.

Based on Musacchio et al. (2016) disaster education focused on the series of counselling and knowledge provisions, regarding the natural phenomena related to disaster risk. It also emphasized the provision of skill and awareness, which better prioritized DM (disaster management). Nifa et al. (2017) also mentioned four basic factors about the importance of disaster education, namely (1) In the category of community, children are highly vulnerable to disaster, (2) Children are presentation of the nation's future, (3) School is the center of discipline encounter in formal institution discipline, and (4) Disaster education learning is expected to become a transfer of community knowledge. In this case, the knowledge of hazardous occurrences aimed to carry out the following, (1) Reduce disaster risk, such as

the potential, historical occurrence, and form of anticipation, (2) Enhance knowledge and awareness of disaster signs. It also prioritized the effect of the disaster on individuals, families, and communities, as well as the survival and solution patterns (Kemenristekdikti, 2019; Lanni, 2019).

Thirdly, the seriousness of Syiah Kuala University (SKU) emphasized the development of the curriculum through the application of the Disaster Knowledge and Environment Course. According to Sofia (2019), SKU had been attempting to consistently and continuously strengthen students' character and soft skills since 2016, through the compulsory implementation of the Disaster Knowledge and Environment Course. This indicated that the arrangement of the curriculum provided to students should be adequately coordinated and sufficiently prepared to provide maximum outcomes (Handoyo et al., 2020).

Furthermore, the General Course of Disaster Knowledge and Environment is included in the compulsory curriculum at Syiah Kuala University. This proved that the institution had been consistent and very serious in the application of disaster curriculum to the learning processes of all students in Strata 1 (S1) and a few in the Diploma 3 (D-3) program. These were in line with Desfandi (2014), where the Ministry of National Education applied a disaster curriculum from Elementary to Senior High School in 2011. Although the curriculum was not practically included as a special subject, it was still factually provided in understanding and anticipating natural conditions. From this context, the inclusion of this plan was observed in several subjects, such as Geography, Natural and Social Sciences, Bahasa Indonesia, Math, and Religion (Karyono, 2010; Desfandi, 2014). Since the learning outcome obtained was not as expected due to the multiple insertions, the government need to develop special subject of disaster education in the Indonesian educational curriculum.

Regarding previous analysis, all the requirements needed by Syiah Kuala University when applying the general course of disaster knowledge and environment are as follows, (1) competent and experienced teaching staff, and (2) learning device such as syllabus, semester plan, and handout. This was in line with Shaw et al. (2011) where disaster education aimed to reduce the various risks encompassing the several learning materials of DM (Disaster Management). In this case, the implementation of this education enhanced the community awareness of DRR (Disaster Risk Reduction).

As contained in the syllabus and semester learning plan, this course aimed to provide insight to students, as well as introduce the basic principles of disaster risk reduction and its relation to the environmental condition in a disaster-potential area. Therefore, the final outcome enhanced response attitude, which was part of disaster preparedness. For students, the learning outcome expected from disaster education also emphasized the following, (1) The ability to be disaster literate, (2) The ability to enhance the paradigm about the importance of DM (Disaster Management), (3) Possession of good DM skill, (4) Development of awareness about the importance of disaster mitigation, and (5) Reduction of hazard helplessness (Chung & Yen, 2016; Duong, 2009; Sukoco, 2021; Boon & Pagliano, 2014; Muttarak & Pothsiri, 2013; Shiwaku et al., 2007).

According to Zainatunnisa & Satria (2018), student preparedness, knowledge and attitude, emergency plan, disaster warning system, and resource mobilization were in a very prepared category at 94.7%, 100%, 74.5%, 60.6%, and 69.1%, respectively. This indicated that disaster-education curriculum was effective in enhancing students' preparedness, especially at Syiah Kuala University. Disaster knowledge and attitude is also one the parameter of disaster preparedness. This often enhanced when good learning is obtained from the teacher or formally in various educational levels. Handoyo et al. (2020) mentioned that the scheme of handling disaster impact in school should be applied in Indonesia. This showed that a 12-year compulsory education encouraged the involvement of each Indonesian in institutional learning process. The equipment of students with adequate knowledge and skill often led to the ability of all citizens to handle worse post-disaster situation (Kapur & Baez, 2017).

This was in line with the actions of Syiah Kuala University, where disaster education was provided to students in critical and normal conditions. Based on Kurniawati & Suwito (2017) most DE (Disaster Education) were only implemented in critical conditions and gradually reduced when disaster did not occur for a long time. Disaster preparation and handling proved to be quite effective in reducing the bad impact of hazardous occurrences, due to the acquisition of good knowledge by the victims (Shiwaku et al., 2016). In Austin et al. (2013), the enhancement of skill and simulation was obtained during disaster management training, to improve students' preparedness levels. It also provided opportunities to them, for the possession of a critical stance in responding to each disaster. In addition, Chen et al. (2014) indicated that adequate training contributed accurately to the occurrence of disaster.

Formal and informal disaster education are likely to occur in the community, and family. These are often observed through the local wisdom contained in community environment. For example, "the *smong* local wisdom traditionally had a close relationship with tsunami disaster mitigation, and had been delivered through the poems contained in *manafi-nafi* (folklore), *mananga-nanga* (a lullaby), and *nandong* (humming), which were introduced to the posterity from the cradle to the old age" (Gadeng et al., 2018). Besides that, there are still many local wisdoms in Indonesian community, which teach disaster education based on the experience of critical conditions in specific areas.

Irrespective of the enhancement patterns of knowledge and attitude toward disaster, it still does not matter. This is because knowledge and attitude become the main assets very important for students to save themselves when disaster occurs. In this case, they are expected to share these assets with other people around them, to generate faster and broader social effects (Paton, 2003). According to Kurniawati & Suwito (2017), knowledge was the main factor that became the key for preparedness. It also influenced attitude and concern toward disaster preparedness. Moreover, Finnis et al. (2010) stated that participation in disaster education enhanced the understanding about self-protection attitude when disaster occurs. This enabled the responsiveness of the community to disaster occurrences while possessing good preparedness levels. Handoyo et al. (2020) also mentioned that the preparation of a responsive community in toughly handling critical conditions was a massive massive and continuous effort. This method should be complete and structured to reach all people. The final aim of the various breakthroughs developed by Syiah Kuala University was to become disaster preparedness campus. For Lanni (2019) several Indonesian campuses has self-declared as Disaster Preparedness Institutions, which provide training and education to its Civitas Academic.

Widiamurti et al. (2012) also highlighted that the scopes of Disaster Preparedness Campus are as follows, (1) Soft Skill, disaster preparedness campus enhanced the target ability in associating with other people and attributes to maximally develop work. For example, the ability in disseminating, advocating, and socializing about the effort of disaster risk reduction, (2) Knowledge, attitude, and skill. In disaster preparedness campus, the target ability and attitude in the DRR field were enhanced through training and another activity, and (3) Non-structural mitigation. For example, increasing knowledge, changing attitude and behavior, as well as regulating DRR policy. Based on these results, all the goals and scopes of DPC (Disaster Preparedness Campus) were reflected from various programs and breakthroughs, which were carried out by Syiah Kuala University. The institution is also expected to be declared a DPC while being able to become example for another public and private higher education in Indonesian disaster context.

5. Conclusion

The seriousness of Syiah Kuala University to become a disaster preparedness campus began since 2005, with various efforts carried out, such as (1) Establishment of Tsunami Disaster Mitigation Research Centre (TDMRC) in 2006. (2) Establishment of Master Study of Disaster Science in Postgraduate Program in 2010. (3) Development of the General Course of Disaster Knowledge and Environment, which was mandatory for all the students from various faculties, departments and study

programs. All the breakthroughs developed by this institution are part of the Tri Dharma of higher education in the field of learning, experiment, and community service. These are expected to be beneficial in enhancing the disaster preparedness of Indonesia, especially in the Aceh community. Therefore, the efficacy of all these breakthroughs are to be futuristically tested during the occurrence of natural disasters.

Conflicts of Interest

The authors are not involved in a conflict of interest from funds, personal and institutional or any other relationships from this article.

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