Development of Training Curriculum in Improving Community-Based Geological Hazard MitigationCompetency

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ABSTRACT. The purpose of this study was to provide training curriculum model in improving community-based geological hazard mitigation competency. It can be achieved through research and development method which divided into three main stages. Firstly, the analysis of requirements as introduction. Secondly, the development of curriculum model. Thirdly, the test of curriculum model to measure the effectiveness in improving the competency of geological hazard mitigation. This study showed that the training curriculum model, which is developed based on the result of requirements analysis, is effective to improve the participant's competency. The result of pre-post test showed the improvement of the participant's cognitive aspect. The significant improvement identified in the training competency shows the effectiveness of Test II in improving the participant's practical competency to carry out the training. Some factors that support the training curriculum model development related to community-based geological hazard management are: (a) the public servant's competency for geological hazard mitigation; (b) the motivation of the community who become the volunteer; and (c) support from the decision maker. On the other hand, the inhibitors found are the lack of competency for training related to geological field, the lack of educational background and knowledge of geological hazard, and the lack of time.

Keywords: Curriculum, Training, hazard mitigation, Community

Introduction

Indonesia is located around the "ring of fire". It makes Indonesia one of the places which is vulnerable to geological hazard. Indonesia, at least, has 500 volcanoes. 129 out of 500 are considered to be the most active volcanoes. They are found in the path of the killer volcanoes as long as 7000 kilometers which stretch from Sumatera, Java, Bali, Nusa Tenggara until Halmahera, and North Sulawesi (Abdurahman et al, 2013:71). Other geological hazard is earthquake, a natural disaster of no strange for human. It can occur everywhere in Indonesia and certain earthquake can be followed by tsunami, just like what happened in Aceh 2004.

The result of research done by Haryani (2014) stated that the prone level of flood on the beach is classified high, which covered 93,53% of the area, and the low level was 6,48% ; the high level of abrasion stated as 34,7% of the area and 65,3% classified low counted from the length of the coastline; while the designation of the buffer area stated as 93,3% and the cultivation area stated only as 6,69% of the area.

People living in county are likely more vulnerable to the disaster due to the lack of mitigation practice. This vulnerability, according to Caruson & MacManus (cited in Kapucu et al., 2013), results from the lack of infrastructure support from government and lack of financial resource. Furthermore, the allocation of fund, which the central or local government has managed based on the population size, is uncertain when it is given to the people living in county. Thus, this economic situation influences the efforts carried out to develop and implement mitigation practice.

The participation of the people, who become one of the most important elements in minimizing disastrous effects, has increased every year. The positive effect of the people's participation is to develop self-confidence and improve the people's ability to face

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natural disaster. Furthermore, the people's participation can produce some practical solutions. The people's ability to be ready to face natural disaster will get improved if they have a strong bond as stated by Kapucu and Van Wart (Kapucu et al., 2013).

In Indonesia, especially in some regions that are vulnerable to natural disasters, there are some communities consisting of volunteers coming from different places who care for and have willingness to assist the government's conduct in disaster mitigation. These communities are the vanguard of conducting disaster mitigation. Since they are close to the people and deal with the natural disaster, they can be more active in carrying out mitigation, not only after the disaster occurred but also before the disaster happen. Unfortunately, they lack the ability to conduct pre-disaster mitigation.

Low competency of those volunteers is attributed to some factors and one of them is the lack of access to the training of disaster mitigation. The government's training institutions still focus on government officials and make them as the target of training participants. Whereas,, instead of formal education, training is considered to improve the volunteer's competency. The training program that will be given to the community is not the regular one similar to those of government officials. The change of participant can also change the training. Based on that reason, this study aims at exploring the training curriculum that can be developed accordingly in order to improve the competency of community-based geological hazard mitigation.

Curriculum development, according to Taba (1962:12), can be achieved through seven steps including diagnosis of requirement analysis, formulation of objectives, selection of content, organization of content, selection of learning experiences, organization of learning activities, and determination of what to evaluate and of the ways and means of doing it. Instead of determining the goal, Taba starts the process of curriculum development with a study of educational need in a society. Läänemetsand Kalamees-Ruubel (2013), "Taba also pays attention to the selection of the content and its organization with an aim to provide students with an opportunity to learn with comprehension". Similar to the previous statements, Nudu (2001:60) explained that curriculum will be a competitive excellence if it capable to (a) catch on what the industry needs, and (b) maximize the utilization of the existed resources.

In their opinion, Taba's approach could be perfectly applied for market-centered education. Taba's approach appears to be applicable to the training, considered as a market-centered education (i.e., in this case the society's need related to disaster mitigation).

Zais (1976) defines a training as "A process by which teachers employing the validated discoveries of the behavioral sciences, manipulate learners and their environments in such a way that the learners efficiently acquired prescribed behavior". Zais views that learners are the raw materials that will be processed in which they will be given materials curriculum so that the learners can be the expected product. McNeil (1990:121), "Training usually implies narrower purposes than educating. Training tends to look at the student's competences in some occupation."

The best training is the one that can give the participants a chance to practice and experience. Drengson cited by Manondog (in Dolotallas et al., 2015) stated that any information that someone obtains is not going to be knowledge if the person does not interact with the information, relates it to the knowledge that he has already had, and integrate it. Knowledge can be part of on-going experience when the person uses it. The training participants should have a chance to be able to participate and share their experience according to the topic, so that they can achieve a principle to be applicable in the real life.

Research Method

To answer the research questions, this study applies mixed approach of quantitative and qualitative. Qualitative approach is used to obtain a description of the curriculum process based on the understanding of phenomenon that becomes a component of the training program. The description is taken from the participants' point of view. Through qualitative approach, this study is expected to be more creative in the curriculum making.

Quantitative approach is considered appropriate to be used in measuring the level of effectiveness of the curriculum implementation to improve the participants' competency in disaster mitigation, especially of Landslides.

This study also uses Research and Development (R&D) to develop the curriculum focusing on training program, improving the curriculum effectiveness to enhance the participants' competency, and producing a community-based training program that can be used as the reference for the future training program.

This study focuses on the existing curriculum product development which adjusts to the change of the training participants – the officials become the participants taken from the community. Based on the reason above, this study needs analysis in nature (i.e., using survey or qualitative method) as the cornerstone of materials used to arrange the training curriculum model. Meanwhile, to test the training curriculum effectiveness to be utilized by community, this study uses experiment quasi-design with pre-post test (quantitative).

The introduction of this study is a requirement analysis which carried out in three stages. Firstly, the energy and human resource sector used as the basics for all national strategy issues related to disaster mitigation. Secondly, the vulnerable-disaster region's profile used to identify what the disaster mitigation requires/needs in a more specific region. Thirdly, the community living in the vulnerable-disaster regions used as the specific portrait of the future training participants.

The result of this analysis is used as the basics of the curriculum development focusing on the training program. This process needs the involvement of many stakeholders (i.e. the curriculum developer) and experts on mitigation. The curriculum development can be in the form of new curriculum arrangement or the existing-modified curriculum owned by the training institution.

The curriculum implementation in the form of training program is used to check the curriculum effectiveness and efficiency in improving the community's competency for disaster mitigation. This curriculum test is carried out in two steps, Test I and II, with the participants taken from the community. Like a cycle, the result of the evaluation becomes the basics of the next program improvement. The evaluation is conducted based on the pre and post-tests as well as the whole practice. This study does not have control class because of the lack of the participants and the frequency of the training execution.

Training Requirements Analysis

Nation, according to the constitution, has a responsibility for protecting all Indonesian people, including protecting them from disasters.

Disaster Risk Management Act No 24, 2007 stated that everyone has the right to be protected, especially the people living in vulnerable-disaster regions. In addition, they also have the right to gain education, skill, and training of how to deal with disasters.

Everyone -when tackling disaster- also has the responsibility for keeping social life in harmony, keeping safe the function of living life, carrying out disaster mitigation, and sharing the accurate information about disaster mitigation to the public.

The constitution also stated that the government has a responsibility for determining the development policy to take efforts in preventing disaster and establish rehabilitation. Those efforts are parts of disaster mitigation. The execution of disaster risk management (in time when the disasters do not occur) includes the plan of disaster risk management, reduction of disaster risk (i.e. to socialize, monitor disaster risk, and improve the awareness of disaster risk), prevention, guidance in creating the development plan, giving the requirement of disaster risk analysis, the spatial management, education and training, and the technical requirement for disaster risk management.

Bandung suburb of West Java tends to be highly vulnerable to disasters. The disasters frequently happen here are flood, landslides, and hurricane. Currently, the frequency and intensity of such disasters occurrences tend to increase, especially flood and landslides due to the increase in rainfall intensity.

The effort that the local government does -which is related to disaster mitigation- is to give the introduction of disasters to the community. However, the effort is still considered less effective due to the lack of financial support. The local government of Bandung suburb region is planning to launch *Gerakan Sekolah Aman* (School Safety Movement) and has established 30 schools as the pilot project. Yet, so far, the *Gerakan Sekolah Aman* shows less improvement because the government has less facilitator. In this case, a community can help the government with pre-mitigation steps.

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Table 1 shows the identification of the current condition and the expected condition based on the requirement analysis. This study recommends that the local government should hold a training program of landslides mitigation to resolve the problem.

Several conditions need to be considered when completing the requirement analysis are (1) the community members do not have geological knowledge as the basic understanding of landslides disaster. The community members only know how to save themselves and deal with the condition during and after the disasters happen; (2) Some community members have experiences -in different forms, materials, and methods- to become the training facilitator. Yet, they have no experience in creating a scenario plan for the training that will be used in training program; (3) the community members have different strata of education and backgrounds. They also have different jobs, hence the training program should be adjusted to their time.

Development of Training Curriculum in Improving Community-Based Geological Hazard Mitigation Competency

The curriculum development, based on requirement analysis, is conducted through the process of modifying the existing training curriculum. It is entitled *Penyuluhan Mitigasi Bencana Gerakan Tanah Berbasis Masyarakat* (community-based landslides disaster mitigation counseling.) This training aims at forcing the participants to be able to carry out the result training of landslides risk management. The duration of this training is 22 hours and apply the educational requirement for the participants of high school graduated or similar to join the program. This durations and educational requirement are made to meet the community's expectation and accommodate their various characters.

The educational curriculum and the training of Landslides mitigation based on

Table 1
The Current Condition vs Expected Condition

No	The current condition	The expected condition
1.	Indonesian regions which are vulnerable to disasters. *The regions tend to be vulnerable to Landslides disaster in Bandung suburb are very wide*	The efficient and effective disaster mitigation can minimize the victims.
2.	The mitigation done by local government in Bandung focuses on how to save or rescue people's lives during and after the disaster happens . The efforts of how to manage disaster risk has yet to be managed by BPBD.	The preventing efforts should be prioritized.
3.	The socialization of disasters is considered less effective due to the lack of *financial support*.	The community has an important role before, during, and after disasters happen.
4.	*The community members' competency for pre-disaster mitigation still needs improvement.*	The community members have good competency for disaster mitigation in every step.
5.	Gerakan Sekolah Aman *does not run well due to the lack of facilitator*.	The community as the facilitator to give socialization of disaster mitigation

Table 2.
Lessons Delivered in the Training *(Test I)*

No.	Lessons	Hours	
		Theory	Practice
1.	Introduction to Geology	3	4
2.	Landslides Risk Management	2.75	2.25
3.	Socialization about Landslides Risk Management	2.25	7.75
		8	14
Total of hours		22	

the community consists of 3 competency units, eight competency elements, and 27 characteristics performance embodied into some training lessons (Table 2).

The developed curriculum above has practice hours more than 60%, especially for subject of Socialization about Landslides Risk Management/Mitigation (2.25/7.75 JP), which valued more than others because through this subject the participants are expected to have the ability of "giving a counseling/ training" and get the "experience". The plan lessons that the teachers prepared -based on the developed curriculum- show that the participants "have the real experience" to be the facilitator (someone who gives training). The content of Introduction to Geology and Landslides Disaster Risk Management can be further developed independently by the participants or developed in other geological engineering training programs.

The Test I -i.e., the community-based training curriculum of landslides Disaster Risk Management- gives the average score of the post-test about 60. The highest score reaches 91.7 and the lowest is 50. This result shows an increase of 19.6 in the pre-test. The highest increase is 45.8 and the lowest is 8.3. Meanwhile, the average score for the practice session of the Socialization of Landslides Disaster Risk Management is 2.86 (* Scale 1-4). The highest score is 3.14 and the lowest is 2.43.

The result of the Test I above shows that the practical score of the training should be prioritized. Thus, the reviews of the syllabus and lesson plan are necessary. Also, there are some changes need to do, following the results of pre-posttests, especially on certain elements that have not been correctly answered by more than 60% of the participants.

The results of the curriculum test I produces the community-based training curriculum of landslides disaster mitigation Test II, which still consists of 3 competencies, 8 competency elements, 28 criterias for the performance embodied into three training lessons with additional duration of 31 one hour sessions. The additional performance criteria of "*Struktur geologi dikenali* (the known geological structure)*"* to the competency element of *"Mengenal Fenomena Geologi* (to know the geological phenomenon) -as the follow up to the post-test result- shows that the participants' understanding of geological structure still needs improvement.

Based on Test I, the extension of hour lessons are applied to almost all lessons, especially *Socialization of Landslides Disaster Risk Management.* The extension of the training lesson is given to *praktik menyusun rencana menyuluh* (the practice to plan the disaster risk management counseling/training) and *microteaching* before conducting the training practice. This effort is expected to be able to improve the participants' ability to conduct the

Table 3.
A Comparison of Training Lessons as Well as Their Hour Between Test I and II

No.	Training Lessons	*Test I*		*Test II*	
		Theory	Practice	Theory	Practice
1	Introduction to Geology	3	4	2	6
2	Landslides Disaster Risk Management	2.75	2.25	5	5
3	Training of Landslides Disaster Risk Management	2.25	7.75	3	10
		8	14	14	21
The total of hour lessons		22		31	

Table 4.
The Variant Coefficients of the Pre-posttest and the Training Practice in the Curriculum Model (Test I and II)

	PraTest Number1	PostTest Number1	PreTest Number2	Post Test Number2	Score of the Practice I	Score of the Practice 2
Std. Deviation	15.1609	12.9229	14.4643	18.6883	.3098	.1408
Variant of P	206.4	150	183.064	305.507	0.08	0.02
The average score	42.6	60.84	45.63	61.96	2.86	3.34
Variant coefficient	3.558897	**2.12408**	3.16991	3.016188	0.108322	0.042156

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training practice. Meanwhile, the extension to the hour lesson of Introduction to Geology, especially to the practice hour of *"Struktur Geologid ikenali"* (the known Geological Structure) is conducted by giving additional lessons through the use of geological model. The hour extension is also applied to Training Program of Landslides Disaster Mitigation. The hour extension includes two-times of theoretical and practical hours. This extension is conducted as the response to the result showing that the knowledge of mitigation, as the content of training practice, still needs improvement. Table 3 shows the hour change of each training lesson.

Test II shows that the average score for post-test is 61.96 (Test I =60), with the highest score is 95.8 (91.7) and the lowest is 33.3 (50). This result shows that the average score of pretest has increased as many as 16.34 (Test I=19.6), with the highest increase is 41.7 (45.8) and the lowest is -4.2 (8.3). Meanwhile, the average score for the training practice is 3.34 (*Test I =2.86),* with the highest score is 3.5 *(3.14)* and the lowest is 3.07 *(2.43).*

The comparison of the pre-test, post-tests, and the training practice (Test I and II) showed the increase of the average score. The average score for the training practice has increased significantly from *2.86* in Test 1 to 3.34 in Test II.The increase in the average score of the training practice showed that there is an effect of the hour extension to the *praktik menyusun rencana menyuluh* (to the practice session of disaster risk management) and *microteaching* before conducting the training practice. The measurement of the population coefficient of variance (Table 4) in Test I and II shows that the practical score for the homogeneity level in Test II (0.042) is higher than one in Test I (0.108). This result means that the participants' ability to conduct the training practice in Test II tends to be equal one to another than that of in Test I.

Discussion

Requirement analysis, as the introduction of this study as well as the development that the researcher makes, recommends that there should be the participants' competency improvement in conducting the training program of landslides mitigation. The recommendation refers to the identification of the existing program related to the geological hazard mitigation and focuses on the existing training curriculum of Landslides Disaster Risk Management.

The modification is then conducted based on the result of requirement analysis. The first change is conducted by adding *"community-based"* to the existing training curriculum. The change is based on the participants change as the target–i.e. from the government officials to the community taken from the society. This participant change becomes the basics of the other changes in the existing curriculum component.

The main change is applied to the series of competency units, including the performance elements and criteria. Yuvaraj (2011) states that these series of competency units refer to a package of knowledge, skill, and behavior needed to do a job effectively and efficiently. Then, requirement analysis becomes basics of method, media, and time adjustments. These adjustments are needed to be applied in all training lessons so that the participants can completely give their participation in the program. Gardner and Winslow (cited in Gass, 2012) state that requirement analysis aims at giving factual information needed to make a training adaptable and accepted by the participants.

The pattern that this study uses, as stated above, appears to be similar to the Inductive Model (Model I) in the requirement analysis concept proposed by Kaufman and Harsh (in Kaufman, 1972:33). The Inductive Model is conducted through the induction process. The goals and achievements of these lessons are obtained from the stakeholders. These goals and achievements become the basics for the program arrangement. Likewise, the program that this study develops shows the curriculum based on the learning goal resulted from requirement analysis. The learning goals are not identified and determined. Yet, they resulted from the perception and attention of the stakeholders (Kaufman, 1972) ,where they focus on the discrepancy between the current condition and expected condition.

This Model I has a potential to produce shortcoming, longer duration, and more complicated process (Kaufman, 1972). The more complicated process come up when the data collection and the result verification to the stakeholders are conducted. The process of data collection and verification need longer duration. In a practical condition, the model of need analysis will pay attention to the duration.

Model I	Step	The developed model
Identify the extant behaviors (*)	1	To identify the current and the expected condition (*)
Compile and classify behaviors into programs and behaviors expectancies (**)	2	To determine discrepancy and recommend that the program should be stopped (**)
Compare to existing broad goals	3	To identify and compared to the existing program (**)
Reconcile discrepancies (*)	4	To determine the change regions in the existing program (**)
Set detailed objectives (**)	5	To determine the competency units and elements as well as the performance criteria (**)
Develop educational program (**)	6	To develop curriculum as well as the devices (**)
Implement educational program (**)	7	To implement the curriculum (**)
Evaluate educational outcomes (*)	8	To evaluate the curriculum based on the learning result of the participants (**)
Revise (**)	9	To improve (**)

*) Conducted by the educators and the representative of the sub-community facilitated by the educational institution.
**) Especially conducted by the educators.

Figure 1. A comparison between The Inductive Model (Kaufman and Harsh, cited in Kaufman, 1972:33) and the one that has been conducted.

The strength of Model I is certainty that the learning goals can really be suitable to the most prioritized need, either macro need at sector level or the smaller one, in any region that is vulnerable to disasters and society.

The involvement of public servants in the requirement analysis process has to be extended, starting from the step of determining discrepancy to the giving recommendation of the follow-up. Next, the involvement of public servants in several steps of the curriculum development facilitates the curriculum adjustment being developed along with the implementation plan stated in the lesson plan made by public servants. The discrepancy occurred among the cases treated as curriculum plan and the curriculum being implemented can hopefully be minimized. This statement is in line with Kobiah *et al.* (2015) stating that the teacher's participation in the process of curriculum development can improve his/her ability to interpret the philosophy, educational goals, and specific or general goals of the curriculum. The management policy needs to be more focus on experience and the teacher's ability in the process of curriculum development.

In relation to the statement above, Läänemetsand Kalamees-Ruubel (2013) state that in the Taba Model, as well as in its induction, the curriculum is developed by approaching the teacher so that this model is often known as *grass-roots approach.* In this model, the teacher tends to prioritize the need of his participants or students with the teacher as the curriculum maker and the one who implements it.

The curriculum developed has four components according to Print (1993) stated. They are a well-organized learning experience, the learning experience offered by educational institution, the learning experience arranged in a document, and the learning experience implemented in a training

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program. The curriculum is implemented in the form of the organization of many elements related to each other, starting from the purpose, contents, learning experience, methods, and evaluations. This statement is in line with Lunenburg (2011) stating that the organization making and the relationship among those five elements of Taba Model and related to each other are *objectives, content, learning experiences, teaching strategies,* and *evaluative measures* to make a learning and teaching system exist.

In the context of *experiential learning theory* (Healey & Jenkins, 2007), this study relates "training" and "disaster mitigation" to educational and geography fields which are categorized into *Accommodators* (Tabel 5). It is the curriculum developed for this training program that has to consider the learning condition that can give a change to the participants to obtain the practical experience. Likewise, this study also attempts to give "experience" in terms of training to the participants through the training program.

In this training, the lesson plan made by public servants based on the curriculum showing that the participants have "a real experience" as the one who give a training (*learning experiences)*. New thing added to this curriculum and different from the existing program is the training practice that has been organized to resemble the real training, including inviting the society (people) as the audience. Through this effort, the participants are expected to be able to have "a real experience" of giving training. This study, along with other public servants involving the implementation process (Test I and II), also prepare the process of having "real experience" to other training lessons by prioritizing practice instead of theory.

Table 5.
The Categorization of Science in ELT (Nulty & Barrett, in Healey & Jenkins, 2007)

Accomodators	***Divergers***
Commerce	English
Demography	History
Education	Linguistic
Environmental studies	Philosophy
Geography	Sociology
Political Science	
Public Policy	
Convergers	***Assimilator***
Applied economics	Astronomy
Applied physics	Chemistry
Art history	Classics
Computing	Earth Sciences
Demography	Economics
Engineering	Mathematics
Forestry	Physics
Law	Theoretical physics
Medical research	

The curriculum model that is developed has the practical hours more than 60%. Landslides Disaster Risk Management even has the comparison of theoretical and practical hours as many as 2.25/7.75 in duration. The reason why the training lessons have longer duration is due to the important competency that needs to be improved through this training, which is the competency of "giving training". The quality of Landslides Disaster Risk Management is quite lower. The training lesson has lower quality because it can be further developed independently by the participants or through other geological engineering training programs.

The statement above is in line with Mayo and DuBois (1987:2) stating that in a training program should emphasise more on performance or ability instead of knowledge even though knowledge could be one of the requirement used to develop a performance. Likewise, Hughey and Mussnug (in Masadeh, 2012) stated that "Training is best supplemented with practical, hands-on experience". The participants will not only listen to what the teacher says and then forget it, but also will be able to act if they have "the experience" in the training. That is to say, the more practice, the less theory.

One of the ideas resulting from FGD requirement analysis is that the training should be conducted with fun. Therefore, the teacher should pay attention to the teaching method that will create a fun situation. This statement is in line with Taylor (1972:104), "*help them enjoy the experience of learning so that they will like the learning more when the training course has finished."*

The tests showed that the organized training curriculum as well as its devices is effective in improving competency for the training program of geological hazard mitigation. This curriculum effectiveness will only happen when the described condition matches the result of requirements analysis. The conditional changes, either from the constitutional aspect and the government policy, the condition of the region (i.e., where

the disaster occurs), or the community's profile will influence the re-modification of the organized curriculum.

Conclusion

The curriculum model development is based on requirement analysis comprehensively conducted through some stages being selected. Through the stages, this study can identify the whole needs and distortion. The result of requirement analysis becomes the basics for goals, target, content, method, medium, and the evaluation process of the training program that has been suggested by requirement analysis.

The evaluation process -i.e., through pre-post rest used as the instrument to identify the participants' cognitive aspect- shows the increase in Test I and II. The significant increase found in the training competency shows the effectiveness of Test II in improving the participants' competency for the training practice. That is to say, the training goals can be achieved and the curriculum model is effective in improving the participants' competency for mitigation.

This success is attributed to the participants' motivation to improve their competency. This motivation is related to the integrity and loyalty to the community. The teacher's readiness to understand the curriculum used as the reference is also the factor of this success.

Time is an inhibitor to conduct an ideal training that matches the competency need. The community members with different occupation have also limited time. The other inhibitor is the lack of practical location with good geological object in Bandung and the neighboring regions. The limitation of practical location causes the participants cannot have "the real geological experience". The use of geological model, simulation, or video has yet to be able to replace geological outcrop in the real field.

References

Abdurahman, Oman., dkk. (2013). *Hidup di Atas Tiga Lempeng – Gunung Api dan Bencana Geologi.* Badan Geologi – Kementerian Energi dan Sumber Daya Mineral.

Dolotallas, A. C. & Nagtalon, J. A. (2015).The Effect of Experiential Learning Approach on the Students' Performance in Filipino*. Journal of Education & Social Policy. Vol. 2, No. 6; December 2015.* Diakses Tanggal 1 Agustus 2016 dari www.jespnet.com.

Gass, J. (2012). Needs Analysis and Situational Analysis: Designing an ESP Curriculum for Thai Nurses. *English for Specific Purposes World, ISSN 1682-3257, http://www.esp-world.info, Issue 36, vol. 12, 2012*.Diakses Tanggal 20 Juni 2016 dari http://www.esp-world.info/Articles_36/Gass_ Nurses.pdf.

Haryani (2014), Potensi Pengembangan Atraksi Wisata Kampung Nelayan Pasie Nan Tigo Kota Padang di tengah Ancaman Bencana Abrasi dan Banjir. *Jurnal Sosial dan Pembangunan, MIMBAR, Volume 30, No. 2 Tahun 2014, p.198*.

Healey, M. & Jenkins, A. (2007). Kolb's Experiential Learning Theory and Its Applications in Geography in Higher Education. *Journal of Geography, 99:5, 1985-195.*

Kapucu, N. Hawkins, C. V. Rivera, F. I. (2013). Disaster Preparedness and Resilience for Rural Communities*.Risk, Hazards & Crisis in Public Policy, Vol. 4, No. 4, 2013.*Diakses Tanggal 27 Juni 2016 dari https://www.researchgate.net/publication/262417963_Disaster_Preparedness_and_Resilience_for_Rural_Communities.

Kaufman, R. A. (1972). *Educational System Planning*. New Jersey: Prentice-Hall, Inc.

Kobiah, L. K. dkk.(2015). Teacher's Participation in Curriculum Conceptualisation and Effective Implementation of Secondary School Curriculum in Kenya. *International Journal of Education and Research Vol. 3 No. 7 July 2015.* Diakses Tanggal 15 Agustus 2016 dari *http://www.ijern.com/journal/2015/July-2015/26.pdf*

Läänemets, Urve & Kalamees-Ruubel, Katrin. (2013) The Taba-Tyler Rationales. *Journal of the American Association for the Advancement of Curriculum Studies - Volume 9, 2013.*Diakses Tanggal 20 Juni 2016 dari www.uwstout.edu/soe/jaaacs/upload/2013-05-1-urve.pdf.

Lunenburg, Fred C. (2011). Curriculum Development: Inductive Models*. Schooling Volume 2, Number 1, 2011.* Diakses Tanggal 20 Juni 2016 dari http://www.nationalforum.com/Electronic%20Journal%20Volumes/Lunenburg,%20Fred%20C.%20Curriculum%20Development-Inductive%20Models-

 ISSN 0215-8175 | EISSN 2303-2499

Schooling%20V2%20N1%202011.pdf.

Masadeh, M. (2012). Training, Education, Development and Learning: What is the Difference? *European Scientific Journal. May edition vol. 8, No.10. ISSN: 1857-7881 (Print). e - ISSN 1857-7431.* Diakses Tanggal 20 Juni 2016 dari http://www.eujournal.org/index.php/esj/search/results.

Mayo, G. D. & Dubois, P. H. (1987). *The Complete Book of Training: Theory, Principles, and Techniques.* California: University Associates.

McNeil, J. D. (1990). *Curriculum: A comprehensive Introduction 4th edition.* United States of America: Scott, Foresman/ Little. Brown Higher Education.

Nudu, Josef H. & Muhammad, Chaznin R.(2001). Pendekatan Sistem untuk Menghasilkan Kurikulum Pendidikan Teknik yang Kompetitif dan Perbaikan Kualitas yang Berkesinambungan. *Jurnal Sosial dan Pembangunan, MIMBAR, Volume 17 No. 1 Tahun 2001, p.60.*

Print, M. (1993). *Curriculum Development and Design*. N.S.W.: Allen & Unwin.

Republik Indonesia. (2007). *Undang-Undang Nomor 24 Tahun 2007 tentang Penanggulangan Bencana.*

Taba, H. (1962). *Curriculum Development: Theory and Practice*. USA: Harcourt, Brace & World, Inc.

Taylor, P. (2003). *How to Design a Training Course – A guide to participatory curriculum development.* London: Continuum.

Yuvaraj, R. (2011). Competency Mapping–A Drive for Indian Industries. *International Journal of Scientific & Engineering Research, Volume 2, Issue 8, August-2011 1 ISSN 2229-5518 IJSER © 2011*. Diakses Tanggal 1 Agustus 2016 dari http://www.ijser.org

Zais, Robert S. (1976). *Curriculum: Principles and Foundation.* New York:Harper &Row Publishers.