

Competencies of Teachers in Integrating Disaster Risk Reduction in Science and Social Studies Subjects in Basic Education Schools

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Abstract: *This is a descriptive study, employing both quantitative and qualitative methods, conducted to determine the competencies of secondary school teachers handling science and social studies in the Basic Education Schools. Using the purposive sampling method, a researcher-made questionnaire based on Schulman's Pedagogical Content Knowledge (PCK) theory was administered to 62 secondary school teachers handling science and social studies subjects only. Results revealed that the teachers rated themselves "somewhat competent" ($x=2.47$) in terms of mastery of subject matter and "competent" ($x=2.95$) in the art of questioning in integrating disaster risk reduction in Science and Social Studies subjects. As to skills, the teachers rated their communication and facilitative skills as "competent" ($x=2.99$) and their evaluation skills as "competent" ($x=2.90$). With regards to methodologies, the teachers rated their use of strategies and techniques in teaching as "competent" ($x=2.90$) and the production and use of instructional materials as "competent" ($x=2.83$). Among the perceived difficulties of teachers in integration, disaster risk reductions are the lack of textbooks, modules, and instructional materials as well as lack of financial and technical support. Alternative methods to supplement the lack of textbooks and instructional materials include Internet research and pamphlets on disaster risk reduction.*

Keywords: competencies, risk reduction, risk management of teachers, integration, strategies, pedagogy

1. Introduction

Disaster Risk Reduction (DRR) aims to reduce the damage caused by natural hazards like earthquakes, floods, droughts, and cyclones, through an ethic of prevention. Disaster risk reduction is the concept and practice of reducing disaster risks through systematic efforts to analyze and reduce the causal factors of disasters. Reducing exposure to hazards, lessening vulnerability of people and property, wise management of land and the environment, and improving preparedness and early warning for adverse events are all examples of disaster risk reduction.

In 2007, the Secretary of the Department of Education (DepEd) issued a memorandum order (DepEd Order No.55, series of 2007) to mainstream the teaching of disaster risk reduction in the curriculum. DepEd decided that integration of DRR topics into subjects already taught such as Science and Social Studies (Araling Panlipunan) would be more effective than creating a new subject, and it would be easier for the children to understand the lessons ("DepEd to teach disaster risk reduction," March 8, 2010, www.balita.ph).

The education sector has a relevant role to play in disseminating information on disaster risk reduction. As the intellectual leaders in the community, teachers are then the key players in the transmission and dissemination of knowledge and information on disaster risk reduction. With the existing framework for disaster risk reduction and the significant progress on materials production, the teachers' role is to deliver and teach the lessons effectively to the students.

The existing program on mainstreaming disaster risk

reduction in the curriculum will not be fully realized if teachers lack the necessary knowledge and skills on how to implement them. Hence, it is the purpose of this study to determine the competencies of teachers in integrating disaster risk reduction in the Science and Social Studies subjects in the secondary curriculum.

2. Method

The descriptive method of study was utilized in this research with the use of a questionnaire as the main data gathering instrument supplemented by interviews. The questionnaire was researcher-made based on Schulman's Pedagogical Content Knowledge (PCK) theory. A panel of experts validated the questionnaire during the Agency In-house review. The teaching competencies of the teachers were divided into three parts, namely: competencies on knowledge, competencies on skills, and competencies on teaching methodologies.

The competencies on knowledge were further classified into mastery of subject and art of questioning; the competencies on skills were classified into facilitative and communication skills and evaluation skills, and the competencies on teaching methodologies were classified as to strategies and techniques in teaching and the production and use of instructional materials. The level of competencies ranged from 1 – not competent, 2 – somewhat competent, 3 – competent, and 4 – very competent. The answers of the respondents in the questionnaires were collated and treated statistically using weighted mean and chi-square test of association.

3. Results

The profile of the teachers as to age, gender, highest educational attainment, area of specialization, and years of teaching experience are shown in Table 1.

Table 1: Profile of Respondents

		Frequency	Percentage	Rank
Age of Teachers	23 – 28 years old	26	41.94	1
	29 – 34 years old	13	20.96	2
	35 – 39 years old	9	14.52	3.5
	40 – 45 years old	5	8.06	5
	46 – above	9	14.52	3.5
	Total	62	100	
Gender	Male	5	8.06	2
	Female	57	91.94	1
	Total	62	100	
Highest Degree Earned	Baccalaureate degree	60	96.77	1
	Master degree	2	3.23	2
	Doctorate degree	0	0	3
	Total	62	100	
Area of Specialization	Science	34	54.84	1
	Social Studies	20	32.26	2
	Others	8	12.9	3
	Total	62	100	
Number of Years in Teaching	1 – 8 years	46	74.2	1
	9 – 16 years	10	16.13	2
	17 – 24 years	4	6.45	3
	25 – 32 years	1	1.61	4.5
	33-above	1	1.61	4.5
	Total	62	100	

Of the 62 teachers, 26 of them are aged 23 – 28 years old. There are 13 teachers who are aged 29 – 34 years old. While the rest of the teachers are aging within the intervals of 35 years old to 46 years old. Most of the teachers are baccalaureate degree holders and handling Science subjects. There are 46 teachers who have teaching experience of 1 – 8 years. Next in rank are the teachers who have teaching experience of 9 – 16 years.

The competencies of teachers are divided into three categories, which are: knowledge, skills, and methodologies. In terms of knowledge, the competencies are classified as to the mastery of subject matter and art of questioning. The competencies of teachers as to the mastery of subject matter are shown in Table 2.

Table 2: Competencies of teachers as to mastery of subject matter

Competency	Mean	Description
1) I have in-depth knowledge on disaster risk reduction (DRR).	2.64	Competent
2) I have professional preparation and training on DRR.	2.11	Somewhat Competent
3) I know how to access information and link with community resources on DRR.	2.45	Somewhat Competent
4) I can identify and design lesson that meet the learning goals.	2.61	Competent
5) I can develop instructional content and concepts based on learner's need and interests.	2.56	Competent
Over-all mean	$\bar{x}=2.47$	Somewhat Competent

The teachers answered that they are “competent” in sharing their knowledge on disaster risk reduction ($\bar{x} = 2.64$), identifying and designing lessons that meet learning goals ($\bar{x}=2.61$), and developing instructional content and concepts based on learners' needs and interests ($\bar{x} = 2.56$). However, they feel that they are “somewhat competent” in professional preparation and training in disaster risk reduction ($\bar{x} = 2.11$)

and in accessing information and linkages with community resources ($\bar{x}=2.45$). In totality, the teachers are "somewhat competent" in the competencies pertaining to the subject matter ($\bar{x}=2.47$).

The competencies of teachers on the art of questioning are shown in Table 3 below.

Table 3: Competencies of teachers as to the art of questioning

Competency	Mean	Description
1) I ask questions that motivate learners to share prior knowledge and experiences.	2.99	Competent
2) I construct questions that are suited to learners' learning styles	2.87	Competent
3) I listen to students' answers and help them to express themselves.	3.1	Competent
4) I have the ability to probe on learners' understanding and elicit feedback from learners.	2.93	Competent
5) I ask questions involving higher-order thinking skills during discussions.	2.88	Competent
Over-all Mean	$\bar{x}= 2.95$	Competent

The teachers rated themselves "competent" in motivating their learners to share prior knowledge and experiences ($x=2.99$), in constructing questions that are suited to learners' learning styles ($x=2.87$), in listening to students' answers, and helping them to express themselves ($x=3.10$), in probing on learners' understanding and elicit feedback from learners ($x=2.93$), and in asking questions involving higher-order thinking skills during discussions ($x=2.88$). The

overall mean is $x=2.95$, which means that the teachers are "competent" on the competencies of the art of questioning.

In terms of skills, the competencies are classified into communication and facilitative skills and evaluation skills. The competencies of teachers as to communication and facilitative skills are shown in Table 4.

Table 4: Competencies of teachers as to communication and facilitative skills

Competency	Mean	Description
1) I have a good command of the medium of instruction in teaching.	2.95	Competent
2) I exhibit several styles of communication.	2.86	Competent
3) I encourage learners to use their own experiences to illustrate and clarify learning.	3.07	Competent
4) I serve as a facilitator of learning and as a communicator of information.	3.04	Competent
5) I provide a learning environment that is conducive to learning.	3.05	Competent
Over-all Mean	$x=2.99$	Competent

The teachers professed that they have competence in using the medium of instruction in teaching ($x=2.95$), in exhibiting several styles of communication ($x=2.86$), in encouraging learners to use their own experiences to illustrate and clarify learning ($x=3.07$), in facilitating learning and communicating information ($x=3.04$) and in providing a learning environment that is conducive to learning ($x=3.05$). The overall mean is $x=2.99$ which implies that the teachers

are "competent" in terms of communicative and facilitative skills.

With regards to methodologies, the competencies are divided into strategies and techniques in teaching and production and the use of instructional materials. The competencies of teachers as to evaluation skills are shown in Table 5.

Table 5: Competencies of teachers as to evaluation skills

Competency	Mean	Description
1) I formulate assessment in line with the learning objectives.	2.98	Competent
2) I determine the reliability and validity of the assessment tools prepared.	2.84	Competent
3) I conduct formative and summative assessment based on learners' performance.	2.96	Competent
4) I provide timely feedback on learners' performance.	2.84	Competent
5) I reflect on the outcomes of evaluative/assessment tools given to students.	2.89	Competent
Over-all Mean	$x=2.90$	Competent

The teachers rated themselves "competent" in formulating assessment in line with learning objectives ($x=2.98$), in determining the reliability and ability of assessment tools ($x=2.84$), in conducting formative and summative assessment based on learners' performance ($x=2.96$), in providing timely feedback ($x=2.84$) and in reflecting on outcomes of evaluative assessment tools given to students

($x=2.89$). In totality, the teachers are "competent" in evaluative skills.

As to teaching methodologies, the competencies of teachers are classified into strategies and techniques in teaching and production and the use of instructional materials. The competencies of teachers on strategies and techniques in teaching are shown in Table 6.

Table 6: Competencies of teachers on strategies and techniques in teaching

Competency	Mean	Description
1) I plan instructional activities that suit learners' interests and needs.	2.93	Competent
2) I utilized strategies that involve the application of lifelong skills.	2.94	Competent
3) I incorporate learning activities that involve the application of skills to real-life experiences.	2.96	Competent
4) I employ strategies for diversity of learners and for the development of multiple intelligences.	2.7	Competent
5) I encourage learners' reflection on both the process and results of learning activities.	2.97	Competent
Over-all Mean	$x=2.90$	Competent

The teachers answered that they are "competent" in planning instructional activities that suit learners' interests and needs ($x=2.93$), in utilizing strategies that involve the application of lifelong skills ($x=2.94$), in incorporating learning activities that involve the application of skills to real-life experiences ($x=2.96$), in employing strategies for diversity of learners and for the development of multiple intelligences ($x=2.70$) and in encouraging learner's reflection on both the

process and results on learning activities ($x=2.97$). The overall mean is $x=2.90$ which means that the teachers are competent in terms of strategies and techniques in teaching.

Likewise, the competencies of teachers on the production and use of instructional materials are reflected in Table 7.

Table 7: Competencies of teachers on production and use of instructional materials

Competency	Mean	Description
1) I select appropriate visual aids for instruction.	2.88	Competent
2) I illustrate proficiency in the use of modern technology in teaching.	2.82	Competent
3) I utilize the learning resources in the community to enhance learning	2.74	Competent
4) I have the creativity and innovative in producing and using instructional materials	2.78	Competent
5) I use multimedia aids (such as videos, clips, etc.) and the internet in teaching the lessons to student	2.81	Competent
Over-all Mean	x = 2.83	Competent

The teachers rated themselves “competent” in the selection of appropriate visual aids for instruction (x=2.88), in illustrating proficiency in the use of modern technology in teaching (x=2.82), and in the utilization of learning resources in the community to enhance learning (x=2.74). They also have the competence in producing and using instructional materials creatively and innovatively (x=2.78). Likewise, they are competent in using multi-media aids and the Internet in teaching the lesson to students (x=2.81). As a whole, the teachers are "competent" in the competencies on the production and use of instructional materials, as evidenced by the overall mean of x=2.83.

This study also looks into the relationship of the profile of the respondents and their competencies in integrating disaster risk reduction in Science and Social Studies subjects that they have taught. Using the Statistical Package for Social Science (SPSS), a cross-tabulation of data was made. Please see Table 8.

Table 8: Correlation between measures

Profile	Competencies					
	Subject Matter	Art of Question	Communication Skills	Evaluation Skills	Strategies & Techniques	Production of Materials
Age	0	0	0	0	0	0
Gender	0.659	0.887	0.738	0.682	0.263	0.476
Degree Earned	0.134	0.911	0.008	0.256	0.152	0.243
Specialization	0.023	0.074	0.008	0.922	0.91	0.064
Teaching Experience	0	0	0	0	0	0

*p < 0.013

The results showed that there is significant relationship between teacher’s age and competencies on subject matter, $\chi^2 (75, N=152) = 218, p < 0.01$; age and competence on the art of questioning, $\chi^2 (75, N=152) = 138, p < 0.01$; age and facilitative and communication skills, $\chi^2 (75, N=152) = 222, p < 0.01$; age and evaluation skills, $\chi^2 (75, N=152) = 177, p < 0.01$; age and teaching strategies, $\chi^2 (75, N=152) = 215, p < 0.01$; and age and production and use of instructional materials, $\chi^2 (75, N=152) = 209, p < 0.01$.

Likewise, there is also a significant relationship between teacher’s years of teaching and their competencies on subject matter, $\chi^2 (57, N=152) = 231, p < 0.01$; with competencies on the art of questioning, $\chi^2 (57, N=152) = 183, p < 0.01$; with competencies on facilitative and communication skills, $\chi^2 (57, N=152) = 229, p < 0.01$; with evaluation skills, $\chi^2 (57, N=152) = 195, p < 0.01$; with teaching strategies, $\chi^2 (57, N=152) = 200, p < 0.01$; and with production and use of instructional materials, $\chi^2 (57, N=152) = 199, p < 0.01$.

On the other hand, there is no significant relationship between teacher’s gender and competencies on subject matter, $\chi^2 (3, N=152) = 1.60, p = .659$; gender and competencies on art of questioning, $\chi^2 (3, N=152) = .643, p = .887$; gender and facilitative/communication skills, $\chi^2 (3, N=152) = 1.26, p = .738$; gender and evaluation skills, $\chi^2 (3,$

$N=152) = 1.47, p = .692$; gender and teaching strategies, $\chi^2 (3, N=152) = 3.98, p = .263$; and gender and production/use of instructional materials $\chi^2 (3, N=152) = 2.49, p = .476$.

The same findings of no significant relationship was found between the highest degree earned by the teacher and competencies on subject matter, $\chi^2 (3, N=152) = 5.58, p = .134$; with competencies on art of questioning, $\chi^2 (3, N=152) = .534, p = .911$; with competencies on evaluation skills, $\chi^2 (3, N=152) = 4.05, p = .256$; with competencies on teaching strategies, $\chi^2 (3, N=152) = 5.29, p = .152$; and competencies on production and use of instructional materials, $\chi^2 (3, N=152) = 4.18, p = .243$. Furthermore, there is no significant relationship between teacher’s area of specialization and competencies on subject matter, $\chi^2 (6, N=152) = 14.67, p = .023$; with competencies on art of questioning, $\chi^2 (6, N=152) = 11.52, p = .074$; with competencies on evaluation skills, $\chi^2 (6, N=152) = 1.98, p = .922$; with competencies on teaching strategies, $\chi^2 (6, N=152) = 2.10, p = .910$; and competencies on production and use of instructional materials, $\chi^2 (6, N=152) = 11.91, p = .064$.

However, there is a significant relationship between the degree earned by the teacher and their competencies on facilitative and communication skills, $\chi^2 (3, N=152) = 11.86, p < .01$; and the area of specialization and communication skills, $\chi^2 (6, N=152) = 17.35, p < .01$.

4. Discussion

The teacher's competence in terms of knowledge and skills is a vital component of effective learning. Content knowledge refers to the amount and organization of knowledge per se in the mind of the teacher (Schulman, 1986). The success of teaching practice can be measured in terms of the teacher's ability to initiate and support learning processes that enable students to achieve specific pedagogical objectives (Baumert and Kunter, 2013).

In this study, the teachers rated themselves "somewhat competent" in terms of mastery of subject matter and "competent" in the art of questioning. This implies that the teachers have felt that they lack the pertinent content knowledge needed to integrate disaster risk reduction in the subjects that they taught. This finding may be attributed to the teacher's profile, where most of the teachers had only teaching experience ranging from one to eight years. The same findings were also found in the study of Gagliardi et al. (1994), where most of the public school teachers were deficient in both training and knowledge of emergency care. Lack of effective and formal training may be the possible cause. Ocal (2005), cited by Yilmaz (2014), reported that teachers have difficulties in integrating earthquake-related issues into their subject areas. Teachers do not consider themselves as literates in disaster education since they are not disaster management specialists. Parallel to this, the incompatibility with teaching methods also posed as a deterrent factor in disaster education (Amri, 2015). The lack of appropriate and adequate background knowledge and experience on disaster-related issues is a challenge (Izadkhan, Hosseini & Hermati, 2012).

As to skills, the teachers rated their communication and facilitative skills as "competent" and their evaluation skills as "competent." With regards to methodologies, the teachers rated their use of strategies and techniques in teaching as "competent" and the production and use of instructional materials as "competent." Apropos, the teachers' pedagogical content knowledge, professional beliefs, work-related motivation, and self-regulation are considered as aspects of their professional competence. Likewise, the application of skills can also be classified as pedagogical knowledge, which goes beyond the subject matter to other dimensions of teaching (Schulman, 1984).

The findings revealed that there is a significant relationship between the degree earned by the teacher and their competencies on communication skills. Likewise, communication skills are also related to the teacher's area of specialization. The same findings were also found by Seghedin (2012) that communication is important, and teachers are careful with the type of communication they have to adopt in dealing with students.

Among the perceived difficulties of teachers in integration, disaster risk reduction is the lack of textbooks, modules, and instructional materials as well as lack of financial and technical support. The lack of facilities, especially library resources, affects teachers' performance (Nadee, 2011). The

teachers then used alternative methods to supplement the lack of textbooks, and instructional materials, including Internet research and pamphlets on disaster risk reduction.

5. Conclusion

Living in a disaster-prone country calls for appropriate and effective risk reduction education. Teachers do play a great role in educating the young generation on disaster risk reduction. The competence of teachers is a vital component in carrying out this role in schools. Competence in knowledge, skills, and methodologies resound to effective teaching. Teachers had the competencies; however, there is a need to enhance mastery of subject matter and content knowledge. It is essential that teachers should equip themselves with content and pedagogical knowledge of disaster risk reduction through continuous and updated seminars and training. Technical and logistic support should also be given to the teachers in teaching disaster risk reduction to their students effectively.

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