Experiences Of Mathematics Teachers In Teaching Non-Mathematics Subjects

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ABSTRACT

Teaching non-mathematics subjects is an extensive problem with repercussions for effective learning and teaching. This study investigated the experiences of junior high school mathematics teachers in teaching non-mathematics subjects. It utilized descriptive-qualitative research. It employed a thematic analysis of the teachers' experiences teaching non-mathematics subjects. Results showed that non-mathematics subjects are given to young and beginning mathematics teachers with limited related training in full-load teaching and handling above-average class sizes. Complete the teaching load and mismatch of teacher needs in the hiring process are the main reasons why there are mathematics teachers who teach non-mathematics subjects. The identified best practices are accepting it as a challenge, doing much reading, searching on the net, and being willing to ask for help. Teachers need to keep grounded, be confident, and be adept at delivering whatever subjects are given to them.

Keywords: Best Practices, Experiences, Mathematics Education, Out-of-Field Teaching.

INTRODUCTION

The teachers' competence and quality of teaching are undeniably among the main important factors affecting the students' development and learning. Teaching competence is associated with the teachers' perception that they have enough knowledge of their discipline and the expertise needed to teach efficiently and effectively. However, teachers who handle subjects outside their field of specialization are called out-of-field teaching.

According to McConney and Price (2009), out-of-field teaching is when a teacher instructs in a subject or field for which they must be qualified to teach at the major or minor tertiary (university) level. Additionally, it refers to instructing students at a grade level for which the teacher needs to be officially qualified. In this case, Du Plessis (2013) mentioned that teaching subjects not within your specialization are a global concern and widespread.

In the study of Zhou (2012), she examines teachers teaching outside of the field of science and mathematics who teach in public schools in 21 countries using the data from OECD. Teachers teaching outside of their field are those who are young and inexperienced with substantial educational attainment, who worked on short contracts and part-time bases. Also, the results revealed that these teachers are disproportionally concentrated in rural, small, and low-SES schools.

The Western Australian State School Teacher's Union, as mentioned by McConney and Price (2009), indicates that teaching outside your area or field is a factor that contributes to stress for teachers. It is a problem for new graduates faced with the extra demands of designing and implementing the program for an unfamiliar subject for which they need more preparation. This is consistent with feedback from math teachers in small schools who said they were given classes in subjects like music, the arts, physical education, and health (MAPEH), technology and livelihood education (TLE), education for special populations (ESP), and others. They claimed that they needed help in handling non-mathematics subjects assigned to them.

Participants in Lynch's study (2014), Out-Of-Field Mathematics Teachers: An International Problem That Needs A Solution, who did not major in mathematics, identified

confidence in teaching mathematics as a problem: 23.5% reported being "very confident," 35.3% reported being "confident," 29.4% reported being "average," and 11.4% reported being "unconfident."

According to a Department of Education survey, 45 percent of mathematics teachers were not experts in the field (Patalinghug, 2018). Moreover, the proportions are worse for science teachers who need to be staffed with adequately qualified teachers who majored in the subjects they were teaching.

A phenomenological study conducted by Andueza, Aquino, Capobres, Ejurango, Libosada, and Fameronag (2018) on the out-of-field teaching of English major education graduates revealed that responding to a need in a particular school, willingness to teach subjects aside from English and other personal reasons are just the identified explanations why there were English Education graduates teaching outside their field of specialization. Similarly, the challenges met by these teachers pertain to the content and pedagogy of teaching the non-English subject.

In the study of Cruz I. et al. (2017), they stated that teaching is a global phenomenon that may impact students' educational experiences, particularly in public institutions. Due to a lack of teachers, teachers are regularly appointed outside of their specialty to teach in rural and challenging-to-staff schools. Their lack of credentials and necessary experience for their positions may make it difficult for them to get started in the profession. A school system tries to fill the post with teachers certified to teach in other subjects if a teacher with the appropriate qualification is not readily available. Most people detest teaching subjects in which they need more experience. It isn't a suitable instructional strategy. Students learning is substantially hampered by inexperienced lecturers who rely too heavily on the textbook.

Teacher quality has become one of education's most widely and loudly debated issues over the last decade. Furthermore, teacher quality has received less attention than the unacceptably high rates of out-of-field assignments in the nation's middle and high schools. The problem is exacerbated in junior high schools, where extremely high rates of misassignment indicate a staggering disregard for whether

teachers have the bare minimum of academic foundation required to teach classes in core academic subject areas.

This study investigated the experiences of Junior High School Mathematics teachers in teaching non-mathematics subject/s. Specifically, it determined the profile of the mathematics teachers, the reasons for the existence of mathematics teachers teaching non-mathematics subjects, and the best practices of mathematics teachers in teaching non-mathematics subjects.

METHODOLOGY

This study utilized descriptive-qualitative research. It used phenomenological analysis of the teachers' experiences in teaching non-mathematics subjects. The study interviewed six principals/school heads to determine the reasons for having mathematics teachers teaching non-mathematics subjects. Eight licensed teachers in the Junior High School of Ilocos Sur Division graduated Bachelor of Secondary Education (BSEd) – Mathematics teaching non-mathematics subjects.

The data were gathered using a survey questionnaire with regard to the teachers' profiles. Meanwhile, a semi-structured one-to-one interview was conducted with the teachers teaching non-mathematics subjects. The researchers asked permission from the Superintendent of DepEd Ilocos Sur to conduct this study. Upon approval, the researchers coordinated with the School's head/principal, and interviews with them were conducted. A letter of consent was given to the teacher participants before the study, and a schedule for the interview was set. Respect for the dignity of the teachers was prioritized. Teacher participants were not subjected to any harm. Also, the anonymity of the teachers in this research was ensured by assigning code for the teacher-respondent, and affiliations of any kind, financial sources, and potential conflicts of interest will be declared. Any communication about this research was done with honesty and transparency. The participants will be benefited from this study since best practices were identified from other teachers teaching non-mathematics subjects, which can be adapted. Frequency and percentage, and thematic analysis were used to analyze the data. Preliminary codes were assigned to describe the content of transcribed interviews. Patterns or themes were identified and named based on these different codes.

RESULTS (FINDINGS) AND DISCUSSIONS

Considering Table 1, the majority of the participants are 30 years old and above. However, there are participants who are above 30 years old. Most of the participants are female, while only one respondent is male. The result is a substantiation that the teaching profession is female-dominated.

Half of the participants are college graduates with master's units and have one year to 3 years of service in the teaching profession. This implies that most of the participants are still new at work.

In terms of the number of seminars or training attended by the participants regarding the Non-Mathematics subjects, five participants attended 1 – 2 seminars or training. On the number of teaching loads, the majority of the participants have four teaching loads. Half of the participants are handling Edukasyon sa Pagpapakatao. Moreso, some are handling MAPEH.

The majority of the participants rendered 1 – 5 years in teaching non-mathematics subjects. Looking further at the table, most participants have 45 – 54 average class sizes. The result implies that there is generally a high number of students as compared to the ideal number of 35 students per class.

Table 1. Profile of the Teacher-Participants

Profile	**f**	**%**
Age		
above 30	3	37.5
30 and below	5	62.5
Total	8	100.0
Sex		
Male	1	12.5
Female	7	87.5
Total	8	100.0
Educational Attainment		
With Doctorate Units	1	12.5
With Master's Units	4	50.0
College Graduate	3	37.5
Total	8	100.0
Length of Teaching Experience (in years)		

16 – 18	1	12.5
13 – 15	1	12.5
4 – 6	2	25.0
1 – 3	4	50.0
Total	8	100.0
Number of Seminars/Training Attended in Non-Mathematics Subject/s		
9 – 10	1	12.5
7 – 8	1	12.5
3 – 4	1	12.5
1 – 2	5	62.5
Total	8	100.0
Number of Teaching Load/s		
6	1	12.5
4	5	62.5
3	2	25.0
Total	8	100.0
***Non-Mathematics Subject/s Taught**		
Technology and Livelihood Education (TLE)	2	25.0
Filipino	1	12.5
Science	2	25.0
Music, Arts, PE, and Health (MAPEH)	3	37.5
Araling Panlipunan (AP)	1	12.5
Edukasyon sa Pagpapakatao (ESP)	4	50.0
Years in Teaching Non-Mathematics		
16 – 20	1	12.5
11 – 15	1	12.5
6 – 10	1	12.5
1 – 5	5	62.5
Total	8	100.0
Average Class Size		
55 – 64	1	12.5
45 – 54	6	75.0
35 – 44	1	12.5
Total	8	100.0

*Multiple Response

The school heads have similar answers as to why mathematics teachers are teaching non-mathematics subjects in their school. Here are the following:

1. Teaching Load Allocation

According to them, additional loads were given to the teachers to comply with the prescribed teaching load in distributing teaching load to their faculty. As one of the school heads said, "The distribution of loads to our teachers should at least meet the required load of DepEd to avoid overload or underload. If I do not do this, then there will be teachers with overload, while some will be under load. If we know that they can handle the subject, we give them additional subjects. For example, in our case, we have three (3) math teachers and only a few class sections. If I give them only math subjects, they will be under load. For this reason, I gave them other subjects besides math."

The result of the study is similar to the findings of Bayani and Guhao (2017). They revealed in their study that another reason for the assignment was to complete the teaching load of the concerned teachers, which must be a result of improper placement of teachers.

2. Job Mismatch

Also, there is a mismatch of teacher needs in the hiring process because of available applicants in the RQA, and the deployment of the hired teachers is also causing this scenario. As mentioned by one school head, "Sometimes, we hire teachers whose major is not of what we need because there are no available in the RQA." Another school head cited, "In this school, four teachers are majoring in science well; two would be enough so we could have other specializations such as MaPEH." The scenario, that is, teachers teaching subjects that are not their field of specialization, is not just for mathematics teachers but also true for other teachers. Just like in one school, a teacher majoring in Filipino teaches Araling Panlipunan, while in another school, Science teachers handle MAPEH and Filipino, and a Social Studies major teaches Filipino and Values Education.

Results of the study by Bayani and Guhao (2017) have revealed that non-major teachers were made to teach Filipino subjects in their respective schools out of compliance with the assignment as teachers and submission to the principals. One main reason for the assignment was the need for more Filipino teachers teaching in the schools where the

participants are assigned. The teacher did not have any choice or the right to say no but to obey the order of the principal.

Out of the five school heads interviewed, two of them admitted that the presence of teachers teaching subjects out of their field of specialization had existed ever since their school started. The rest disclosed that it was already there when they assumed their post as school head. The school heads acknowledged that DepEd Division Office is aware of this situation. It was known, too, that these teachers teaching subjects out of their field of specialization were sent to seminars or training conducted by DepEd in which, through this, they gained additional knowledge on those subjects. Training and seminars are being held to prepare all the teachers for globalization. Their attendance at these seminars helps create an effective learning environment for the student, improves the teaching-learning process, keeps them updated on modern instructional devices, and inspires them to become better teachers in the modern world. One needs to go beyond the textbook and take workshops and continuing education courses to properly grasp the discipline and develop into a truly great teacher.

Labor supply and labor demand are usually evaluated by comparing the employees' acquired education, and it is affected because of the education-job mismatch. The expertise and skills of the employees need to be optimally utilized in the labor market, which is reported to have serious effects on their job satisfaction, occupational choice, and labor turnover (Lauron et al., 2019).

Teaching non-mathematics subjects is an extensive problem with repercussions for effective learning and teaching. Thus, to address these glitches, the following best practices have been identified.

1. Take the heat.

When the mathematics teachers were given with non-mathematics subjects as part of their teaching load by their heads, they revealed that they were astonished but had no choice but to accept it. They professed it as a challenge since they felt it takes much responsibility to teach subjects out of their specialization. According to them, because of their passion for teaching, and their love for their students, they

must become an expert on what is assigned to them. Being able to fulfill their student needs drives them to continuously upgrade themselves this time, not only in their field of expertise but in other subjects too. As they say, teaching is continuous learning. As a teacher, he/she must always be ready to face his/her students no matter what the circumstance is. Teachers must become versatile and compliant in whatever subject is assigned to them because they think of their students' needs first in their profession (Kelly, 2016). These attitudes do not just cut back the stress levels of teachers but also for the students who expect the teacher to be in charge and take control of any situation (Bayani & Guhao, 2017). Teachers are considered light in their classrooms. It is essential that though they feel less confident about what they teach, they need to keep this private from their students but rather a high-spirited teacher to motivate their learners inside the classroom. Knowing that his/her students learned is a teacher's satisfaction.

2. Hit the Books.

The majority of participants described having to go to the library to look for books, teaching aids, and references. They had to do many readings to be prepared when in class. As one of the teachers exclaimed, "I scanned many books for my non-math subject requires a lot of explanation and more ideas, so I need to do advance reading and researching to impart the knowledge about the topic. It needs more readings as compared to my specialization."

According to Seastrom, Gruber, Henke, McGrath, and Cohen (2004), the most important influence on what students learn is what teachers know and can do. Because mathematics teachers have been assigned to teach subjects in which they have little subject knowledge, preparing for the subjects is difficult.

Bayani and Guhao (2017) noted that constant reading was an indicator of how resourceful the teachers were that had helped them become effective in teaching Filipino.

3. Online Browsing.

The participants mentioned that they mainstream technology to improve the traditional techniques and use new educational methods. Moreover, they specified that since

books are not always available, they opt to browse on the internet to look for materials they could use in their classes. Advanced research is an effective weapon for the teachers who consume much of their time just to prepare for the lessons the next day. The internet provides vast resources of teaching materials or aids a teacher may use in his/her class.

All the teachers interviewed asserted that they surf the internet for topics that they had difficulty understanding and have little knowledge of it. Also, they look for video tutorials that they can easily follow, like cooking or dance steps. After which, they try it first themselves so that they would not just show the video clips to their students but also would be able to guide them during the actual performance.

The vast sources of video clips, PowerPoint presentations, modules, and other activity sheets are accessible to the teachers through the Internet. These are used in the teaching-learning process. Visuals capture the attention of the students so that they would use interesting videos from the YouTube that are supplementary to their lessons. Everyday discussions were made interesting with frequent use of visual aids like PowerPoint presentations and video presentations. These results support Granata's (2016) assertion that students learn best in a lively and imaginative classroom setting that has been created by the teacher.

Instructional materials in the teaching-learning process are significant throughout the delivery of the educational programs (Aureada, 2017). These materials aid in the learning process by allowing the students to independently explore the knowledge as well as providing repetition. Instructional materials are not designed to become a substitute for an effective teacher but to supplement the instructional process (Torrefranca, 2017). Because of technological advancement, there are numerous educational resources found on the internet. However, teachers must be able to determine which is appropriate to the learning needs of their students. She must evaluate these resources before it is used by the students.

4. Call for help.

Teaching a subject which one is not familiar with requires courage. The participants acknowledged that teaching subjects out of their specialization concerned them not on the

content of the subject but rather on how they are going to deliver the content to their students since the approach will be different from teaching mathematics. They seek inspiration from other creative masters and find volumes of advice. They noticed that the most important resources are found in their room next door and the office down the hall. They consulted their colleagues, who are experts on the subject, to help them out specifically on difficult lessons. This includes the suggesting effective strategy used in dealing with the topic or sharing the learning materials they used in the subject.

It is not degrading to ask for the help of experts or those who are more acquainted with the subject. This is what the mathematics teachers did when they were given non-mathematics subjects, specifically on how to teach it. They asked for advice from teachers who specialized in that field or from those who have been teaching the same subject.

The results support Johnson's (2015) contention that innovative educators regularly adapt their instructional strategies and learning activities to cater to students' multiple intelligences.

The results of the study agree with Darling-Hammond (2006) that effective teachers need to respond to the multifaceted nature of the environment in which they function and realize how they can relate to this environment.

CONCLUSIONS AND RECOMMENDATIONS

Non-mathematics subjects are given to young and beginning mathematics teachers with limited related training in full-load teaching and handling average class sizes. The existence of teachers teaching subjects they are not specialized to teach is a reality that needs to be addressed and must be investigated by the Department of Education, particularly in the hiring and placement of the teachers. Lastly, teachers need to keep grounded, be confident, and adept in delivering whatever subjects are given to them.

The results of this study should be disseminated to junior high schools to help other teachers teach subjects outside of their field of specialization. A strong support from colleagues and school leaders must be extended to these teachers teaching non-mathematics subjects. Since this study shows the existence of teachers teaching out of their field of specialization, education students must be oriented to the

scenario. It is a call for teachers in the College of Teacher Education not to confine their teaching simply to the content of the subject but also integrate the approaches as to how to teach the subject, whether it is a major subject or not. Education students should observe and explore the methodologies, strategies, and approaches of their teachers, focusing not only on using in their major subjects but on other subjects. To intensify and confirm the findings of this study, another study may be conducted on the experiences of mathematics teachers in teaching non-mathematics subjects with another group of participants in public schools and in private schools and also to determine the effect of out-of-field teaching on the performance of students may be carried out

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