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Influence of Instructional Support to Public Secondary Mathematics Teachers' Competence

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ABSTRACT

The study assessed how instructional support affected the competency of public secondary math teachers in the Oriental Mindoro Philippines Department of Education (DepEd) Schools Division. Descriptive-correlational research design was used to investigate the relationship between the instructional support and mathematics teachers' competency in certain areas. The study included 86 teachers and 43 school heads who were selected using purposive sampling. This also made clear that, in order to effectively instruct students and optimize their acquisition of knowledge and skills, teachers must possess a strong grasp of instructional competences. Therefore, it is recommended that teachers use a variety of instructional support activities, materials and others in their mathematics lessons to encourage students to participate more actively in their learning.

Keywords: Mathematics teachers, instructional support and competencies and regression analysis

Introduction

The responsibilities that teachers carry out are quite complex, and as a result, they need to be able to consider and adjust to a variety of classroom situations. In order to effect change in the classroom, educators need to assume a leadership position and assess their own proficiency, responsibility, and lifetime learning pre-service training. Teachers must be able to enable the establishment of learning environments that are conducive to learning in order to accomplish the national goals of enhancing students' mathematical competencies. The ability of teachers to transfer knowledge—which is based on their teaching competencies—must be considered. Considering the complexity of the teacher's tasks, it is necessary to see teacher's competence as a structure that consist of, among others, subject-didactic pedagogical competence which is essential components of mathematics teacher's activity. (Helos, 2021)

One could view mathematics as a kind of second language which could not be acquired without studying it in school. For sustainable development and to realize the meaning of globalization, the ability to challenge the problem which does not have only one answer and trying to find the best solutions through collaboration beyond each economy is important. This is the problem-solving approach in the mathematics education. Mathematical communication is an important key idea not only for improving mathematics but also for developing necessary ability for sustainable development on knowledge-based society. From these views, educators focus on mathematical communication (Ulep, 2019).

Mathematics is one of the specific fields of study where in real life problems are tried and tested through formulas and equations. It is one of the subjects required in academic studies that have always been the major focus of attention and concern of many educators who agreed that the major goal of schooling should be the development of students understanding of basic mathematics concepts and procedures. Moreover, it is a powerful tool in encouraging the use of precise and accurate thinking to solve problems. Knowledge of mathematics helps one understand calculators and computers, which are important features of modern life. The development of modern calculators and computers has enabled mathematicians to solve problems that previously were extremely difficult or impossible to solve. One of the goals of mathematics is to solve a problem in a systematic way so that similar problems can be solved more easily in the same way.

The computer is the latest technological innovation that has a significant impact on education and society. If one is not computer literate, one may feel that he or she is not up-to-date. It is noticeable that a number of schools have introduced computing as one of the subjects. The intention is to equip the learners with the requisite computer skills and knowledge. In addition to computers, other forms of electronic media are being used in teaching. These have provided a variety of learning experiences and have facilitated individualized learning. Curriculum designers afford to ignore technology and influence on the curriculum. (Chambers, 2018)

Mathematics, as a tool, contains the skills for problem-solving, organizing, and interpreting data, and performing calculations that are necessary in science, business and industry. Hence, mathematics in the secondary level which is currently being implemented advocates using a variety of teaching strategies

among which are practical works, discussion, problem solving, investigations besides exposition and practice and consolidation, as well as cooperative learning.

It is therefore evident that for a coherent and challenging mathematics-based curriculum to be obtained, the necessary resources should be truly addressed. However, such a curriculum may not guarantee the realization of the successful goals of teaching mathematics. Such a curriculum must be effectively implemented thus arise the demands of the crucial role that teachers play.

Teachers' knowledge of subject matter combined with a challenging curriculum is what often distinguishes the level of students' achievement. The argument, therefore, is simple. Teachers even though equipped with a strong mathematical background cannot teach well in a context defined by a fragmented and incoherent curriculum. Teachers feel the constraints of the standards that is the curriculum-the one of that defines the world of education. Likewise, another test that hold them accountable is the textbooks they use.

Having been a Mathematics teacher for 15 years and a Mathematics department head for more than 10 years, the researcher is convinced that something must be done to improve mathematical performance of the students and upgrade the instructional competence of the mathematics teachers.

In the context of accountability, in developed countries the primary responsibility to improve teaching is focused on the teacher. The profession should strive to recruit more qualified teachers; likewise, the challenge is to remedy whatever deficiencies current teachers are facing. The focus on the teacher certainly has some merits. The focus should be for the improvement of teaching. The methods that teachers use in the classroom should therefore yield greater returns.

Thus, the study determines the influence of instructional support to public secondary mathematics teachers' competence with the hope that an appropriate program could be identified and implemented for mathematics teachers. It further hopes to identify their teachers' strengths and weaknesses so that prompt and preferential attention and concerns can be done.

Methods

The descriptive survey correlational design was used in this study. The descriptive method focused on the present conditions obtaining around the research environment. It was deemed to be the best design for it provides facts on scientific judgments based on the data. This study was also correlational in nature to determine whether variables are related to each other. Through correlational studies, one can ascertain the degree of relationship among the variables tested.

The researcher used purposive sampling in choosing the respondents of the study. The respondents were chosen on the basis of their knowledge of the information desired and specified number of certain types of samples was included in the sample.

The respondents of the study were 43 school heads and 86 mathematics teachers to determine instructional competence in Mathematics of the public secondary teachers in Department of Education (DepEd) Schools Division of Oriental Mindoro Philippines.

The researcher used Teacher-Observation Guide for Instructional Competence (IS Form 3A/CB-Past Form 3A), a questionnaire for the assessment of school administrator and Mathematics teachers on instructional competence in Mathematics of the public secondary teachers in terms of diversity of learners, content and pedagogy, planning, assessing, reporting learners' outcomes. The researcher asked permission from the School Division Superintendent to use the said questionnaire.

To compute the reliability of the questionnaire, school heads and Mathematics teachers were allowed to answer the questionnaire. The scoring of responses followed the Likert scale valuing 1 to 5 with 1 as lowest and 5 as highest.

Pearson's product moment of correlation was used to compute the level of reliability using the tabular value of 0.65 at 5 percent level of significance.

The researcher first sought from the School Division Superintendent and different school administrator their consent to allow him to conduct the study in the division and to distribute questionnaire to the target respondents. In like manner, permission to access the records and use of IS Form 3A/ CB-PAST 3A was also sought. The researcher also got the assistance of the school administrator for the distribution of the questionnaire to the teachers. Also, the cooperation of the respondents was asked so that valid and reliable perceptual data can be drawn in the process.

The data gathered were tallied, tabulated and statistically treated using descriptive and inferential statistics. Inferential statistics was used to test the hypothesis of the study using Pearson's Product Moment Correlation (Pearson's r) and Multiple Linear Regression.

Results and Discussion

Table 1 presents the influence of instructional support to mathematics teachers' competence in terms of diversity of learners. The hypothesis of no relationship was tested using multiple regression and correlation analysis. As shown in the table, a significant relationship exists between the instructional support and the mathematics teachers' competence in terms of diversity of learners with F–value of 3.32 and p-value of 0.03. The multiple R of 0.46 reflects significant positive relation with 21% of changes in teachers' competence which may be attributed to the changes in instructional support as indicated by 0.21 R square.

Table 1

Influence of Instructional Support to Mathematics Teachers' Competence in Terms of Diversity of Learners

Instructional Support	**Beta Coefficient**	**t-value**	**Probability Value**	**Significance**
Educational Attainment	-0.22	-2.14	0.04	Significant
Instructional Materials	0.05	1.00	0.32	Not Significant
Number of Trainings	0.03	2.87	0.01	Highly Significant
Significance of Regression Model				
Multiple R	0.46	Significant		
R square	0.21			
F-value	3.32			
p-value	0.03			
Intercept	4.09			

The significant variables are educational attainment and number of trainings. It was found out that there exists significant negative relation between educational attainment and teachers' competence in terms of diversity of learners. This implies that the academic orientation and professional development have significant influence on the competencies in instruction, instructional aid development, classroom management and evaluative skills of the respondents resulting for more instructional support. This may be attributed to the following factors; teachers who are enrolled in the graduate school may gain insights on the needs and nature of their learners; and the subjects offered in the graduate school enhance the teachers' knowledge on the diversity of learners. Meanwhile the number of trainings in mathematics being attended by the teachers helps them in teaching the subject. The said seminar/trainings also expose them to the varied content and pedagogical approaches needed in teaching mathematics.

The forgoing findings imply that educational attainment or continuing education and the number of trainings being promoted by DepEd as instructional support have a bearing on the instructional competence of the teachers in mathematics.

Using Multiple Regression and Correlation Analysis, the hypothesis of no relationship was tested. As presented in Table 2, a highly significant relationship exists between the instructional support and the mathematics teacher's competence in terms of teacher's behavior in actual teaching with F-value of 9.24 and p-value of 0.0001. The multiple R of 0.65 reflects a significant positive relation with 42% of changes in teachers competence which may be attributed to the changes in instructional support as indicated by 0.42 R square.

Table 2

Influence of Instructional Support to Mathematics Teachers Competence in Terms of Teachers' Behavior in Actual Teaching

Instructional Support	**Beta Coefficient**	**t-value**	**Probability Value**	**Significance**
Educational Attainment	-0.37	-4.24	0.0001	Highly Significant
Instructional Materials	-0.06	-1.30	0.20	Not Significant
Number of Trainings	0.04	4.32	0.0001	Highly Significant
Significance of Regression Model				
Multiple R	0.65	Highly Significant		
R square	0.42			
F-value	9.24			
p-value	0.0001			
Intercept	4.60			

The significant variables are educational attainment and number of trainings. As shown in the table, there is a significant negative relation between educational attainment and teacher's competence in terms of teacher's behavior in actual teaching.

Further, the number of trainings is highly and significantly influencing the teacher's competence with p-value of 0.0001 indicating that as the number of training increases, the mathematics teachers' competence in terms of teacher's behavior in actual teaching improves.

On other hand, it was also found out that that use of instructional materials does not significantly affect the teacher's competence as indicated by p-value of 0.20. Findings imply that instructional competence of the respondents provide capability building enhancement for them. This implies that the teachers

gain updated content and appropriate strategies in the graduate school classes. The learning discussion and insights obtained in graduate classes may help the teachers improve their behavior in actual teaching.

Likewise, training/seminars in mathematics being hosted by DepEd update the teachers with the new curriculum, innovations, relevant and worthwhile strategies and appropriate technique in teaching. Thus, the educational attainment and number of trainings in mathematics have helped the mathematics teacher in their actual teachings.

This may be explained by the relevance or importance of the teaching strategies in teaching mathematics. Those technique and activities that catered to the needs of the learners may have more bearing on the teachers' competence rather than the instructional materials used in teaching mathematics.

Table 3

Influence of Instructional Support to Mathematics Teachers' Competence in Terms of Learners' behavior in the Classroom

Instructional Support	**Beta Coefficient**	**t-value**	**Probability Value**	**Significance**
Educational Attainment	-0.38	-2.97	0.005	Highly Significant
Instructional Materials	-0.04	-0.59	0.56	Not Significant
Number of Trainings	0.05	3.11	0.004	Highly Significant
Significance of Regression Model				
Multiple R	0.51	Highly Significant		
R square	0.26			
F-value	4.49			
p-value	0.009			
Intercept	4.30			

Multiple regression and correlation analysis were used to test the hypothesis of no relationship in Table 3. As indicated in the table, there is a significant relationship between the instructional support and the mathematics teacher's competence in terms of learner's behavior in the classroom with F-value of 4.49 and p-value of 0.009. The multiple R-value of 0.51 reflects a highly significant positive relation with 26% percent of changes in teacher's competence which may be attributed to the changes in instructional support as indicated by 0.26 r-square.

The significant variables are educational attainment and number of trainings. It was revealed that there exists a significant negative relation between educational attainment and teacher's competence in terms of learner's behavior in the classroom. This implies that it is not only the educational attainment of the teachers that speak for their ability to teach mathematics. According to interview, teachers gave importance to their experiences in teaching mathematics. They said that their experiences in teaching made them realized their own strengths and weaknesses in teaching mathematics subjects and be able to develop new strategies to become a better teacher.

Further, the number of trainings is highly and significantly influencing the teacher's competence in terms of learner's behavior in the classroom with p-value of 0.004 which indicates that as the teachers gain more trainings, their competence particularly managing the learners' behavior in the classroom also improves.

Result also emphasizes the role of trainings in improving the teaching competencies of teachers. When the teachers are exposed with varied trainings and seminars, they were able to gain new methods in teaching mathematics and became much prepared and eager to maximize the use of new knowledge to promote better classroom discussion among their students.

As further revealed in the table, the use of instructional materials does not significantly affect the teacher's competence in terms of learner's behavior in the classroom as indicated by p-value of 0.56. Results imply that teacher must incorporate instructional materials into the unit plan and modify them in a way that considers the development stages of learning, needs and interest, aptitudes, prior knowledge, learning style and motivation.

The use of instructional materials does not affect the teacher's competence in terms of learner's behavior in the classroom because the performance and participation of the students depend more on how the teachers deliver the lesson. The mastery of the lesson part of the teachers and the learning innovations being introduced by the teachers excite the students to the study the mathematics lesson.

Table 4

Influence of Instructional Support to Mathematics Teacher's Competence in Terms of Planning, Assessing and Reporting Learner's Outcome

Instructional Support	**Beta Coefficient**	**t-value**	**Probability Value**	**Significance**
Educational Attainment	-0.30	-3.20	0.003	Highly Significant
Instructional Materials	-0.06	-1.40	0.17	Not Significant
Numbers of Trainings	0.03	3.09	0.004	Highly Significant
Significance of Regression Model				
Multiple R	0.54	Highly Significant		
R square	0.30			
F-value	5.32			
p-value	0.004			
Intercept	4.79			

The hypothesis of no relationship was tested in this study using multiple regression and correlation analysis. As shown in the Table 4, a highly significant relationship exists between the instructional support and the mathematics teacher's competence in terms of planning, assessing and reposting learner's outcome with F-value of 5.32 and p-value of 0.004. The multiple R of 0.54 reflects a highly significant positive relation with 30% of changes in teachers' competence which may be attributed to the changes in instructional support as indicated by 0.30 R square.

The significant variables are educational attainment and number of trainings. It was found out that there exists a highly significant negative relation between educational attainment and teachers' competence in terms of planning, assessing and reporting learners' outcome.

This may be attributed to the teachers' preparedness and exposure to the varied techniques in evaluation and assessment of the students' performance which are commonly gained in trainings and graduate school sessions. The focus of the graduate school classes is to provide the teachers with the much-needed content in assessing the learners' outcome. Likewise, in the division and regional mathematics training the teachers are given much opportunities to apply the learning's they gained through demonstration teaching and actual practicum.

Further, the number of trainings is highly and significantly influencing the teacher's competence in terms of planning, assessing and reposting learner's outcome with p-value of 0.004 indicating that as the number of trainings increases the teachers' competence improves.

The table also shows that the use of instructional materials does not significantly affect the teachers' competence in terms of planning, assessing and reposting by the p-value of 0.17.

This may be attributed by the importance or impact of the reinforcement or enrichment given to the teachers without the aid of the instructional materials. Students learn mathematics in varied ways they might be demonstrating varied learning styles or interest towards mathematics. However, the use of instructional materials is not that important in the conduct of assessment and reporting learners' outcome.

Thus, a competent teacher knows the range of his responsibilities and the task that need to be prioritized. The knowledge of teacher could match the needs and purpose of the school with his qualification, his own interest, his potential competencies. A competent teacher can succeed by the standard of others and by his own if he sets expectations that are realistic and clear to him.

Conclusions

A significant relationship exists between the instructional support and the mathematics teachers' competence in terms of diversity of learners. A highly significant relationship exists between the instructional support and the mathematics teachers' competence in terms of teachers' behavior in actual teaching. There is a significant relationship between the instructional support and the mathematics teachers' competence in terms of learners' behavior in the classroom. A highly significant relationship exists between the instructional support and the mathematics teachers' competence in terms of planning, assessing and reporting learners' outcome.

Recommendations

The technical assistance provided by the school heads in teaching mathematics has to be included as an indicator for instructional support. The results of post-conference in actual observation of classes may also be considered as an instructional support in the study. Instructional competence in mathematics may also be measured by the following indicators: art of questioning used in test, type of test administered, competencies covered in test, content or topics covered in the test, enhancement lessons conducted in mathematics. In the future studies, the following variables may be studied as form of instructional support because these may have impact on teacher's competence, analysis of post-conference results, mentoring done by school heads, coaching employed by school heads and supervisors, learning resource materials in mathematics provided to teachers and relevant projects conducted by the school heads. This study may be replicated in the future researchers.

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