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SCHOOL HEADS' INSTRUCTIONAL LEADERSHIP AND MATHEMATICS TEACHERS' PEDAGOGICAL PRACTICES TOWARD INNOVATIVENESS

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ABSTRACT:

Mathematics teaching in the basic education necessitate teaching pedagogies and innovativeness among teachers; and for teachers to practice such, instructional leadership practices play a role. This research sought to investigate if there is a significant relationship between instructional leadership and teaching pedagogies practices of elementary mathematics teachers on their teaching innovativeness. This mixed method research was participated by elementary school teachers who are teaching math.

The study further revealed that the instructional support mathematics teachers need to develop teaching pedagogies and innovativeness are: technical assistance; professional growth and development opportunities; and provision of teaching and learning resources. Mathematics teachers develop their teaching pedagogies and teaching innovativeness through professional advancement; learning from others, learn, relearn and unlearn principles which are shared by the mathematics teachers.

Keywords: school heads , instructional leadership , mathematics teachers, pedagogical, practices,innovation

Introduction :

Instructional support is given by the school heads and master teachers who are considered instructional leaders. Instructional leadership is one of the leadership aspects that school leaders need to master as such has an impact on teaching effectiveness which facilitates academic performance.

Bolman and Deal (2013) emphasize the need for leaders to think long-term and consider both internal and external factors in shaping the school's direction. Quality instructional leadership significantly influences teaching pedagogies and fosters innovation among teachers (Brolund, 2016). Its importance is underscored by its impact on teaching practices and the overall direction of schools whereby school heads assist teachers to establish effective teaching methods and reflect on to understand their practices.

Mathematics teaching at the elementary level is challenging as teachers are teaching young minds the concepts of mathematics which serve as a foundation for future math learning endeavors. However, Filipino students performed poorly in the 2018 Programme for International Student Assessment (PISA) mathematics assessment, with more than 50% obtaining scores below the lowest proficiency level. Students from public schools also performed worse compared to their private school counterparts (Golla & Reyes, 2020). From this report alone, teachers in Mathematics are challenged to improve their pedagogies and innovativeness in teaching. In addition, this miserable performance prompted the Philippine government to call for "the urgency of improving the quality of basic education in the Philippines" (Department of Education, 2019).

The way teachers facilitate the class in Mathematics is very significant to consider for improved learners' performance. In doing so, instructional leaders play an important role. However, research related to these are limited. There is a gap in research that could be established as research is more focused on other variables and teaching in a general perspective, and the researcher has not come across studies related to instructional leadership as the independent variable for teacher pedagogies and innovativeness particularly among math teachers.

Hence, a study on these aspects will fill in this gap in research. Furthermore, this study attempted to establish how these leadership practices of the school heads and master teachers influence the teachers in their pedagogies and innovativeness. In a qualitative sense, it also explores the support needs of the teachers for them to improve their teaching of Mathematics among elementary school pupils.

Statement of the Problem

This study aimed to find out the significant influence of instructional leadership practices on teaching pedagogies and innovativeness among elementary Mathematics teachers.

Specifically, it sought to answer the following research questions:

1. What is the level of instructional leadership practices received by mathematics teachers, in terms of curriculum implementation, program improvement, classroom observations, monitoring and supervision, and evaluation of instruction?
2 .What is the level of teaching pedagogies applied by elementary mathematics teachers in terms of experiential and situated learning, reflective learning, constructivism, cooperative learning, and discovery and inquiry-based learning?
3. What is the level of teaching innovativeness among elementary mathematics teachers, in terms of teacher receptivity, openness to change, and willingness to adopt change?
4. Is there a significant relationship between the quality of instructional leadership and the level of teaching innovativeness among elementary mathematics teachers?
5. Does the level of instructional leadership significantly influence the level of teaching innovativeness among elementary mathematics teachers?
6 .Is there a significant relationship between the quality of teaching pedagogies applied by teachers and the level of teaching innovativeness among elementary mathematics teachers?
7. Does the quality of teaching pedagogies applied by teachers significantly influence the level of teaching innovativeness among elementary mathematics teachers?
8 .What instructional support do mathematics teachers need for them to develop teaching pedagogies and teaching innovativeness?
9. How do mathematics teachers develop their teaching pedagogies and teaching innovativeness?

Scope and Delimitation of the Study

This study was focused on finding empirical evidence of the relationships of the variables such as instructional supervision, teaching pedagogies, and teaching innovativeness of teachers. The independent variable, instructional supervision was delimited to the quality of instructional leadership practices received by mathematics teachers, in terms of curriculum implementation, program improvement, classroom observations, monitoring and supervision, and evaluation of instruction.

One of the independent variables was the teaching pedagogies applied by elementary mathematics teachers and these are delimited only to pedagogies such as experiential and situated learning, reflective learning, constructivism, cooperative learning, and discovery and inquiry-based learning. The second independent variable was teaching innovativeness among elementary mathematics teachers which will only be focused on teacher receptivity, openness, and willingness to adopt change. The respondents of the study were elementary school teachers who were teaching in the schools under the Kidapawan City Division.

Method Used

This study made use of both quantitative and qualitative research design also known as the mixed method. Mixed methods research is the use of qualitative and quantitative data in a single study or series of studies to provide a better understanding of research problems that could not be addressed in either approach alone (Creswell & Clark, 2007).

In particular, the design is called concurrent embedded design type of mixed method since it includes one phase of data collection in which priority is given to one approach that guides the project, while the other approach is embedded or nested in the study and provides a supporting role. This is because the embedded approach often addresses a different question than the primary research question (Creswell, Clark, Guttman & Hanson, 2003).

Sources of Data

This study used primary sources of data. There were one hundred ten (110) informants who participated in the conduct of the study. Ten (10) informants were interviewed through in-depth interview (IDI), while the One hundred informants(100) were the elementary school mathematics teachers coming from different schools. The respondents of the study were selected through these criteria: teaching mathematics for grades 4, 5, and 6; must have been teaching in public school; has been teaching for 2 years or more; and must have a willingness to participate in the study.

Sampling Technique

The sampling technique is used in the proper selection of the informants, for the quantitative data gathering, respondents were selected through simple random sampling so that teachers would have equal opportunity to be selected as a sample. In the qualitative data collection, the researcher used purposive sampling. Ten teachers participated in the in-depth interview (IDI). Research participants were purposively selected since they are in the same field and researchers could randomly select the finest participants that have great help in the study (Bueno, 2016).

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

In this chapter, the data gathered and their respective analysis are presented. The order of the presentation is based on the statement of the problem developed in the beginning section of this paper.

Level of Instructional Leadership Practices

This study explored the level of instructional leadership practices received by mathematics teachers, in terms of curriculum implementation, program improvement, classroom observations, monitoring and supervision, and evaluation of instruction. These are presented in the succeeding tables.

Curriculum Implementation

Table 2 presents the level of instructional leadership practices received by teachers in terms of curriculum implementation. Results show that school heads highly practiced with the highest mean of 4.91 in informing the teachers about curriculum changes, communicating to teachers what the curriculum implies, guiding them in delivering instruction, providing inputs on how assessments should be done appropriately, and helping them in unpacking the curriculum guide. Overall, the mean score is 4.86 described as highly practiced.

Program Improvements

The data presented in Table 3 shows the level of instructional leadership practices received by teachers in terms of program improvement. It shows that school heads highly practiced this leadership with the highest mean of 4.85. These practices include assigning their teachers tasks and activities, involving the teachers in planning how to address learners' performance and on what programs will be implemented to ensure better performance of the learners, deliberating results of the program implementation, and communicating the goals of the school related to better learning outcomes. This has an overall mean of 4.82 or highly practiced.

Classroom Observations

The data presented in Table 4 gives level of instructional leadership practices received by teachers in terms of classroom observations. It shows that school heads highly practiced classroom observation as reflected in the highest mean score of 4.92 in visiting teachers' classes for classroom observations.

Monitoring and Supervision

Table 5 shows the level of instructional leadership practices received by teachers in terms of monitoring and supervision. It revealed that school heads highly practiced monitoring teachers if the strategies being agreed upon were implemented. Results also showed that the highest mean score is 4.86 .

Evaluation of Instruction

The data shown in Table 6 reflect the level of instructional leadership practices received by teachers in terms of evaluation of instruction. It is presented in the table that the school heads highly practiced the following with the highest mean score of 4.90: note teachers' strengths and weaknesses; school heads always inform teachers about the result of the classroom observation, always give feedback about it, always discuss with them the strategies they use, and always inform them on what should be done to attain the learning goals set.

Level of Teaching Pedagogy

The level of teaching pedagogies applied by elementary mathematics teachers is also explored in this study. Teaching pedagogies were described in five categories – experiential and situated learning, reflective learning, constructivism, cooperative learning and discovery, and inquiry-based learning.

Experiential and Situated Learning

The data in Table 7 indicate the level of teaching pedagogy applied by elementary mathematics teachers in terms of experiential and situated learning. With the highest mean score of 4.92.

Reflective Learning

Table 8 shows the level of teaching pedagogy applied by elementary mathematics teachers in terms of reflective learning. It revealed the highest mean score of 4.89 or highly practiced.

Constructivism

Table 9 reveals the level of teaching pedagogy applied by elementary mathematics teachers in terms of constructivism. With the highest mean of 4.89.

Cooperative Learning and Discovery

Table 10 shows the level of teaching pedagogy applied by elementary mathematics teachers in terms of cooperative learning and discovery.

Inquiry-Based Learning

Table 11 shows the level of teaching pedagogy applied by elementary mathematic teachers in terms of inquiry-based learning as revealed in the highest mean of 4.92 or highly practiced.

Level of Teaching Innovativeness

This study explored the level teaching innovativeness among elementary mathematics teachers, in terms of teacher receptivity, openness to experience and willingness to adopt change.

Teachers' Receptivity

Table 12 shows the level of teaching innovativeness among elementary mathematics teachers in terms of teachers' receptivity which gained the highest mean of 4.93.

Openness to Experience

The data shown in Table 13 represent level of teaching innovativeness among elementary mathematics teachers in terms of openness to change. It shows that teachers are highly innovative with the highest mean of 4.92. Teachers seek for new ways to teach a subject matter, willing to try other teaching strategies, willing to learn from technical assistance, learn from the results of their teaching evaluation, and give room for new knowledge about teaching Math.

Willingness to Adopt Change

The level of teaching innovativeness among elementary mathematics teachers in terms of willingness to adopt change is presented in Table 14 which shows the highest mean score. It revealed that teachers implement in their classes the suggestion provided during their evaluations, apply the strategies suggested during their classroom observations, change their teaching strategies suggested after finding out that those are not helpful to their students, and apply their new learning, and willing to unlearn and relearn.

Relationship of the Quality Instructional Leadership andTeaching Innovativeness

Table 15 is the correlation matrix showing the relationship between quality instructional leadership and level of teaching innovativeness of the elementary mathematics teachers.

The data show that among the dimensions of the quality of instructional supervision, only classroom observations and evaluation have significant correlations to the level of teaching innovativeness of the mathematics teachers. As shown in the data, classroom observations (Coefficient 0.203*; Prob.= 0.042) and evaluation of instruction (Coefficient 0.225*; Prob.=0.024) show moderate level of correlation but the values show that the correlation is significant. Hence, the null hypothesis is rejected since these dimensions are significantly related to teaching innovativeness.

Table 15 Correlation matrix showing the relationship between quality instructional leadership and level of teaching innovativeness among elementary mathematics teachers.

Quality Instructional Leadership		Teachers' Receptivity	Openness to Change	Willingness to Adopt Change
Curriculum Implementation	Corr. coef.	0.010	0.055	0.023
	Probability	0.924	0.585	0.817
Program Improvements	Corr. coef.	0.130	0.035	0.012
	Probability	0.194	0.726	0.903
Classroom Observations	Corr. coef.	0.129	0.203*	0.024
	Probability	0.199	0.042	0.816

Monitoring and Supervision	Corr. coef.	0.078	0.056	0.025
	Probability	0.436	0.579	0.805
Evaluation of Instruction	Corr. coef.	0.050	0.067	0.225*
	Probability	0.620	0.503	0.024

*.Correlation is Significant at 0.05 level.

**.Correlation is significant at 0.01 level

Influence of the Quality Instructional Leadership on the

Level of Teaching Innovativeness

The influence of teachers' quality instructional leadership on their teaching innovativeness is presented in the foregoing sections.

Quality of Instructional Leadership on Teachers' Receptivity

As shown in Table 16, the quality of the instructional leadership does not significantly influence the teaching innovativeness in terms of teachers' receptibility (R^2 = 0.044; Prob. 0.489^{ns}). This means, the null hypothesis of the study is accepted at 0.05 level of significance.

Table 16 Influence of the quality instructional leadership on the level of teaching innovativeness of the elementary mathematics teachers in terms of teachers' receptivity.

Quality Instructional Lead	Coef. β	Std. Error	t – value	Probability
(Constants)	4.131	0.975	4.235	0.000
Curriculum implementation	0.033	0.104	0.319	0.750
Program improvements	0.157	0.108	1.455	0.149
Classroom observations	0.118	0.091	1.294	0.199
Monitoring and supervisions	0.050	0.086	0.586	0.559
Evaluation of instructions	0.035	0.098	0.356	0.723

R^2 = 0.044 F – Value = 0.878

Probability = 0.489^{ns} ^{ns} = Not Significant.

Quality Instructional Leadership on Openness to Change

The data displayed in Table 17 reveal the quality of the instructional leadership does not significantly influence the teaching innovativeness in terms of teachers' receptibility (R^2 = 0.056; Prob. 0.351^{ns}). These results lead to acceptance of the null hypothesis of the study. This further implies that the quality of instructional supervision has no influence to the innovativeness in terms of openness to change among elementary mathematics teachers.

Table 17 Influence of the quality instructional leadership on the level of teaching innovativeness of the elementary mathematics teachers in terms of openness to change.

Quality Instructional Lead	Coef. β	Std. Error	t – value	Probability
(Constants)	5.865	1.021	5.742	0.000
Curriculum implementation	0.068	0.109	0.625	0.533
Program improvements	0.039	0.113	0.344	0.731
Classroom observations	0.198	0.095	2.075	0.041*
Monitoring and supervisions	0.004	0.090	0.050	0.960
Evaluation of instructions	0.107	0.103	1.039	0.301

R^2 = 0.056 F – Value = 1.127

Probability = 0.351^{ns} ^{ns} = Not Significant.

Quality Instructional Leadership on Willingness to Adopt Change

As displayed in Table 18, the quality of the instructional leadership does not significantly influence the teaching innovativeness in terms of willingness to adopt change (R^2 = 0.057; Prob. 0.355^{ns}). This means, the null hypothesis posed in this study is accepted at 0.05 level of significance.

Table 18 Influence of the quality instructional leadership on the teaching innovativeness of the elementary mathematics teachers in terms of willingness to adopt change.

Quality Instructional Lead	Coef. β	Std. Error	t – value	Probability
(Constants)	4.166	0.984	4.235	0.000
Curriculum implementation	0.049	0.105	0.469	0.640

Program improvements	0.016	0.109	0.150	0.881
Classroom observations	0.044	0.092	0.481	0.632
Monitoring and supervisions	0.004	0.086	0.049	0.961
Evaluation of instructions	0.230	0.099	2.322	0.022*

R^2 = 0.057 F – Value = 1.120

Probability = 0.355^{ns} ^{ns} = Not Significant.

Relationship of the Teaching Pedagogy and the

Teaching Innovativeness

The correlation matrix in Table 19 shows the relationship of the teaching pedagogy and the teaching innovativeness of the elementary mathematics teachers. Among the dimensions, experiential and situated learning, and reflective learning show moderate degree of correlations (0.638** and 0.397** respectively) and these are significantly linked to teachers' receptivity; and inquiry-based learning pedagogies of teachers has moderate degree of correlation showing significant relationship with openness to change and willingness to adopt change.

Table 19 Correlation matrix showing the relationship of the teaching pedagogy and the teaching innovativeness of the elementary mathematics teachers.

Spearman Rho Teaching Pedagogy		Teachers' Receptivity	Openness to Change	Willingness to Adopt Change
Experiential and situated Learning	Corr. coef.	0.397^{**}	0.158	0.100
	Probability	0.000	0.113	0.321
Reflective learning	Corr. coef.	0.668^{**}	0.118	0.012
	Probability	0.000	0.240	0.908
Constructivism	Corr. coef.	0.025	0.048	0.007
	Probability	0.804	0.632	0.944
Cooperative learning and Discovery	Corr. coef.	0.078	0.006	0.136
	Probability	0.437	0.954	0.176
Inquiry-based learning	Corr. coef.	0.096	0.638^{**}	0.397^{**}
	Probability	0.338	0.000	0.000

*.Correlation is Significant at 0.05 level.

**.Correlation is significant at 0.01 level

Influence of the Teaching Pedagogy on the

Teaching Innovativeness

The succeeding tables show the influence of teaching pedagogy on the teaching innovativeness of the teachers.

Teaching Pedagogy on Teachers' Receptivity

As shown on table 20, the teaching pedagogy significantly influence the mathematics teachers' teaching innovativeness in terms of teachers' receptibility (R^2 = 0.530; Prob. 0.000). This means, the null hypothesis posed in this study is rejected at 0.05 level of significance.

Table 20 Influence of the teaching pedagogy on the teaching innovativeness of the elementary mathematic teachers in terms of teachers' receptivity.

Teaching Pedagogy	Coef. β	Std. Error	t – value	Probability
(Constants)	-0.525	1.023	-0.513	0.609
Experiential & situated learning	0.229	0.085	2.679	0.009**
Reflective learning	0.920	0.106	8.674	0.000**
Constructivism	0.070	0.093	0.753	0.453
Cooperative learning & discovery	0.042	0.098	0.425	0.672
Inquiry-based learning	0.077	0.099	0.779	0.438

R^2 = 0.530 F – Value = 21.465

Probability = 0.000** ** = Significant at 1% level.

Teaching Pedagogy on Openness to Change

Table 21displays the data showing that the teaching pedagogy significantly influence the mathematics teachers' teaching innovativeness in terms of openness to change (R^2 = 0.450**; Prob. 0.000). This means, the null hypothesis is rejected at 0.01 level of significance.
Teaching pedagogy has influenced openness to change to up to 15.52% and the remaining 84.48% is due factors not included in the study.
In particular, among the indicators, the best predictor of the openness to change among math teachers is inquiry-based learning pedagogy. This means, when teachers practice inquiry-based learning, they are also open to change. This indicates that teachers welcome any teaching practice that will enable them to appropriately practice inquiry-based learning in mathematics.

Table 21 Influence of the teaching pedagogy on the teaching innovativeness of the elementary mathematic teachers in terms of openness to change.

Teaching Pedagogy	Coef. β	Std. Error	t – value	Probability
(Constants)	1.851	1.167	1.586	0.116
Experiential & situated learning	0.149	0.097	1.525	0.131
Reflective learning	0.203	0.121	1.681	0.096
Constructivism	0.069	0.107	0.645	0.521
Cooperative learning & discovery	0.036	0.112	0.321	0.749
Inquiry-based learning	0.943	0.113	8.346	0.000**

R^2 = 0.450 F – Value = 15.524
Probability = 0.000** ** = Significant at 1% level.

Teaching Pedagogy on Willingness to Adopt Change

Table 22 shows the data on teaching pedagogy which significantly influence the mathematics teachers' teaching innovativeness in terms of willingness to adopt change (R2 = 0.147; Prob. 0.009). This means, the null hypothesis is rejected at 0.01 level of significance.
It is also shown in the result that 3.28% of the variability in the teaching innovativeness in terms of willingness to adopt change is attributed by teaching pedagogy while the remaining 96.72% is due to factors not included in the investigation.

Table 22 Influence of the teaching pedagogy on the teaching innovativeness of the elementary mathematic teachers in terms of willingness to adopt change.

Teaching Pedagogy	Coef. β	Std. Error	t – value	Probability
(Constants)	1.894	1.398	1.354	0.179
Experiential & situated learning	0.093	0.117	0.797	0.427
Reflective learning	0.032	0.145	0.219	0.827
Constructivism	0.053	0.128	0.413	0.680
Cooperative learning & discovery	0.222	0.135	1.651	0.102
Inquiry-based learning	0.465	0.135	3.435	0.001**

R^2 = 0.147 F – Value = 3.287
Probability = 0.009** ** = Significant at 1% level.

Instructional Support Mathematics Teachers Need to Develop

Teaching Pedagogies and Teaching Innovativeness

The themes and core ideas on the instructional support mathematics teachers need to develop teaching pedagogies and innovativeness are presented in Table 23. These themes are discussed in the succeeding section: technical assistance; professional growth and development opportunities; and provision of teaching and learning resources.

Technical assistance. For the teachers, they need support from their instructional leaders whom they expect to provide them technical assistance through the provision of technical knowledge in teaching; technical assistance in material development and teaching pedagogies; support in teaching innovation; and regular classroom observation as technical assistance.

The teacher participants shared that as teachers in mathematics they expect their school heads and master teachers to offer them knowledge in teaching the subject. In particular they need support in terms of lesson planning to ensure better learning.

As for me, I need support like in lesson planning. There are different ways to teach the lesson and I need more knowledge on this. ***TP4***

Similar response is also evident in this answer of one of the participants.

Damo man gid mga pamaagi nga itudlo ang math bisan budlay na sya specially sa basic education. So we need assistance from our leaders on how this could be done with the types of learners we have. (There are different ways to teach math even if it is considered a difficult subject specially in basic education. {…}.TP1

Furthermore, the teachers also emphasized that they need support in terms of making learning materials necessary in teaching math. They need support in terms of materials to be used which will be particularly taken from the school's operating expenses.

Bisan sa mga cartolina and colored paper lang…unta iprovide mi ana kay gastos sad baya kaayo. However, we also have chalk allowance naman which we can use to purchase our needs but sometimes we also run out of supplies. ***TP10***

Meanwhile, teachers believed that they also tried to innovate on their own in terms of teaching mathematics. Hence, they need support on the innovation they have. They need affirmation about what they do.

Naa man ko usahay mainnovate sad nga mga games. Usahay mga different activities sa Math. I feel more encouraged and motivated to do it *labi na kung supported ka saimong school head*. (There are instances when I also innovate games…sometimes different activities in Math. {…}…especially if you are supported by your school head. **TP2**

The same response is also uttered by another math teacher.

Nakakapagod po talaga mag innovate para lang mas mapadali ang pagkatoto ng mga bata. Minsan ang dami mo maisip, mga kanta, laro, illustrations and many others. So supporta lng para sa lahat ng mga ito, ang sarap na sa feelings. (It is so really tiring to innovate just to make sure children could easily learn. You may think of so many technics like songs, games, illustrations and many others. The support is giving a pleasant feeling. **TP5**

There are also teachers who see classroom observation as a form of support if this is done for technical assistance for the math teachers. They consider observations of their instructional leaders as form of help for them to improve their math teaching capabilities.

I love being observed in my classroom. In many instances, I want somebody to observe how I teach to affirm what I do is right and to gain more insights about my teaching. **TP8**

The same response is generated from another math teacher who said that:

Being observed by my school head is a very important form of support for me. In the classroom observation tool, there are indicators of which teachers are expected to follow and implement in the class. Once I am observed, I will know how to be more effective in my next classes. **TP3**

The results show that teachers need technical assistance for them to improve their teaching and to support their innovativeness in teaching. This implies that they are willing to learn and the technical assistance of the school leaders is very important for them to practice various pedagogies and the same time be able to apply their innovativeness in math teaching. In the essence of instructional leadership, principals provide support for teachers in their teaching practice and resource management (du Plessis, 2013; Salo et al., 2015). In supporting teachers and encouraging them to improve their teaching practice continuously, principals who are also instructional leaders positively impact the development of teachers' potentials. Goslin (2009) stated that visiting classrooms allowed the principal to recognize opportunities for improving the technical aspects of instruction.

Professional growth and development opportunities. Another theme generated from the responses of the teachers is that professional growth and development opportunities is another form of support for them.

For the teachers, holding sharing of ideas on math pedagogies during the school learning action cell is already a form of support for them. This is a professional development that will enable them to learn new pedagogies and innovations in teaching.

Holding school learning action cell sessions is also a form of support from my instructional leaders. Once this is regularly done line once a month or twice a month, I know I could really learn more. **TP8**

The same thought arises from another teacher.

I love attending school learning action cell. We really need it. This is a kind of support for us math teachers to develop ourselves and this is offered for free. **TP4**

Moreover, the teachers also need support in terms of giving them the permission to attend trainings and seminars.

Sugtan lang unta mi mag seminar and training kay if sa DepEd, less number of teachers ra baya ang mapili to attend. (I hope we will be given the permission to attend seminar and training since in DepEd, only a less number of teacher are given the opportunity to attend.) **TP7**

It is also interesting to note that for the math teachers, giving them the opportunity to have focused group discussions with other math teachers is already a form of support for their development in teaching. As explained by one of the teachers:

Unta hatagan mi ug time for focused group discussions with our fellow math teachers. We discuss how a competency can be effectively taught….like doing this every Friday in just 1 hour is already very help jud sa among tanan. **TP2**

As revealed in this study, teachers believed that they are supported when they are given the opportunity for professional development. The instructional leader observes and improves instruction using classroom observation and professional development opportunities (Eaker & Keating 2012). Professional development is also emphasized by Salo et al. (2015) as very important for teachers and that instructional leaders should be able to provide this for teachers. Facilitating professional development activities and encouraging teachers to take risks for innovation in their instruction also has positive effects on student learning.

Provision of teaching and learning resources. The math teachers also need support in terms of teaching and learning resources they can use in teaching. Specifically, they mentioned about the provision of internet connection.

There are a lot of math teaching activities which can be accessed online. So we need stable and fast internet connection. **TP6**

In as similar note, they also need support in terms of technology use in the classroom.

I am so interested on the use of tablets that my pupils could manipulate during our math class. I hope we will soon be provided with like this in our class. **TP10**

Another math teacher specifically mentioned about TV and internet connection in their class.

TV and internet connection is very important in the class. The internet offers a lot of free math activities and learning resources. I really love using them in the class and of course, I know my pupils will also love this. **TP8**

Table 23. Themes and core ideas on Instructional support mathematics teachers need to develop teaching pedagogies and teaching innovativeness

Themes	Frequency of Response	Core Ideas
Technical assistance	General	provision of technical knowledge in teaching technical assistance in material development support teaching innovation regular classroom observation as technical assistance
professional growth and development opportunities	Typical	School learning action cell Seminars and trainings Focus group discussions with subject group
Provision of teaching and learning resources	General	Provision of internet connection Technology use in the classroom Availability of other teaching-learning resources

Legend: General -50% and above of the responses
Typical- 25%-49% of the responses
Variant-24% and below of the responses

Generally, it can be deduced from the responses of the teachers that they indeed need support when it comes to provision of learning and teaching resources in their respective classrooms. An instructional leader encourages and supports teachers to improve their teaching practices, leading to increased student achievement (du Plessis, 2013). Instructional leadership offers schools a process to become more effective at the teaching and learning process (Alig-Mielcarek, 2003).

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Presented in this chapter are the summary, conclusions and recommendations.

Summary

This research sought to investigate if there is a significant relationship between instructional leadership practices and teaching pedagogies applied by elementary mathematics teachers on their teaching innovativeness. It also aimed at finding out the significant influence of instructional leadership and teaching pedagogies to the innovativeness of these math teachers.

Elementary school teachers who are teaching math were the respondents of the survey and they also participated in the interviews. These teachers are working at the Department of Education (DepEd) as regular teachers. Descriptive and inferential statistics were used to treat the data from the survey and thematic analysis was used to analyze the transcribed interview data.

Results generated from the survey revealed that the instructional leadership practices terms of curriculum implementation, program improvement, classroom observations, monitoring and supervision, and evaluation of instruction is *always* done by the instructional leaders which means the leadership is of *excellent quality level*.

In term of the teaching pedagogy practices, the data show that the elementary school teachers are *always practice* the teaching pedagogies such as experiential and situated learning, reflective learning, constructivism, cooperative learning and discovery, and inquiry-based learning. This result shows that teachers have excellent quality of teaching pedagogy practices.

Furthermore, the level of teaching innovativeness among the teachers in terms of teacher receptivity, openness to experience and willingness to adopt change is found *very high* as they always practice the above indicators.

The test of significant relationship between instructional leadership and teaching innovativeness shows significant relationships between classroom observation and teaching innovativeness in terms of openness to change among the mathematics teachers. There is also a significant relationship between evaluation of instruction and willingness to change. However, there is no indicator in instructional leadership have significantly influenced teaching innovativeness.

Meanwhile, teaching pedagogy and the teaching innovativeness of the elementary mathematics teachers show significant correlation in terms of experiential learning, reflective learning towards teacher receptibility and openness to change; while experiential learning is linked to openness to change.

Moreover, teaching pedagogy has significant influence to teaching innovativeness in terms of teachers' receptibility; openness to change and willingness to adopt change.

Thematic analysis of the qualitative data revealed that the instructional support mathematics teachers need to develop teaching pedagogies and innovativeness are: technical assistance; professional growth and development opportunities; and provision of teaching and learning resources. Furthermore, mathematics teachers develop their teaching pedagogies and teaching innovativeness through professional advancement; learning from others, learn, relearn and unlearn principles which are shared by the mathematics teachers.

Conclusion

Based on the results of the study, the act of instructional supervision, as it is traditionally understood and practiced, does not directly contribute to fostering innovativeness in teaching of the teachers. On the other hand, the teaching pedagogies of teachers contributed to their teaching innovativeness. Therefore, the methods, approaches, and strategies employed by teachers in the classroom play a significant role in promoting innovation in teaching. To support teachers in developing their teaching pedagogies and innovativeness, assistance with technology, opportunities for professional growth and development, and the availability of teaching and learning resources are essential. Additionally, mathematics teachers refine their teaching methods and innovativeness through ongoing professional development, drawing from the experiences of others, and continually adapting and refining their instructional approaches based on shared principles within the mathematics teaching community.

Recommendations

Based on the results of the study, the following are recommended:

Instructional leaders may strengthen their practices in order to better help teachers in their teaching pedagogies and teaching innovativeness;

Teachers may continue their quest for teaching innovativeness in teaching math to young learners as they employ the teaching pedagogies in facilitating math learning;

School leaders may consider the needed support of the teachers for them to be able to develop and better apply their teaching pedagogies and innovativeness;

Future researchers may conduct a qualitative study to further explain the reason why there is no significant relationship in between instructional supervision and teaching innovativeness;

The modified framework presented in the succeeding section may serve as the basis for future researchers to investigate potential correlations of variables.

INTERVENTION PLAN

Table 15 Proposed intervention plan

Activities	Objectives	Persons Involved	Resources Needed	Expected Output
Upskilling of teachers for Math Instruction	to reorient teachers about the classroom instruction strategies particularly in mathematics. to guide teachers on how to craft lesson plans in line with the different teaching pedagogies	Master teachers and teachers	Office supplies	Reflection Paper Lesson Plan
Classrom Observations and Monitoring	to provide teachers with coaching and teaching feedbacking	Master teachers and teachers	Office supplies	Reflection Paper Feedback form
Teaching Demonstration	to demonstrate effective teaching methodologies where math teachers can observe	Master teachers and teachers	Office supplies LCD Projector	Reflection Paper Lesson Plans
Sharing Innovative Resources	to share lesson plans, and teaching resources	Master teachers and teachers	Office supplies LCD Projector	Reflection Paper Developed learning resources
Creating Collaborative Environments (Collaborative teaching, lesson plan making, teaching resources)	to enable teachers to collaborate, exchange ideas, and learn from each other	Master teachers and teachers	Office Supplies LCD Projector	Reflection Paper Lesson Plans Developed learning resources
Program Evaluation	to evaluate the activities	Master teachers and teachers		Pictures Monitoring and Evaluation Results

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