

K+12 Mathematics Teachers' Perception On Instructional Objectives, Instructional Control And On The School Factors Affecting Instruction

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Abstract: A descriptive study was conducted employing survey questionnaire to ninety-five K+12 Junior and Senior High School Mathematics teachers for SY 2017-2018 to look into the perception on instructional objectives, instructional control and on the school factors affecting instruction. Results revealed that the teachers have moderate emphasis on mathematical objectives but they have heavy emphasis on basic mathematical skills objectives and on reasoning objectives. Results also revealed that the teachers have minimal control over curriculum and pedagogy. In terms of the factors affecting instruction, results showed that facilities and equipment as well as students and parents have a heavy impact on posing a problem for instruction while time constraints moderately pose a problem for instruction.

Index Terms: Instructional control, instructional objectives, K+12 Mathematics Teachers perception, school factors affecting instruction.

1 INTRODUCTION

Philippines is the only country in the ASEAN region which has only ten years of basic education for its students for the past years. In those years, poor quality of its basic education was reflected in the low achievement scores of the students in the National Achievement Test (NAT) and International tests. With its dream to enhance the quality of basic education, the Philippine government decided to change the curriculum into 12 years, making it Enhanced K+12 Basic Education Program since they believe that having a congested curriculum is one of the reasons for the poor performance of students. Through the implementation of the K+12 Basic Education program, the Philippine government's goals, missions and expectations will be achieved. With its support in terms of financial, instructional, physical and manpower aspects, the Philippines' dream will soon be realized. Talking of manpower aspects, the teachers' role is very crucial. Teachers being the ones who deliver instruction, are expected to have a good emphasis on their instructional objectives in the classroom. These instructional objectives are the composites that estimate the amount of emphasis teachers place on various objectives. These are in particular the composites on math objectives, basic mathematical skills and on the mathematics reasoning objectives. In the newly implemented K+12 curriculum, there is a great need for the teacher to have the skills and knowledge in making, implementing and emphasizing the objectives in order to develop and enhance the different abilities and skills of the students. Thus we can say that the 21st century learners are in dire need to have teachers who are multi-skilled and multi-talented. Teachers who can teach their field of specialization and who are knowledgeable in other disciplines. In addition, the teachers must also have instructional control. This refers to those composites that estimate the level of control teachers perceive to have over curriculum and pedagogy decisions for their classrooms.

As the popular proverb says, it takes a village to raise a child which could be interpreted that in the classroom, the curriculum and how the teacher handles the discussion has an essential role to play in the growth and development of the student (Van Roekel, 2008). Thus, there is a need of teachers who have an ability to share to the learners so that they will have a skill that could compete globally. Teachers should also be aware on how facilities and equipment, parents and students and time constraints affect instruction. The factors affecting instruction are those composites that estimate the extent to which various factors negatively impact mathematics instruction in schools. Thus, this study would focus on the K+12 mathematics teachers' emphasis on the instructional objectives (math objectives, basic mathematical skills objectives and mathematics reasoning objectives), teachers' instructional control (curriculum control and pedagogy control) and on the extent to which facilities and equipment, parents and students and time constraints affect instruction. The results of the study will be beneficial to the parents, administrators, teachers, students and researchers. This will help in the enhancement of the quality of education. The results will become the basis for determining what specific skills need to be further developed among the teachers. These will also serve as inputs to the administrators to determine what trainings or seminars the faculty will be required to attend to enhance the most concerned aspect on the teaching and learning of mathematics. The teachers will also be able to reflect on the need to improve themselves in terms of teaching strategies, to reflect as well on the needs of the school in order to address it and respond to the challenges of the 21st century education and the K+12 curriculum. In addition, the extent to which facilities and equipment, parents and students and time constraints affect instruction will be made known. The study was limited to the K+12 mathematics teachers perception on instructional objectives, instructional control and on the school factors affecting instruction of the Junior and Senior High School Mathematics teachers for SY 2017-2018 in the District of Maramag and Don Carlos Bukidnon. The questions were focused on the teachers' perception on instructional objectives, instructional control and on the school factors affecting instruction.

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2 METHODOLOGY

A descriptive study was conducted. It made use of a questionnaire adapted from 2000 National Survey of Science and Mathematics Education. The questions focused on the K+12 mathematics teachers' perception on instructional objectives, instructional control and on the school factors affecting instruction of the Junior and Senior High School Mathematics teachers for SY 2017-2018 in the District of Maramag, and Don Carlos, Bukidnon. The questions were focused on teachers' instructional objectives (mathematics objectives, basic mathematical skills objectives, and mathematics reasoning objectives) with 12 questions, instructional control (curriculum control and pedagogy control) with 9 questions and lastly, the factors affecting instruction (facilities and equipment, parents and students and time constraints) with 10 questions. This survey instrument is answerable in approximately 10 to 15 minutes. The questionnaire has a reliability coefficient of 0.84. The respondents of the study were the mathematics teachers who taught junior high school mathematics subjects and senior high school math subjects. They were randomly selected from the 14 public secondary schools from the District of Maramag and Don Carlos Bukidnon. Thirty-seven of them are males and fifty-eight of them are females. They were born in the year 1960 to 1996, which implies that they are of the age ranging from 21-57. Thus, they have taken their math courses in 1978 to 1990. In terms of the number of years in teaching K+12 curriculum, these teachers taught math for 1 to 5 years. In obtaining the data, notification letters were sent to the principal of the schools that were selected for the survey. The teachers were given questionnaires to answer. In addition, phone calls, messaging and sending of emails of survey materials were used to encourage the respondents to complete the questionnaires. In analyzing the data, mean and standard deviation were used to answer the research questions raised for the study.

3 RESULT AND DISCUSSION

This section presents, analyses and interprets the data according to the problems.

Table 1. Teachers Perception on Instructional Objectives specifically on Mathematics Objectives

Mathematics Objectives	Mean	SD	Qualitative Interpretation
1. Understand the logical structure of mathematics	3.21	.63	Moderate Emphasis
2. Learn about the history and nature of mathematics	3.09	.70	Moderate Emphasis
3. Learn how to explain ideas in mathematics effectively	3.32	.62	Moderate Emphasis
4. Learn how to apply mathematics in business and industry	3.30	.60	Moderate Emphasis
	3.23	.12	Moderate Emphasis

As seen on the table, teachers have moderate emphasis on mathematical objectives (3.23). This implies that in terms of instructional objectives, teachers are taking into consideration the NCTM five process standards namely problem solving, reasoning & proof, communication, connections and representation. It seems that teachers are really upholding the vision of the K+12 on the complete human development of

every graduate that they must hold an understanding of the world around a zest for life-long learning which addresses every child's basic learning needs (K+12 handbook). In order for the students to solve mathematical problems even outside the classroom, teachers have to see to it that mathematics objectives must be emphasized inside the classroom, at least moderately, if not heavily emphasized so that they will be able to draw logical conclusions based on evidence or stated assumptions in every problem. With these, teachers must bear in mind that simply exposing students to mathematical topics is not enough nor just knowing only how to perform mathematical procedures or recall facts. They must learn to reason and make sense of mathematics so that they are able to use math in meaningful ways. Students today need to develop critical thinking skills to succeed in mathematics and in life. (NCTM, 1989) As the teacher formulates mathematical objectives, he must do it in a way that the students would include communication and be able to explain of their answers and not only through memorization of facts or formula. With this, students can reason out and make sense of the mathematics that they are learning. They need to see a purpose in studying mathematics beyond the goal of preparing for the next mathematics course or standardized test. Moreover, research shows that students are more likely to retain mathematics that has its foundation in reasoning and sense making than mathematics that is presented as a list of isolated skills.

Table 2. Teachers Perception on Instructional Objectives specifically on Basic Mathematical Skills Objectives

Basic Mathematical Skills Objectives	Mean	SD	Qualitative Interpretation
1. Develop students' computational skills	3.92	.73	Heavy Emphasis
2. Learn to perform computations with speed and accuracy	3.38	.62	Moderate Emphasis
3. Prepare for standardized tests	3.23	.66	Moderate Emphasis
	3.51	.28	Heavy Emphasis

As seen on the table, teachers have heavy emphasis on the basic mathematical skills objectives (3.51) To be well prepared for their future lives, students need to have mathematical competence, which includes knowing not only how to carry out basic mathematical procedures but also which procedures to choose, when to choose them, and for what purpose. Being successful in our fast-paced, economically competitive society will increasingly require innovation and creativity. Such success most often depends on hard work and builds on a firm foundation of usable knowledge (NCTM, 1989) Teachers must remember that college mathematics are increasingly calling for the same kind of reasoning, problem solving, and other critical thinking skills that focus in High School Mathematics. Moreover, students who develop a deep understanding of the mathematics that they study are more likely to remember it and to be able to use it in the future, thus ensuring that they will do well in college-level courses. Therefore, the Principles and Standards for School Mathematics have been influential. Teachers must therefore incorporate worthwhile tasks that engage all students in thinking about and making sense of mathematics, not just practicing concepts and procedures they have already been taught (NCTM, 1989)

Table 3. Teachers Perception on Instructional Objectives specifically on Mathematical Reasoning Objectives

Mathematics Reasoning Objectives	Mean	SD	Qualitative Interpretation
1. Learn mathematical concepts	3.45	.58	Moderate Emphasis
2. Learn how to solve problems	3.53	.58	Heavy Emphasis
3. Learn to reason mathematically	3.41	.63	Moderate Emphasis
4. Learn how mathematics ideas connect with one another	3.73	.90	Heavy Emphasis
	3.53	.16	Heavy Emphasis

As seen on the table, teachers have heavy emphasis on mathematics reasoning objectives (3.53). Teachers can make reasoning and sense making a focus in any mathematics class. A crucial step is to determine how reasoning and sense making serve as integral components of the material that they teach. Even with topics traditionally transmitted through procedural approaches, teachers can present the material in ways that allow students to reason about what they are doing. Although procedural fluency is important in high school mathematics, it should not be sought in the absence—or at the expense—of reasoning and sense making. The focus of every mathematics class should be on helping students make sense of the mathematics for themselves. Bringing this focus to instruction depends on selecting worthwhile tasks that engage and develop students' mathematical understanding, skills, and reasoning; creating a classroom environment in which serious engagement in mathematical thinking is the norm; effectively orchestrating purposeful discourse aimed at encouraging students to reason and make sense of what they are doing; using a range of assessments to monitor and promote reasoning and sense making, both in identifying student progress and in making instructional decisions; and constantly reflecting on teaching practice to be sure that the focus of the class is on reasoning and sense making (NCTM, 1989). Professional development will be necessary to ensure that teachers have the tools that they need to build a classroom culture that promotes student engagement in reasoning and sense making. Simply providing teachers with isolated workshops will not achieve this goal.

Table 4. Teachers Perception on Instructional Control specifically on Curriculum Control

Curriculum Control	Mean	SD	Qualitative Interpretation
1. Determining course goals and objectives	2.10	0.53	Minimal Control
2. Selecting textbooks/ instructional programs	2	0.45	Minimal Control
3. Selecting other instructional materials	3.10	0.75	Minimal Control
4. Selecting content, topics, and skills to be taught	2.15	0.64	Minimal Control
5. Selecting the sequence in which topics are covered	2.13	0.47	Minimal Control
	2.3	.10	Minimal Control

As shown on the table, the teacher felt that they have minimal control (2.3) on the curriculum. This means that in terms of instructional control particularly in curriculum control, the teachers believe that the control on those items in every

category are not fully in them. The No Child Left Behind (NCLB) takes the powers of professional discretion away from teachers Sizer (2004). Included in the changes are the curriculum guides, textbook adoption practices, testing and leadership. It even narrows the curriculum with resulting losses of opportunity for creativity and relevant meaning making (Archbald & Porter, 1994; Robinson & Azzam, 2009). Due to narrowing the curriculum, it minimizes the instructional control of the teachers and it has negative impacts on the education of students which results to losses of opportunity of students' creativity (Archbald & Porter, 1994; Robinson & Azzam, 2009). In addition, the disadvantage of curriculum control is, it controls what is prescribed in the curriculum. It limits the teacher to make instructional decisions to better meet the demands of the students. According to the curriculum control model, "the greater the control over curriculum, the lower should be the reported control by teachers over both content and pedagogy in the classroom" Archbald and Porter's (1994). Result in a study indicate that, teachers exercise a certain amount of professional discretion regarding teaching practices used in the classroom, whatever the level of influence of the prescribed curriculum. (May, 2010) Furthermore, most of the schools are simply not provided with relevant teaching resources, including wall charts, flash cards, posters, audio and visual aids, language software, e-learning resources, a well-equipped language computer laboratory, and other facilities (Shehdeh, 2010). Furthermore, they are designed with the assumption that the students will all benefit from them to the same degree, regardless of their individual differences and varying learning styles. The unavailability of such adequate teaching resources result in (a) teachers failing to consider the use of teaching aids in their classroom; (b) teachers relying heavily and solely on textbooks and blackboards during the class period; (c) teachers often choosing to read to their students when a listening segment in the lesson is to be delivered to them; and (d) some teachers undertaking to design their own teaching aid materials which, since they lack a professional touch, are less effective than they could be.

Table 5. Teachers Perception on Instructional Control specifically on Pedagogy Control

Pedagogy Control	Mean	SD	Qualitative Interpretation
1. Selecting the pace for covering topics	1.75	.43	Minimal Control
2. Determining the amount of homework to be assigned	2.8	.62	Minimal Control
3. Choosing criteria for grading students	1.75	.48	Minimal Control
4. Choosing tests for classroom assessment	2.10	.57	Minimal Control
	2.10	.13	Minimal Control

As seen in the table, teachers have minimal control over pedagogy (2.10). Teachers nowadays are usually provided with prototype lesson plan wherein the goals and objectives, the textbooks, the contents, topics, activities to be given to the students and even the grading system were already there. When everything is almost provided, the implementer of the lesson inside the classroom would feel that there is a control over her that would somehow refrain her in giving the students more than what is expected in the prototype lesson plan that was given to them. Thus, the current curriculum was

developed with consideration of the kind of skills and abilities that students should develop by the end of each school level and whether the developed curriculum is designed in a way that incorporates all previous levels and progresses into higher ones (Al-Seghayer, 2014)

Table 6. Teachers Perception on the Extent to which Facilities and Equipment Pose a Problem for Instruction

Extent to Which Facilities and Equipment Pose a Problem for Instruction	Mean	SD	Qualitative Interpretation
1. Facilities	3.79	.41	Heavy Impact
2. Funds for purchasing equipment and supplies	3.95	.52	Heavy Impact
3. Materials for individualizing instruction	3.83	.57	Heavy Impact
4. Access to computers	3.85	.55	Heavy Impact
5. Appropriate computer software	3.93	.73	Heavy Impact
	3.87	.12	Heavy Impact

Based on the results shown above, the most heavy impact that poses problem for instruction is on facilities or equipment or the resources. The result of this study is the same as the result of the study conducted by the National Teachers Survey in the year 2000. According to the result, the most serious instructional problems are related to resources. In science, these include funds for equipment and supplies, inadequate facilities, lack of computers and software, and lack of materials for individualizing instruction. In mathematics, lack of appropriate software, funds for equipment, access to computers, and lack of materials for individualizing instruction were the most commonly cited resource-related problems. According to Legaspi (2014), the unavailability of learning materials is just one of the problems still hounding the country's new basic education program, K to 12, in the three years of its implementation. The government should endeavor to provide the necessary infrastructures and facilities that will motivate teaching and learning of mathematics (Adolphus, T., 2011).

Table 6. Teachers Perception on the Extent to which Students and Parents Pose a Problem for Instruction

Extent to Which Students and Parents Pose a Problem for Instruction	Mean	SD	Qualitative Interpretation
1. Student interest in mathematics	3.8	.42	Heavy Impact
2. Student reading abilities	3.73	.48	Heavy Impact
3. Student absences	3.85	.51	Heavy Impact
4. Maintaining discipline	3.93	.43	Heavy Impact
5. Parental support for education	3.87	.55	Heavy Impact
	3.84	.11	Heavy Impact

The table above shows that students and parents has a heavy impact (3.84) as it pose a problem for instruction. Families need to be involved in the mathematical preparation of their high school students. Each year, families should be sure that their students are enrolled in challenging mathematics classes—courses that will move the students toward their long-term goals. Families should show interest in what is

happening in the mathematics classroom and look at their students' mathematics work. They should encourage their students to persevere, even when the material is difficult, and urge them to ask questions in class when the material is not clear. As parents help students complete their homework or prepare for a test, they should ask the students to explain what they are doing and why it makes sense. Family members should remind their students that simply finding the answer to a problem is not enough; being able to explain how they found the answer and why their method works is also essential. If a family's student is having serious difficulties, family members should encourage him or her to set up sessions with the teacher for extra help. Families should emphasize to students that effort is the major determinant of long-term success. By the same token, if students are doing well, families should encourage them to explore what is going on in class more deeply, doing additional research, or solving extended problems provided by the teacher. Finally, families should stay in contact with their students' mathematics teacher. If the teacher raises any concerns or asks for assistance, families should try to help. Likewise, if at any point families have questions about any aspect of their students' mathematical preparation, they should not hesitate to contact the teacher. Families should recognize—and teachers and administrators should demonstrate—that their students' success is a shared goal, with many people working together to achieve it. According to the study, parent, family, and community involvement in education correlates with higher academic performance and school improvement. When schools, parents, families, and communities work together to support learning, students tend to earn higher grades, attend school more regularly, stay in school longer, and enroll in higher level programs. Researchers cite parent-family community involvement as a key to addressing the school dropout crisis and note that strong school-family-community partnerships foster higher educational aspirations and more motivated students. The evidence holds true for students at both the elementary and secondary level, regardless of the parent's education, family income, or background—and the research shows parent involvement affects minority students' academic achievement across all races. (Van Roekel, 2008)

Table 7. Teachers Perception on the Extent to Time Constraints Pose a Problem for Instruction

Extent to Which Time Constraints Pose a Problem for Instruction	Mean	SD	Qualitative Interpretation
1. Time to teach Mathematics.	3.43	.68	Moderate Impact
2. Opportunities for teachers to share ideas	3.20	.75	Moderate Impact
3. Time available for teachers to plan and prepare lessons	3.39	.59	Moderate Impact
4. Time available for teachers to work with other teachers during the school year.	3.33	.73	Moderate Impact
5. Time available for teacher professional development.	3.68	.49	Heavy Impact
	3.41	.14	Moderate Impact

In terms of the factors affecting instruction, teachers consider time constraints (3.41) as having a moderate impact. Math teachers need enough time to plan and prepare lessons, to teach math, to share ideas about math and for professional development. Time is one of the key resources to education.

In education, the amount of time spent is oftentimes considered as a separate and central resource in the educational process (Baker, Fabrega, Galindo, & Mishook, 2004). Thus, time is a complex issue partially because the efficiency of instruction and the amount of time spent on instructional tasks are hard to determine which means instructional time is dependent on its relationship to curriculum and instructional quality (Baker et al., 2004). Faced with such large student enrollment and with current class time constraints, teachers find it difficult to cover all of the course material and effectively teach language skills. This amount of time is insufficient, since some of the lesson materials and associated class activities cannot be completed in a single lesson. This constraint leads to ineffective teaching and learning experiences. Teachers' goal, as a result, centers around finding ways to cover all of the textbook's units at the expense of delivering effective instruction, along with the provision of frequent, substantive feedback for students' efforts and work. Students also will not be given enough time to absorb the lesson and do not receive ample opportunities to practice the newly taught material. Thus, in order to make teaching more effective and efficient, and to create a more meaningful learning environment with more opportunities for participation, greater individual attention, and improved instruction, the class size and contact hours need to be reconsidered so that the development of students' skills and learning is achieved.

4 CONCLUSIONS AND RECOMMENDATIONS

This section presents the conclusions and recommendations of the study.

4.1 Conclusions

Based on the findings of the study, the following conclusions are drawn: Teachers have moderate emphasis on mathematical objectives and they give heavy emphasis on the basic mathematical skills objectives and mathematics reasoning objectives. On instructional control, teachers have minimal control over curriculum and pedagogy. They believe that control on these items in every category are not fully in them. The curriculum control restricts the teacher to make instructional decisions that would better meet the demands of the students than what is prescribed in the curriculum. In terms of the factors affecting instruction, the teachers find facilities and equipment as well as students and parents to have a heavy impact in posing a problem for instruction. They consider time constraints as having a moderate impact. In addition, students reveal that many teachers find it hard to obtain appropriate curriculum materials and resources from their schools. Furthermore, there are limited quality computer software as well as computers for students use. Moreover, some students have negative attitudes and a lack of interest in Math as a compulsory subject. In effect, some students prefer to be passive learners and refuse to participate in classroom discussions. Moreover, the lack of parental support for students to do well in Math may have hindered them to achieve positive learning outcomes. Lastly, time constraints is considered to have a moderate impact in posing a problem for instruction. Teachers lack the time required to plan, design more effective teaching approaches and review mathematics programs in their schools, primarily because they have heavy teaching loads and they handle congested classes.

4.2 Recommendations

In terms of instructional objectives, teachers must take into consideration the NCTM five process standards, namely: problem solving, reasoning and proof, communication, connection and representation. Teachers must be allowed to exercise certain amount of professional discretion regarding teaching practices used in the classroom. School administrators must support instruction by being more supportive to the teachers in providing the resources that they need in order to plan and deliver their lessons effectively, without limiting access to facilities such as the internet, LCD projectors, visualizers, quality computer as well as computers for classroom use. They must not only encourage teachers to explore new teaching ideas and innovations but also facilitate the teachers in getting mathematics resources for the school. Adequate training for teachers to use the teaching resources effectively must also be provided. Parents and students need to be constantly reminded of the importance of Mathematics in students' life and for the students' future. To do this, teachers may have to work collaboratively with the parents to ensure that parents also take responsibilities to support and educate their children in the importance of mathematics in real life. Lastly, the school administrators must have to work harder to improve the conditions that would make the Mathematics instruction of the teachers more effective.

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