

Practices of the Twenty-first Century Mathematics Teachers

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Abstract: The study sought to develop the emerging practices of the mathematics teachers in Bukidnon. Responses of the fourteen public secondary school teachers in the interviews were coded, clustered, and categorized through constant comparison of incidents and memos. From the analysis of all these data, the following practices of mathematics teachers in Bukidnon emerged: ask God's providence; teach with a heart, apply reflective teaching; resourceful; maintain good communication skills in communicating about the course, assignments, procedures and all others; engage students; use humour; provide clear and precise instructions; give room to individualized learning to progress at their own pace; offer encouragement and provide frequent, timely and positive feedback; involve students in decision making; use peer learning; love the subject/job; establish mathematics goals to focus learning; implement tasks that promote reasoning and problem solving; use and connect mathematical representations; facilitate meaningful mathematical discourse; pose purposeful questions; build procedural fluency from conceptual understanding; support productive struggle in learning mathematics; elicit and use evidence of student thinking; monitor student work and always teach on grade level; give multiple mini-assessments; understand (and accept) various methods of solving a problem; work collaboratively; develop metacognitive strategies; value parental/familial involvement; pursue lifelong learning; monitor student work; accessible to students; allow students to progress through assignments at their own pace; provide help to understand and practice new knowledge; and enable students to ask questions.

Keywords: Teaching practices, practices of mathematics teachers; practices of mathematics teachers in a rural area; twenty-first century mathematics teachers practices; practices of teachers in Bukidnon

1. Introduction

One of the most critical social institutions is education. Through education, we acquire more knowledge, correct values, and enhance skills, beliefs, and moral habits. It encourages quality learning all through life among individuals. Education is essential for everyone to improve knowledge and method of living, just as social and financial status for the duration of one's life. Thus, according to Sadruddin (2013), each country requires teachers who will give the best type of training to the students at every level. Teachers can best realize the quality education provided to every student; thus, they are considered the lifeblood of any educational system. According to Hattie (2009), the quality of teachers has a more significant impact on the students' learning than the teaching methods, the role of parents, the school building, or the quality of the curriculum. Thus, teachers' quality must be considered to have a quality education.

In the Philippines, there is a shortage of investigations about 21st-century mathematics teachers and students. Most of the studies are in urban areas where advanced technology, sophisticated equipment, and plenty of educational software are used in the classroom. Most of the students are well off and financially stable, whose parents can afford to spend on their children's education. Despite all of these, schools in the rural area were still performing in mathematics, as evident in the Mathematics Teachers Association in the Philippines – Math Challenge. It is, therefore, interesting to study the scenario/case in a rural area. These reasons urge the researcher to gather data through systematic methodological procedures and come up with a list of practices of the 21st-century teacher in a rural area, specifically in the Philippines, that is grounded in the data.

2. Methodology

2.1 Qualitative Research Design

This exploration utilized case studies to develop and investigate the data. In this investigation, interviews of the participants concerning the practices of 21st-century math instructors in rural areas were conducted.

2.2 Data Collection Procedures

Data were collected through two to three hours of interviews with the teacher-participant, interviews with the student and the principals, and gathering documents such as lesson plans. In addition, follow-up interviews were scheduled. A field log was utilized to explain the time spent during the interview, transcription, and analysis phase.

2.3 Research Setting

The research study was conducted at the secondary schools in the third district in Bukidnon province. The Province of Bukidnon is a landlocked area in the Philippines situated at the focal point of Mindanao Island, a southern piece of the Philippines. The name "Bukidnon" signifies "highlander" or "mountain inhabitant." Its capital is the city of Malaybalay. The area borders, clockwise beginning from the north, Misamis Oriental, Agusan del Sur, Davao del Norte, Cotabato, Lanao del Sur, and Lanao del Norte.

The schools were chosen based on the overall ranking from grade seven to grade ten and from 2016 to 2019 on the secondary district level performance in the Metrobank MTAP - Math Challenge.

2.4 Participants of the Study

The participants of this investigation were the secondary mathematics instructors in the government-funded schools of the third District of Bukidnon. All the participants engaged with this qualitative methodology were chosen due to the common qualities they share (Creswell, 2013).

Two to three hours of in-depth interviews were conducted. The researcher went to the place of the teacher-participant for the interview. Interviews were semi-organized and dependent on the research questions. The researcher composed memos.

2.5 Data Sources

The sole instrument utilized in this study was the semi-structured interview protocol. The semi-structured interview task was used to evoke practices of 21st-century math educators. The formulation of inquiries depends on the priori constructs of the study.

The in-depth nature of an exhausting interview cultivates evoking every participant's translation of their experience. The interviewer looks to comprehend the subject and the teacher-participant has the pertinent encounters to reveal insight into it (Seidman, 2013; Fontana & Frey, 1994). In this way, the questioner's inquiries posed the participant to depict and think about their encounters as educators in regular daily existence. The questioner was there to tune in, see with affectability, and urge the individual to react. Thus, in this discussion, the participant did a large portion of the talking.

2.6 Triangulation of Data Sources

Triangulation of data sources was observed. Aside from the semi-organized interviews with the teachers, data were accumulated through the semi-structured interview with the students and principals. The appropriate responses of the teacher-participants were checked through the document, which is the lesson plans. Moreover, the researcher returned to the participants to validate the findings.

2.7 Data Analysis Procedure

In the analysis of data, the software maxQDA was utilized. This software serves to give insights into qualitative data sets without recommending translations. This software device for qualitative data and text analysis considers simple arranging, organizing, and breaking down a lot of text or other data and eases the administration of the subsequent interpretations and assessments.

For the coding cycle, open, axial, and selective coding were utilized to analyze the data.

2.8 Limitation of the Study

The study was conducted last March 2020 until July 2020. Until today, the Philippines and the rest of the countries worldwide are experiencing the pandemic Corona Virus Disease – 19 (COVID-19). The pandemic affects all the people, and it hinders close contact with everyone. At these times, physical distancing and facemask use are the new normal.

The existence of the pandemic resulted in the untimely closure of classes a few days before the scheduled closing last March 2020. Since face-to-face classes in the classroom are not possible, the Philippine government opted to have online or modular courses later to lessen the spread of the virus. This is the reason why the researcher was not able to conduct classroom observation. So instead of the classroom observations, an interview of the principal and colleagues of the participants was conducted.

3. RESULTS AND DISCUSSIONS

Practices of the 21st-Century Math Teachers in Bukidnon

Teaching practices are the ways teachers perform their professional obligations, develop the students' abilities, promote positive values, and act ethically to have proper communication with students, co-teachers, parents, and all other stakeholders of the school. Knowing the practices of teachers gave us information on what the teachers provide the students for the teachers to put on their pedagogical knowledge and skills in their practice. It is another avenue that the student will understand their role in the school.

Based on the data gathered, the following are the teaching practices of the Mathematics teachers in Bukidnon.

They were asking for God's providence. Teachers in Bukidnon pray to seek God's Providence before starting their class. Asking for God's providence is the way to ask God for help to guide and steer life personally and individually. They believe that they can always trust in the providence of God.

Teach with a heart. To teach with a heart is one of the essential practices of the teacher. The essence makes students feel that the teacher cares for them. When students feel that someone cares for them, they would feel the importance of their existence.

Resourceful. There are many unattainable resources in the rural area, so teachers find ways to get things done or have a replacement if the equipment or materials they need are not available in the school.

Applies Reflective Teaching. The teachers are doing self-assessments on their teaching. They examine their teaching strategies and pedagogy, express details and strengths of their methods and techniques, and recognize areas for modification or enhancement.

Maintain good communication skills in communicating about the course, assignments, procedures, and all others. A practical and fruitful teacher can connect with the students, associate with the learners and sense their needs. Nowadays, the key is to discover a harmony between being effectively open to your students to address their inquiries and giving assistance without covering your profitability and spare time. Open and transparent communication is the way to build up a solid benevolent learning atmosphere inside and outside the class.

Engage students. Teachers offer opportunities for students to be vigorously engaged in their learning journeys. For the teachers, it is very challenging to get students engaged, especially since students nowadays are multitasked and can barely hold lengthy attention. Thus, they can become uninterested and disengaged. With this knowledge, teachers must use stimulating educational games and activities, use technology and multimedia resources and then make the teaching student-focused and attempt to narrate the lesson to the student's setting.

Use humor. Be humorous at suitable times because this can lead to students' engagement and self-confidence.

Provide clear and precise instructions. The teacher begins a new topic/lesson or project with clear objectives and learning goals, and he offers clear criteria to guide students to be effective.

Give room to individualized learning so that students progress at their own pace. Students are not the same in all aspects, and they have different abilities and capabilities. They learn differently; a few students are moderate

learners, and others are fast; some are kinesthetic (learn by experience or by doing), and others are auditory or visual. Teachers remember these contemplations in mind and give their best to watch out for every student in the class. Teachers ought to permit students to advance through an educational plan at their speed and assist them with getting to realize how strong they can be and how weak they are at times, which builds their feeling of certainty just as an eagerness to persist.

Offer encouragement and provide frequent, timely, and positive feedback. It is important to share feedback with students during the learning process. Checking students from time to time, giving varied formative assessments, and discussing students' difficulties in their learning are all essential. Aside from each feedback, printed or spoken, teachers also deliver whole-group feedback on the areas of need.

Involve students in decision-making. Students feel good and do great when teachers let them think they are trusted and part of the teaching-learning process.

Use peer learning. Teachers use peer learning. This cooperative learning method promotes the importance of student-student interaction and enhances results in different learning outcomes.

Love the subject/ job. Teachers are gifted with compassion, dedication, and commitment. Being a teacher might not be easy, especially when students are rough. Still, the teachers' satisfaction when students appreciate them or have learned from them is one of the things that motivates and keeps the teachers going. As Abraham Lincoln once said, "Love your job, and you will never have to work a day. "

Establish mathematics goals to focus on learning. Effective mathematics teaching builds up clear objectives for the mathematics that students are learning, situates goals within learning movements, and utilizes the purposes to manage instructional choices.

Implement tasks that promote reasoning and problem-solving. Effective mathematics teaching involves students answering and deliberating charges that enhance mathematical thinking and problem answering and allow many entry points and different answers.

Use and connect mathematical representations. Effective mathematics teaching encourages students to build connections among mathematical expressions to understand mathematical ideas and processes better and as tools for problem answering.

Facilitate meaningful mathematical discourse. Effective mathematics teaching encourages dialogue among students to develop a shared understanding of mathematical ideas by examining and relating student policies and opinions.

Pose purposeful questions. Effective mathematics teaching uses focused queries to evaluate and advance students' thinking and sense-making about essential mathematical thoughts and relations.

Build procedural fluency from conceptual understanding. Effective mathematics teaching shapes articulation with processes on a foundation of conceptual understanding. Over time, students become practiced in using techniques openly as they answer contextual and mathematical problems.

Support productive struggle in learning mathematics. Effective mathematics teaching constantly offers students chances and supports to participate in fruitful efforts to encounter mathematical concepts and relationships.

Elicit and use evidence of student thinking. Effective mathematics teaching uses proof of student thinking to measure improvement of mathematical understanding and modify teaching methods that upkeep and frequently encompass learning.

Monitor student work and always teach on the grade level of the student. Teachers try integrating math ideas that are essential to the students. They give examinations, which is a better method of checking the students' improvement. The goal of checking student output is to discover how much improvement the students have made relative to the objectives set.

Give multiple mini-assessments. Teachers give mini-assessments to check for understanding throughout the unit. This gives students a chance for self-reflection and permits the teacher to adjust the lesson based on the student

feedback. Mini-assessments allow quick check for both the student and the teacher to recognize if the material should be revised before moving on.

Learn (and accept) multiple methods of solving a problem. Teachers permit students to choose different alternatives to solve a similar issue instead of showing just a single strategy. The ultimate objective is for students to become mathematical thinkers and not replicators of the solutions of their educator. While there are more effective approaches to working with most mathematical ideas, students should be permitted to utilize whatever strategy they are comfortable with as long as it is mathematically stable. If students are adaptable mathematical thinkers, they will be more fit to apply ideas to any challenge they may confront later.

Work Collaboratively. Teachers of the same grade level help each other. Cooperation with different teachers is the best practice to guarantee student achievement. As they cooperate, exercises become more adjusted, and exercises and appraisals become additionally captivating for students. When students are more involved and talk about the activities, they will learn more.

Develop Metacognitive Strategies. Students are offered the freedom to design, arrange, screen their work, direct their learning, and self-reflect as they do the activity. When we give students time to know about their insight and their reasoning, students' confidence increases. Also, research explains that metacognition can be taught.

Value parental/familial involvement. Bridging a connection between the home and school helps the teachers, the parents, and the students stay informed. It also makes it easier for parents to reinforce and support their children when they know what is happening in the classroom.

Pursue lifelong learning. Teachers should stay up-to-date on movements and developments in the field to allow the teachers to help students prepare for an ever-changing world. Pursuing personal passions will benefit the learners because teachers can reflect on what it is like to be in the shoes of their students.

Monitor student work. Giving developmental and summative evaluations is one acceptable method of observing your students' development. The objective of checking students' jobs is to discover how much advancement your students have made corresponding to the underlying goals you set.

Giving help to comprehend and practice new information. Regularly, teachers' explanation of why they become an instructor is to assist students with gaining and mastering further details. It's maybe an essential piece of the work, and it is likewise the most convoluted activity to do at times.

Has an end goal to remain on time and keep everything under control. With the end goal to remain on time, students' inquiries are not all entertained. The difficulty with this truth is that questions are sometimes discouraged, or students are hesitant to ask anymore.

4. RECOMMENDATIONS

The following are recommended:

Building partnerships. The very inspiring practices of teachers are essential to building partnerships and addressing the issues and problems encountered by the teachers.

Supporting Professional Development. Professional development focusing on high-quality instruction and enhancing teachers' knowledge, values, and skills should be a continuing concern for educational leaders to guarantee good teaching. Moreover, according to the study, professional development is one of the key elements fueling teacher commitment and satisfaction in their work. It benefits DepEd authorities, policymakers, and school heads to think of a necessary arrangement to help instructors as they continue looking for continuous training and advancements in different areas of concern, for example, behavior management, strategies of teaching, and modern trends in education.

Aiming for internationalization. As it is, the typical rural setting lacks the infrastructure for connectivity and is not accessible to many technology tools. It may be hard to think of technology when electricity may not even be present in the locality. Instead, incorporating a global standpoint into education has the great potential of generating internationally competitive learners, even among rural learners. Knight (2015)] thinks about the teachers as the drivers of internationalization.

Lastly, further qualitative research studies may be done using other methods depending on the purpose of the study. Also, further studies may be conducted to test the reliability of the result. Similar research studies may be conducted on the applicability of the theory in the educational system as this would help in the selection process, provide training, and require the professional development of new and experienced teachers.

References

1. Boykin, A and Noguera, P. 2011. *Creating the opportunity to learn: moving from research to practice to close the achievement gap*. Alexandria, Va.: ASCD.
2. Creswell, J. 2013. *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (3rd ed.). Los Angeles, CA: Sage.
3. Department of Education Order No 36 series 2013. Retrieved from https://www.deped.gov.ph/wp-content/uploads/2013/09/DO_s2013_36.pdf
4. Department of Education Order No 70 series 2012. Retrieved from <https://www.deped.gov.ph/2012/08/13/do-70-s-2012-guidelines-on-the-preparation-of-daily-lessons/>
5. Fontana, A and Frey, J. H. 1994. Interviewing: The art of science. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (p. 361–376). Sage Publications, Inc.
6. Hafsa Jan. 2017. *Teacher of 21st Century: Characteristics and Development*. Research on Humanities and Social Sciences. ISSN (Paper) 2224-5766 ISSN (Online) 2225- 0484. Vol 7. No. 9.
7. Hattie, J. 2009. *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement*. London, UK: Routledge.
8. Knight, J. 2015. Updated Definition of Internationalization. *International Higher Education*, (33). <https://doi.org/10.6017/ihe.2003.33.7391>
9. Merriam, S. 2009. *Qualitative Research: A Guide to Design and Implementation*. San Francisco. CA: Jossey-Bass.
10. Quismundo, T. 2012. "Philippine education spending still below UN standard." *Philippine Daily Inquirer* (issue date: 31 March 2012). Retrieved from <http://globalnation.inquirer.net/31229/philippine-education-spending-still-below-un-standard>.
11. Seidman, I. 2013. *Interviewing as Qualitative Research: A Guide for Researchers in Education and the Social Sciences* (4th ed.). New York: Teachers College Press.
12. Silva, E. 2009. Measuring skills for 21st-century learning. *Phi Delta Kappan*, 90(9), 630-634.
13. Sadruddin, M. 2013. Are We Preparing Global Competent Teachers? Evaluation of the Incorporation of Global Education Perspective in Teacher Education Curriculum in Pakistan. *International Journal on New Trends in Education and Their Implications*, 4(1): 188-202.