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Junior High School Mathematics Teachers' Instructional Practices: A Proposed Intervention Plan

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ABSTRACT

This study assessed the instructional practices of junior high school mathematics teachers in the Schools Division of Oroquieta City during School Year 2025–2026 and developed a proposed intervention plan. Using a quantitative descriptive-correlational design, the researcher surveyed 89 mathematics teachers from 15 public secondary schools through an adapted, expert-validated questionnaire. Descriptive statistics and tests of difference were used to examine four instructional dimensions and variations across demographic groups. Overall instructional practices were rated effective (M = 3.19, SD = 0.75), with contextualized tasks (M = 3.28), problem-based learning (M = 3.26), and collaborative learning (M = 3.23) rated higher than student-centered instruction (M = 2.97). Promoting learner autonomy received the lowest indicator mean (M = 2.41, less effective). Instructional practices differed significantly by educational attainment (p = 0.038) and professional development participation (p = 0.019), but not by age, sex, teaching experience, or grade-level assignment. Based on these findings, the MATH-CORE Instructional Enhancement Program was proposed to strengthen student-centered instruction, technology-supported assessment, activity-based learning, remediation and enrichment, and professional development. The results provide a context-specific basis for supporting reflective and learner-centered mathematics instruction.

Keywords: *mathematics instruction; student-centered learning; problem-based learning; contextualized instruction; professional development; intervention plan.*

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Introduction

Mathematics instruction is essential to learners' logical reasoning, critical thinking, and problem-solving abilities. Yet many junior high school learners experience mathematics as abstract or difficult, particularly when instruction emphasizes procedures and memorization rather than inquiry and authentic application. The Philippine K to 12 mathematics curriculum emphasizes conceptual understanding, mathematical processes, and connections between mathematics and everyday experiences. Teachers' instructional decisions are therefore central to creating opportunities for active learning.

Constructivist Learning Theory provides the conceptual foundation for this study. From this perspective, learners develop understanding by connecting new concepts with prior knowledge through exploration, interaction, and reflection (Piaget, 1970; Vygotsky, 1978). In mathematics classrooms, this orientation is reflected in problem-based learning, contextualized tasks, collaborative problem solving, and student-centered teaching. The thesis reviews research linking constructivist-oriented strategies with mathematical reasoning and engagement, while acknowledging the difficulty of implementing such strategies consistently across diverse classroom conditions.

Instructional improvement also depends on teachers' professional circumstances. Educational attainment and opportunities for professional development may support the acquisition of new pedagogical knowledge, while limited instructional time, resources, and varied learner readiness can restrict classroom implementation. In this context, it is important to document not only which instructional approaches teachers report using but also which aspects require additional support.

The study examined junior high school mathematics teachers in the Schools Division of Oroquieta City during School Year 2025–2026. It sought to describe teachers' demographic profiles, determine the level of their instructional practices in four domains, test whether practices differed across demographic groups, and formulate an evidence-informed intervention plan. The resulting recommendations are intended to inform school-based professional learning and mathematics instructional enhancement.

Methods

The study used a quantitative descriptive-correlational design in the Schools Division of Oroquieta City, Misamis Occidental, during School Year 2025–2026. Through total enumeration, 89 eligible junior high school mathematics teachers from 15 public secondary schools participated. An adapted questionnaire based on Balanlay (2021) gathered demographic information and self-reported ratings of problem-based learning, real-life and contextualized tasks, collaborative learning strategies, and student-centered instructional practices on a four-point scale. The instrument underwent expert content validation and reliability procedures described in the thesis. After securing administrative permission and informed consent, questionnaires were administered and responses encoded for analysis. Frequencies, percentages, weighted means, standard deviations, an independent-samples t-test, and analysis of variance were used as appropriate to the research questions. The study maintained voluntary participation and confidentiality. Because the data were self-reported and cross-sectional, the findings describe perceived practices and group differences rather than observed classroom effects or causal relationships.

Results and Discussions

Respondents' Demographic Profile

The 89 respondents represented Grades 7–10 mathematics assignments. The largest age group was 31–35 years (22.47%), followed by 26–30 years (20.22%) and 36–40 years (17.98%). Most respondents were female (68.54%). Regarding educational attainment, 33.71% held bachelor's degrees, 28.09% had master's units, 20.22% had master's degrees, 11.24% had doctoral units, and 6.74% held doctorates. The most common teaching-experience category was 7–10 years (22.47%), followed by 4–6 years (20.22%) and 11–15 years (17.98%). These distributions provide context for the group-comparison analyses.

Overall Instructional Practices

Table 1. Overall instructional practices of junior high school mathematics teachers.

Instructional practice	Mean	SD	Description
Problem-Based Learning	3.26	0.71	Effective
Use of Real-Life and Contextualized Tasks	3.28	0.73	Effective
Collaborative Learning Strategies	3.23	0.75	Effective
Student-Centered Instructional Practices	2.97	0.79	Effective
Grand Mean	3.19	0.75	Effective

The findings revealed that teachers generally perceived their instructional practices in Mathematics as effective, as reflected in the grand mean of 3.19 (SD = 0.75). Among the four instructional domains, the use of real-life and contextualized tasks obtained the highest mean (M = 3.28, SD = 0.73), followed by problem-based learning (M = 3.26, SD = 0.71), collaborative learning strategies (M = 3.23, SD = 0.75), and student-centered instructional practices (M = 2.97, SD = 0.79). These results indicate that teachers reported relatively strong implementation of instructional approaches that connect mathematical concepts with authentic experiences, encourage multiple problem-solving strategies, and promote meaningful classroom interaction. Particularly, teachers demonstrated strengths in integrating real-life applications (M = 3.45), encouraging multiple solution strategies (M = 3.41), and facilitating peer discussions (M = 3.42). These findings are consistent with Boaler (2016), who emphasized the importance of meaningful mathematical experiences, flexible thinking, and multiple approaches to problem-solving in developing mathematical understanding. Similarly, Hmelo-Silver (2004) explained that problem-based learning encourages students to construct knowledge through inquiry, reasoning, and collaborative problem-solving. Furthermore, Vygotsky (1978) highlighted the importance of social interaction in cognitive development, supporting the instructional value of peer discussions and collaborative mathematical activities. These perspectives suggest that contextualized instruction, problem-based learning, and collaborative strategies provide opportunities for teachers to promote mathematical reasoning, engagement, and conceptual understanding.

Moreover, the findings identified specific instructional practices that require further strengthening despite the overall effective ratings. Student-centered instructional practices obtained the lowest domain mean (M = 2.97, SD = 0.79), particularly the indicator concerning students' active participation in directing their own learning (M = 2.41), which was interpreted as less effective. Likewise, allowing productive struggle before providing solutions (M = 3.05), implementing higher-order questioning (M = 2.89), and assessing collaborative group work (M = 2.97) received comparatively lower ratings. These results suggest that although teachers reported implementing interactive and learner-oriented strategies, opportunities for student autonomy, independent exploration, higher-order reasoning, and collaborative accountability may be less consistently established. Schoenfeld (1985) emphasized the importance of mathematical reasoning, strategic problem-solving, and metacognitive processes in developing learners' mathematical competence. Similarly, Slavin (2014) explained that effective cooperative learning requires structured group processes, individual accountability, and meaningful participation rather than simple group interaction. Hattie and Timperley (2007) further highlighted the importance of feedback in helping learners understand their progress and identify ways to improve performance. Overall, the findings suggest that teachers perceived their Mathematics instructional practices as generally effective, particularly in contextualized learning, problem-based instruction, and collaboration. However, the comparatively lower ratings for student-centered instruction highlight the need for targeted professional development focusing on learner autonomy, inquiry-based activities, higher-order questioning, authentic assessment, and structured collaborative learning. Since the findings are based on teachers' ratings, they reflect perceived instructional effectiveness rather than independently verified improvements in student learning outcomes.

Differences According to Demographic Profile

Table 2. Tests of differences in instructional practices across demographic groups.

Profile variable	Test	Statistic	p-value	Interpretation
Age	ANOVA	F = 1.87	0.102	Not Significant
Sex	t-test	t = 1.21	0.229	Not Significant
Educational Attainment	ANOVA	F = 2.64	0.038	Significant

Years of Teaching Experience	ANOVA	F = 1.95	0.089	Not Significant
Grade Level Assignment	ANOVA	F = 1.53	0.210	Not Significant
Professional Development Attended	ANOVA	F = 3.12	0.019	Significant

The findings revealed statistically significant differences in teachers' reported Mathematics instructional practices when grouped according to educational attainment ($F = 2.64$, $p = 0.038$) and professional development attended ($F = 3.12$, $p = 0.019$), using a 0.05 level of significance. These results indicate that perceived instructional effectiveness varied across educational qualification and professional development categories. Such differences may reflect variations in teachers' pedagogical knowledge, exposure to instructional innovations, and opportunities to strengthen their professional competencies. However, the results do not identify which specific groups differed or whether teachers with higher qualifications or greater training participation obtained higher instructional ratings. These findings are consistent with Shulman (1986), who emphasized the importance of teachers' subject-matter and pedagogical knowledge in effective instruction. Similarly, Darling-Hammond et al. (2017) highlighted that sustained, content-focused, and collaborative professional development can strengthen teachers' instructional knowledge and practices. Furthermore, Desimone (2009) emphasized that professional development should incorporate content focus, active learning, coherence, duration, and collective participation to support meaningful teacher learning. These perspectives suggest that academic preparation and professional learning opportunities may contribute to differences in instructional practices, although the present findings establish statistical associations rather than causal relationships.

Moreover, the findings showed no statistically significant differences in teachers' instructional practices when grouped according to age ($F = 1.87$, $p = 0.102$), sex ($t = 1.21$, $p = 0.229$), years of teaching experience ($F = 1.95$, $p = 0.089$), and grade-level assignment ($F = 1.53$, $p = 0.210$). These results indicate that the study did not obtain sufficient statistical evidence to conclude that instructional practice ratings differed across these demographic and professional categories. Nevertheless, the absence of statistical significance does not necessarily imply that the groups were equivalent or that these characteristics have no relationship with instructional effectiveness. Guskey (2002) emphasized that meaningful changes in teachers' instructional practices require professional learning experiences supported by evidence of successful classroom implementation. Likewise, Opfer and Pedder (2011) explained that teacher professional learning is influenced by the interaction of individual characteristics, school environments, and learning opportunities rather than demographic characteristics alone. Overall, the findings highlight the importance of strengthening teachers' pedagogical competencies through relevant academic preparation and continuous professional development. These results, together with the comparatively lower ratings for student-centered instruction, provided the basis for the proposed MATH-CORE (Mathematics Advancement through Transformative, Holistic, and Constructivist-Oriented Responsive Education) Instructional Enhancement Program. The proposed program integrates student-centered pedagogy, computer-based assessment, activity-based learning with mathematical justification, remedial and enrichment interventions, and sustained professional development. However, MATH-CORE remains a proposed intervention derived from the study's findings, and its effectiveness requires further implementation and empirical evaluation.

Table 3. Summary of the proposed MATH-CORE program components.

Program component	**Principal focus**
Strengthening student-centered instruction	Learner autonomy, inquiry, differentiated teaching, student-led activities
Computer-based assessment in mathematics	Digital quizzes, formative feedback, technology-supported assessment
Activity-based learning with rationalization	Hands-on problem solving, explanation and justification of solutions
Remedial and enrichment mathematics program	Diagnostic assessment, targeted remediation and enrichment
Professional development and academic advancement	Workshops, graduate studies, mentoring and professional learning communities

The findings provided the basis for the proposed MATH-CORE (Mathematics Advancement through Transformative, Holistic, and Constructivist-Oriented Responsive Education) Instructional Enhancement

Program, which aims to strengthen teachers' instructional practices and address areas requiring further improvement in Mathematics education. The program consists of five interconnected components: strengthening student-centered instruction, integrating computer-based assessment, promoting activity-based learning with mathematical rationalization, implementing remedial and enrichment programs, and supporting continuous professional development and academic advancement. The student-centered component emphasizes learner autonomy, inquiry-based instruction, differentiated teaching, and student-led activities to encourage active participation and independent mathematical reasoning. Meanwhile, computer-based assessment incorporates digital quizzes, formative feedback, and technology-supported evaluation to facilitate the monitoring of learners' progress and identification of learning needs. Activity-based learning focuses on hands-on problem-solving, mathematical explanation, and justification of solutions to develop conceptual understanding and higher-order thinking skills. These proposed components are supported by Tomlinson (2014), who emphasized differentiated instruction in responding to learners' diverse needs, and Black and Wiliam (1998), who highlighted the importance of formative assessment in supporting teaching and learning. Similarly, Hattie and Timperley (2007) explained that effective feedback provides learners with information about their performance and opportunities for improvement, while Boaler (2016) emphasized meaningful mathematical engagement, flexible reasoning, and multiple problem-solving approaches.

Furthermore, the proposed program incorporates diagnostic assessment, targeted remediation, and enrichment activities to address differences in learners' mathematical readiness and achievement. These interventions are intended to provide additional instructional assistance to learners experiencing difficulties while offering more challenging mathematical experiences to those demonstrating advanced competencies. The program also prioritizes professional development and academic advancement through workshops, graduate studies, mentoring, collaborative lesson planning, and professional learning communities. These initiatives are particularly relevant to the study's findings, which revealed statistically significant differences in teachers' instructional practice ratings according to educational attainment and professional development attended. Darling-Hammond et al. (2017) emphasized that effective professional development involves sustained learning, collaboration, active participation, and opportunities to apply newly acquired instructional knowledge. Likewise, Desimone (2009) identified content focus, active learning, coherence, duration, and collective participation as important features of meaningful teacher professional development. Guskey (2002) further explained that professional learning and changes in instructional practices are closely connected with teachers' experiences of classroom implementation and evidence of student learning. Overall, the proposed MATH-CORE program provides a structured framework for strengthening Mathematics instruction through learner-centered pedagogy, assessment innovation, meaningful learning activities, differentiated academic support, and sustained teacher development. However, the program remains a proposed intervention based on the study's findings, and its effectiveness must be established through implementation, systematic monitoring, and subsequent evaluation.

Conclusions

Junior high school mathematics teachers in the Schools Division of Oroquieta City reported generally effective instructional practices across four constructivist-oriented domains. Contextualized tasks, problem-based learning, and collaborative learning were relative strengths, while student-centered instruction—especially learner autonomy—was less consistently practiced. Educational attainment and participation in professional development were associated with significant differences in instructional practices. These findings support the development of focused professional learning and instructional improvement initiatives, but should be interpreted within the limitations of self-reported survey data.

Recommendations

Mathematics teachers should expand student-led inquiry, open-ended problem solving, higher-order questioning, reflective activities, and authentic assessment. School heads should provide coaching, classroom-based mentoring, resources, and structured Learning Action Cell activities focused on the weaker instructional indicators. Curriculum planners may develop contextualized materials and assessment guides that support differentiated and constructivist teaching. The proposed MATH-CORE program may be piloted and evaluated using classroom observations, teacher feedback, and student learning measures before broader implementation. Future researchers may test the intervention, include student outcomes, and examine additional school-level

factors through qualitative or mixed-method designs.

Conflict of Interests

The author declares no conflict of interest.

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