A CORRELATIONAL STUDY ON ARTIFICIAL INTELLIGENCE (AI) AWARENESS AND TEACHING COMPETENCY OF PUBLIC SCHOOL MATH TEACHERS

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ABSTRACT

As a hallmark of Education 5.0, Artificial Intelligence (AI) holds transformative potential in enhancing mathematics education by improving teaching quality and competency. Mathematics teachers, as facilitators of learning, must understand how students learn best and adopt effective instructional strategies. However, effective AI integration requires adequate awareness and competence – areas still underexplored. This descriptive-correlational quantitative study examined the AI awareness and teaching competency of 30 public secondary school math teachers from the three districts of Pangantucan, Bukidnon during using the AI awareness for teachers and PPST-based competency scales. Data analysis revealed that teachers reported high AI awareness, but they lacked institutional support, training, and AI-related resources. Teachers rated themselves as highly proficient yet rated lower in competencies covering inclusive education and differentiated instruction. Pearson r results showed no significant correlation between AI awareness and teaching competency, suggesting awareness alone is insufficient. It is recommended that the employer institution may provide structured AI training, resources, and policies, and offer targeted professional development. Teachers may also undergo application-based training to effectively translate AI knowledge into classroom strategies.

Keyword: AI, AI Awareness, Teaching Competency, Mathematics

1. INTRODUCTION

Quality education that teachers provide to the students highly depends on teacher's competence. Thus, showing that in achieving and maintaining the quality of education, teachers play a crucial role. Teaching mathematics is a complex task. Math teachers, who were facilitators of learning, should possess the ability to know how students learn best and how mathematics should be taught best.

Teachers of today have access to highly advanced digital software and tools brought about by the modern technological developments. Artificial Intelligence (AI) - powered tools, which are signifiers of Education 5.0, presents teachers with opportunities. These opportunities include enhancing the teaching competency with the help of AI tools thereby maintaining high teacher competency.

Multiple assessments both international (e.g. PISA, TIMMS) and local (e.g. NAT) had shown low math proficiency among Filipino students. Teaching competency marks as a main identifier of teacher quality. While student's learning outcomes does not entirely depend on teachers, teaching competency remains a significant factor.

Despite this, the number of studies that specifically examine the relationship between AI awareness and teaching competency is limited. Although related research exists, these differ significantly in terms of locale, respondents, and research focus. For example, Batico et al. (2019) investigated ChatGPT awareness among pre-service teachers in Malaybalay, Bukidnon; however, ChatGPT was only one among several AI tools examined. Likewise, Luzano (2024) employed a systematic literature review, which represents a different methodological approach. Lapates (2024) also explored the use of AI, but the primary emphasis of the study was on student outputs. Furthermore, while studies by Manrique and Palomares (2024), Sogillo et al. (2016), Egara and Mosimege (2024), and Owan et al. (2023)

addressed aspects of AI and teaching competency, these investigations vary in terms of their geographical context, selected variables, research approaches, and overall design.

This study aims to contribute to addressing this gap by assessing teachers' AI awareness and examining its correlation with teaching competency. The findings may serve as a basis for designing and implementing targeted teacher training programs on the effective integration of AI in mathematics education.

2. OBJECTIVES OF THE STUDY

This study aimed to examine the AI awareness and teaching competency of public-school secondary math teachers in the Municipality of Pangantucan, Bukidnon.

Specifically, it sought to answer the following questions:

1. What is the level of AI Awareness among math teachers?

2. What is the level of teaching competence among math teachers based on the Philippine Professional Standards for Teachers (PPST)?

3. Is there a significant relationship between the AI Awareness, and teaching competency of math teachers?

3. METHODOLOGY

3.1. Research Design

This research study utilized a descriptive-correlational quantitative approach. The descriptive design aimed to examine the level of AI awareness and teaching competency of the respondents. In the correlational design, it sought to ascertain if there is a significant difference between AI awareness and teaching competency. This research design is appropriate to establish baseline data on the variables, thereby providing foundational knowledge to guide further research.

3.2. Locale of the Study

This study was conducted at the public high schools in Pangantucan, Bukidnon. The Municipality of Pangantucan has three (3) districts, the North, South, and West. The schools included in the municipality has access to internet connection, subsequently making AI tools accessible, and has mathematics teachers who continually sought improvement in competence to maintain the international standards of practice especially in their field. This is in accordance with the Republic Act 10912 or commonly known as the Continuing Professional Development (CPD) Law of 2016. Also, improving teacher quality may help enhance the mathematics proficiency of the students in the municipality.

3.3. Respondents and Sampling

The respondents of this study were the intact 33 mathematics teachers: sixteen (16) from Pangantucan North, thirteen (13) from Pangantucan South, and four (5) from the West district. Upon seeking consent from the respondents, teachers from the two schools respectfully declined due to personal reasons – specifically time constraints and workloads, leaving 30 actual respondents for the study. A census was utilized as it is appropriate for a small population.

3.4. Research Instrument

The study utilized a questionnaire composed of two parts: The level of AI awareness, and PPST-based teaching competency.

In the level of AI Awareness, this was measured using the adopted questionnaire from Safar's (2024) study comprising 36 statement indicators rated with five responses defining their level of agreement (degree of awareness). The Teaching Competency was measured using the PPST strands from DepEd as the indicators rated using a 4-point Likert scale across all domains similar to how the study of Gepila (2020) utilized the questionnaire.

After pilot testing, a Cronbach's alpha (α) coefficient value of 0.986 was obtained – a very high degree of internal consistency, that is 0.975 and 0.986 for the first and second part, respectively.

3.5. Data Gathering Procedure

Before conducting the study, the researcher secured permit from the CMU Institutional Ethics Review Committee (CMU-IERC) to ensure the protection of the respondents' rights, safety, and welfare. The researcher then sent a request letter to the Division of Bukidnon Superintendent, school principals, and the teacher respondents for necessary approval. The questionnaire was administered physically, that is, the researcher

personally visited the schools for the respondents' convenience and gathered the responses one (1) day per school at their respective conference rooms. The researcher ensured that every section was given sufficient clarification of the research study and the statements in the research instrument. The researcher further ensured that all items necessary were filled out completely to avoid risks of missing data. The respondents were informed that they may be contacted for the triangulation of the results obtained.

3.6. Statistical Analysis

The data was statistically analysed using descriptive statistics such as the mean, and standard deviation in determining the math teachers' level of AI awareness and teaching competency.

Shapiro-Wilk test of normality was conducted to determine whether AI awareness and teaching competency is normally distributed. The results indicate that we fail to reject the null hypothesis for AI Awareness data (p=0.314) and conclude that data is normally distributed. Consequently, the results also indicate that we fail to reject the null hypothesis for Teaching Competency data (p=0.369) and conclude that data is normally distributed. The data were examined and found no outliers in the data set.

Pearson r Product-Moment Correlation at 0.05 significance level was then utilized to determine if there is significant relationship between AI awareness and teaching competency.

4. RESULTS ANDS DISCUSSIONS

The data was statistically analysed using descriptive statistics such as the mean, and standard deviation in determining the math teachers' level of AI awareness and teaching competency.

4.1. Teacher's AI Awareness

Table 1 presents the facts on the overall level of AI awareness among Math teachers, with mean, standard deviation, qualitative description, and the overall mean of the 36 scale indicators.

As shown in table 1, the level of AI awareness among public-school math teachers in Pangantucan, Bukidnon came generally at high level with a composite mean of 3.57 and a standard deviation (SD) of 0.87. The distribution

of indicators shows one (1) item categorized as very high, twenty-five (25) as high, seven (7) as moderate, and three (3) as low. These results are in contradiction to the findings of Kurshomova (2024) and Umali (2024) which states that many educators have limited awareness of AI technologies.

Among the indicators cited, I recognize the ethical risks of AI uses in education (4.23), I am aware of the disadvantages of using AI in education (4.20), I am aware that there are challenges or concerns related to the use of AI in education (4.17), I am aware that AI has the potential to help teachers and learners (4.17), and I am familiar with the concept and nature of AI (4.13), obtained the highest mean value.

The highest rated indicators imply that math teachers are familiar with the concept of AI and its potential to help teachers and learners but also acknowledge the issues and disadvantages confronting AI integration in education. Simply put, math teachers are aware of the duality – the payoffs and pitfalls of AI's potential as an educational tool.

Supported by Sibug (2024) who reported that teachers acknowledged the tool's potential to customize and improve the learning experience; and despite concerns about reduced personal interaction and privacy, they still consider these tools valuable supplements to traditional approaches. Additionally, this was specified with the study of Castaneros and Paglinawan (2024) who found that basic education teachers in Cluster IV districts of Bukidnon have demonstrated strong digital awareness and proficiencies, particularly in areas such as online safety, data and information literacy, critical thinking, and problem-solving indicating that educators are well-equipped with the essential skills and knowledge needed to integrate digital tools effectively into their teaching strategies. However, the result is in contrast with Lumanlan (2025) who stated that despite the positive attitude towards AI, a number of educators still has only a moderate level of AI literacy and integration to the teaching process.

Meanwhile, the indicators I participate in training courses, workshops, and specialized seminars on how to use AI-based applications in education (2.27), I received training or support from my educational institution or employer regarding the

use of AI and educational technology (2.40), My educational institution provided the necessary resources and training to help me understand and use AI applications in education (2.43), I read the principles, ethics, policies, and procedures guide specific to AI and its uses in educational environments, and I make sure to adhere to its implementation (2.70), and I read informational awareness brochures about the concepts of AI, its ethics, applications, and risks (2.90) were rated as the lowest among all the indicators.

The lowest rated indicators generally show a lack of institutional support, training, and resources for teachers regarding the use of AI, which are necessary for effective implementation of their awareness as shown in the highest rated indicators. This lack of opportunities indicates a systemic barrier, wherein public-school math teachers may be willing to embrace AI but are hindered from acquiring, not just awareness, but competence in AI integration due to insufficient access to knowledge.

In support of these findings is the study of Aderibigbe (2023) which states that there is limited access to AI resources and lack of training in developing countries, such as the Philippines, which hinders AI adoption in education. Another study by Umali (2024) finds out that although some teachers in the Philippines recognize AI's potential, they still remain hesitant due to concerns about reliability and ethical issues. In contrast, although some findings shows a lack of institutional support and resources for AI integration, Melchor, et. al. (2023) noted progress in the Philippine education system after studying points to growing initiatives such as smart campus technologies, and government-university collaboration that reflect increasing readiness to adopt AI in education, subsequently pointing out that even with the existence of challenges, systemic efforts are already in motion to support broader and more effective AI integration across all levels of education.

Umali (2024) developed a primer for teachers and students on the ethical standards on utilizing AI technology in education, OpenAI (2024) provide disclaimers about the reliability issues and tendencies of artificial hallucinations of their AI tool – Chat GPT, Youtube videos such as TED talks, AI Mindscape, etc. hosts panel discussions and speeches about AI. These indicates that there are accessible resources for teachers available online

and as math teachers in the country develop their AI competency, Basilio (2023) revealed that there is still a need for exploring teacher's perspectives on the AI in teaching, and while some teachers are already enjoying its benefits from AI tools, their level of awareness in terms of its benefits may vary (Adeyele & Ramnarain, 2024).

Contextually, these findings are attributed to the absence of teacher trainings and seminars from DepEd specific to AI literacy and integration. Additionally, while information about AI and its potential in educational settings is widely available online, individual teacher efforts and initiative in accessing this information varies as 21st century skills of a teacher include keeping themselves updated with the trends in education, effective novel teaching strategies and knowledge needed to deal with students exposed highly to technology.

4.2. Teaching Competency

Teaching competency refers to the skill and knowledge that a teacher needs to be successful in teaching based on PPST which is measured using a 4-point Likert scale shown in Table 2. The classification of the strand indicators within the seven (7) PPST domains were indicated as follows: Content knowledge and pedagogy (D1), learning environment (D2), diversity of learners (D3), curriculum and planning (D4), assessment and reporting (D5), community linkages and professional engagement (D6), and personal growth and professional development (D7).

From table 2, the math teachers of Pangantucan, Bukidnon identified themselves as highly proficient with a composite mean of 3.03. The distribution of PPST strand indicators shows that majority (33 out of 37) were rated as "Highly Proficient Teacher" (HPT) and four (4) as "Distinguished Teacher" (DT).

The indicators with the highest mean values were support for learner participation (3.30), learner safety and security (3.30), dignity of teaching as a profession (3.27), learning outcomes aligned with learning competencies (3.20), and school policies and procedures (3.17) tied with professional ethics (3.17), management of learner behavior (3.17), and fair learning environment (3.17).

Two of the highest-rated indicators imply that teachers have a strong commitment to creating safe, inclusive, and participative learning

environments which were key indications of child-friendly and learner-centered education. In addition, the inclusion of "dignity of teaching as a profession" amongst the highest-rated items reflects a strong internalization of teaching as a noble vocation. School policies and procedures, professional ethics, management of learner behavior, and fair learning environment collectively point to a strong orientation of teachers toward maintaining professional conduct, upholding institutional policies, managing behavior effectively, and ensuring a just and respectful classroom environment which were both values-based and practical aspects of the teaching profession.

The emphasis on creating a safe and inclusive learning environment aligns with the conclusions of Salazar and Basierto (2021) that a positive classroom environment significantly enhances more of the students' self-efficacy, highlighting why such conditions are possibly prioritized in teaching practices. Further, the high regard for the dignity of teaching and adherence to professional conduct is supported by Arenillo and Cuarto's (2015) interpretation that teachers' fairness and support, positively influence student responsibility, engagement, and classroom behavior – emphasizing the prevalence of ethical and respectful teaching practices on learner outcomes.

Although the lowest-rated indicators are still within the highly proficient teacher (HPT) range, they emerge with lower mean scores. The lowest rated were the design, selection, organization and utilization of assessment strategies (2.70), research-based knowledge and principles of teaching and learning (2.73), establishment of learning environments that are responsive to community contexts (2.77), and the two indicators which both received the same mean score – learners linguistic, cultural, socio-economic and religious backgrounds (2.83), and learners in difficult circumstances (2.83).

These findings reveal areas where teachers may benefit from professional development. The common denominator among these lowest-rated indicators is their focus on context-responsive teaching, inclusive education, and differentiated assessment, which often require more technical expertise, or specialized training. This implies teachers may need additional professional development because aside from the diverse

cultures, students are open for free acculturation due to the advent of globalization which makes learner diversity even more complicated demanding more efforts for the teachers.

This finding is in line with the findings of Gepila (2019) after assessing the teaching competency of 160 teachers in Southern Luzon that teachers find managing the diversity of learners challenging with only a Proficient level (level 2 in PPST). Also, Sogillo et al. (2016) finds out that Diversity of learners were also at the Proficient level of one group of math teachers assessed using the Competency-Based Performance Appraisal System for Teachers (CBPAST).

On the other hand, these finding result is in contradiction to the findings of Manigbas et al. (2024) investigating the competency of teachers in Domain 1, content knowledge and pedagogy, which found that teachers are highly competent in utilizing research-based knowledge and principles of teaching and learning. However, it aligned to Aquino and Culajara's (2022) findings that while professional development opportunities exist, teachers often face barriers such as limited time, financial constraints, and heavy workloads. These challenges may explain why context-responsive teaching, inclusive practices, and differentiated instruction – areas that require specialized training received lower ratings despite overall high proficiency.

Contextually, teachers in Pangantucan, Bukidnon struggle with employing exploratory teaching strategies due to their students' lack of basic fundamental mathematical skills required to their grade levels which allow teachers to reteach the previous grade level's competencies instead of focusing on the current competencies (e.g. some grade 10 students still lack conceptual understanding regarding decimals). In addition, student factors can also be one of the underlying factors since teachers have observed lack of interest in the subject.

4.3. AI Awareness and Teaching Competency

Table 3 presents the Pearson Product Moment Correlation of the math teachers' AI awareness and teaching competency tested at a 0.05 significance level.

As shown in table 3, the correlation coefficient (r) is -0.016 which indicates an extremely weak negative correlation. The p-value is 0.934, which

is greater than the significance level 0.05, implies that there is not enough evidence to reject the null hypothesis. Therefore, there is no significant relationship between the math teachers' AI awareness and teaching competency. In other words, variations in AI awareness among the respondents do not correspond to the changes in their reported teaching competency. It indicates that being more or less aware of AI and its applications in education does not influence how competent teachers perform in their professional teaching roles.

This finding implies that general awareness of AI alone may not be sufficient to enhance teaching competency. It also implies that a possible gap exists between awareness and application wherein teachers may know about AI conceptually but are not integrating it into their teaching in ways that affect teaching competency. The finding further implies that AI awareness should be supplemented with hands-on application and integration of AI tools in instructional strategies.

The result is supported by Umali (2024) where he implied that the teacher's management of AI technology to the classroom does not have a substantial impact in motivating their students which should be treated with caution as it could be attributed to several factors and may need further investigation. Kurshumova (2024) also found out that many educators have limited familiarity with AI technologies, which hinders their ability to incorporate them effectively into the classroom

However, Gannaba (2024) argued that there is a positive outlook on AI's capacity to support and innovate the teaching process and enhance the learning of students. According to Canonigo (2024), when AI tools are incorporated into mathematics education, students' conceptual understanding and self-efficacy are enhanced, which would mean that there is an effective teaching competency demonstrated by the teacher. Research indicates that teachers who receive adequate training and exposure to AI technologies are more likely to integrate them into their teaching practices (Nazarethsky, 2022). AI awareness contributes to better instructional strategies and more effective lesson planning (van den Berg & du Plessis (2023).

This lack of a significant relationship between the AI awareness and teaching competency may be

due to underlying factors. For instance, math teachers in Pangantucan, Bukidnon remain hesitant in integrating AI into their classrooms due to risks of student overreliance. This hesitance may influence both AI awareness and how they assess their teaching competency. In addition, underlying factors may contribute to having no significant relationship such as generational differences or years in service, since younger teachers may be more receptive to AI while rating their teaching competency lower than experienced teachers who may feel more competent using traditional methods yet show less interest in AI. Additionally, attainment of postgraduate degrees may also contribute to the teachers' AI awareness and perceived teaching competency, depending on exposure to AI-related content. Differing pedagogical beliefs and teaching approaches may also shape how AI is perceived and integrated – further complicating any direct relationship.

5. CONCLUSION

Based on the results from the data analysis, the following conclusions were drawn. The level of AI awareness of public-school math teachers is high. It was also determined that while teachers have conceptual and ethical awareness about AI, they lack training, resources, and institutional support necessary to acquire knowledge on AI and its application to education. The math teachers' classified themselves as highly proficient teachers based on the Philippine Professional Standards for Teachers (PPST) strand indicators. The finding also reveals that teachers may benefit from professional development across some strand indicators concerning inclusive education, differentiated instruction, and context-responsive teaching. The finding also revealed that there is no significant relationship between the math teachers' AI awareness and teaching competency. Subsequently, it is concluded that general awareness of AI alone may not be sufficient to enhance teaching competency.

6. RECOMMENDATION

The findings and conclusions of the study led to the following recommendations.

The Department of Education (DepEd) may consider providing resources and support for teachers to be equipped with competence in AI in mathematics education. Furthermore, structured, and ongoing professional development workshops

and trainings focused on AI integration in teaching may be held to promote practical and pedagogical applications of the available AI tools. The DepEd may also create clear policy and guidelines on the use of AI in classrooms to proactively address risks of AI misuse.

The Department of Education (DepEd) may implement targeted professional development that focuses on inclusive education, differentiated instruction, and context-responsive teaching to ensure that public-school math teachers receive the necessary support to enhance competencies specific to enhance these areas of practice in alignment with the Philippine Professional Standards for Teachers (PPST).

The school administrators may develop and implement application-based training programs that focus on enhancing practical and pedagogical integration of AI tools in the classroom for mathematics teachers to convert knowledge into strategies that directly enhance teaching competency.

Future researchers may investigate the difference of AI awareness and teaching competency on teachers with different demographic profiles such as age, post-graduate studies, and years in service that may have effects on the mentioned variables considering a larger scale and sample for better generalizability.

7. ACKNOWLEDGEMENT

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