

Integrating Numeracy and Literacy Across the Curriculum: Challenges Encountered by Elementary Teachers of Osmeña Colleges in Promoting 21st-Century Skills, Personal Qualities, and Learner Competencies

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Abstract

This study examined the challenges encountered by elementary teachers of Osmeña Colleges in integrating numeracy and literacy across the curriculum to promote 21st-century skills, personal qualities, and learner competencies. Anchored on Constructivist Learning Theory, Curriculum Theory, and Multiple Intelligences Theory, the study explored how interdisciplinary instruction supports holistic learner development while identifying barriers affecting implementation. The study utilized a descriptive-quantitative research design and employed a structured questionnaire-rating scale as the primary data-gathering instrument. Fourteen elementary teachers from Osmeña Colleges during the Academic Year 2023–2024 participated in the study through census sampling. Data were analyzed using percentage distribution and weighted mean. Findings revealed that most respondents were early- to mid-career professionals with moderate teaching experience and predominantly held Bachelor's Degrees. Teachers encountered moderate challenges in integrating numeracy and literacy, particularly in aligning literacy skills with Science and Mathematics subjects. Other identified barriers included limited instructional materials, curriculum rigidity, inadequate training, and insufficient institutional support. Despite these constraints, teachers demonstrated positive use of adaptive instructional strategies such as differentiated instruction, project-based learning, and real-life contextualized tasks to promote learner competencies and 21st-century skills. However, collaborative and thematic teaching approaches remained underutilized. Institutional support mechanisms were perceived as limited, especially regarding budget allocation, policy frameworks, and resource provision for interdisciplinary projects. The study concluded that successful curriculum integration requires targeted professional development, structured curriculum alignment, stronger institutional support, and sustainable policy implementation. Recommendations focused on strengthening interdisciplinary pedagogy, collaborative curriculum planning, professional recognition systems, external partnerships, and long-term curriculum development initiatives. This study supports Sustainable Development Goal (SDG) 4: Quality Education by promoting inclusive and effective teaching practices that enhance literacy, numeracy, and 21st-century competencies among learners. It also aligns with SDG 17: Partnerships for the Goals through its emphasis on institutional collaboration and external support systems for educational improvement. The sustainability impact of the study lies in its potential to strengthen institutional instructional practices, improve teacher capacity, and support long-term curriculum innovation in private elementary education.

Keywords: 21st-Century Skills, Curriculum Integration, Differentiated Instruction, Elementary Teachers, Institutional Support, Interdisciplinary Instruction, Learner Competencies, Literacy, Numeracy, Professional Development

1. Introduction

The demands of 21st-century education require a transformative approach where numeracy and literacy are integrated across all learning areas rather than taught in isolation. The Department of Education continues to promote competencies such as communication, collaboration, creativity, and critical thinking through integrated instruction (DepEd, 2020). Numeracy and literacy are considered foundational gateway skills necessary for accessing, processing, and communicating knowledge effectively (UNESCO, 2021). UNESCO (2016) further emphasized that failure to integrate these skills early negatively affects long-term academic achievement and life success. In the Philippine context, learners continue to experience difficulties in foundational literacy and numeracy, particularly in the early grades, as reflected in the Early Language, Literacy and Numeracy Program results (ELLN, 2019). Consequently, schools are expected to strengthen the development of both academic competencies and personal qualities such as resilience, adaptability, and responsibility (Trilling & Fadel, 2009). However, private and provincial schools frequently encounter implementation difficulties related to curriculum overload, inadequate resources, lack of training, and weak institutional structures for interdisciplinary teaching (Carter et al., 2015; Galaura & Simpal, 2025). At Osmeña Colleges, elementary teachers strive to integrate literacy and numeracy across subjects while aligning instruction with national curriculum goals. Nevertheless, challenges such as rigid schedules, lack of instructional materials, limited collaboration, and insufficient interdisciplinary training affect

implementation. Despite these barriers, teachers continue to employ adaptive strategies including contextualized instruction, thematic teaching, and the use of digital learning tools to support learner development.

Global and local literature consistently emphasize the importance of integrating foundational competencies to prepare learners for increasingly complex educational and societal demands. Brookings (2020) highlighted that modern education must cultivate higher-order skills including communication, collaboration, problem-solving, and creativity. The OECD (2021) identified numeracy, literacy, and digital competencies as essential pillars of 21st-century learning. Research also underscores the importance of teacher competence and interdisciplinary pedagogy in successful integration. Karli, Gunawan, Suwandayani, & Sukmayadi (2024) noted that effective educators require creativity, innovation, self-confidence, and psychosocial adaptability to implement integrated instruction successfully. Dewey (2021) explained that interdisciplinary teaching promotes deeper learning by connecting concepts across subjects and enabling students to apply knowledge holistically. Empirical studies demonstrate both the benefits and challenges of integration. Ali & Nugraha (2024) validated the effectiveness of integrated literacy and numeracy instruction in improving student competencies, while Carter, Klenowski, & Chalmers (2015) identified teacher limitations in understanding cross-curricular numeracy and implementing integrated tasks. Similarly, Mustadi, Utami, Wardana, & Nugraha (2024) reported that teacher competency, stakeholder support, and literacy-related challenges significantly affect the integration of 21st-century skills. Local studies further reveal implementation barriers in Philippine schools. Galaura & Simpall (2025) identified shortages in teaching-learning materials and difficulties in developing higher-order thinking assessments. Binaliw & Pungngay (2024) emphasized the limitations caused by insufficient instructional materials and pedagogical challenges, while Miñoza, Sala, Salera, Roldan, & Dela Peña (2025) found that poor literacy and numeracy outcomes are linked to weak parental involvement and curriculum-related concerns. These studies collectively indicate that curriculum integration requires sustained teacher development, institutional support, and effective instructional frameworks.

Globally, education systems are shifting toward interdisciplinary learning models that integrate foundational competencies and prepare students for workforce and societal demands (Brookings, 2020). International organizations such as UNESCO and OECD advocate for the integration of literacy, numeracy, and digital competencies to improve educational quality and learner adaptability (UNESCO, 2021; OECD, 2021). Nationally, the Philippines has institutionalized educational reforms through Republic Act 9155 (2001) and the MATATAG Curriculum, which prioritize foundational literacy, numeracy, and 21st-century competencies (DepEd, 2024). The Department of Education has also strengthened the Early Language, Literacy, and Numeracy Program to improve basic competencies among learners (Luistro, 2015). Furthermore, Duterte (2023) emphasized the inclusion of “peace competencies,” resilience, and social responsibility across learning areas. Locally, schools such as Osmeña Colleges face contextual challenges in implementing integrated instruction. Provincial and private institutions often struggle with limited resources, inadequate training opportunities, and insufficient structural support for interdisciplinary teaching. These realities highlight the need for localized research that examines the actual classroom experiences of teachers implementing curriculum integration.

This study is anchored on Constructivist Learning Theory, Curriculum Theory, and Multiple Intelligences Theory. Constructivist Learning Theory explains that learners actively construct knowledge through experiences and interactions, requiring teachers to create contextualized and inquiry-based learning environments integrating literacy and numeracy (Piaget, 1976; Vygotsky, 1978). This framework supports the use of project-based learning, thematic instruction, and contextualized teaching strategies. Curriculum Theory emphasizes the role of curriculum design and implementation in influencing learning outcomes. Eisner (1994) argued that rigid discipline-based curricula hinder holistic learning unless interdisciplinary linkages are intentionally embedded. This perspective explains the structural barriers teachers face in implementing integrated instruction. Multiple Intelligences Theory by Gardner (1983) proposes that learners possess diverse intelligences requiring differentiated instructional approaches. Integrating literacy and numeracy across subjects enables teachers to address multiple learner strengths through collaborative tasks, visual aids, and differentiated activities, thereby promoting holistic learner development.

Although extensive literature discusses curriculum integration and 21st-century learning, there remains limited localized research focusing on the actual challenges encountered by elementary teachers in private schools, particularly in provincial settings such as Masbate. Existing studies largely emphasize policy frameworks and general implementation issues but provide insufficient attention to the specific realities faced by elementary teachers in integrating literacy and numeracy across disciplines. The synthesis of related literature reveals a persistent gap between educational policy aspirations and classroom implementation. While global and national frameworks advocate interdisciplinary learning, teachers continue to encounter barriers including lack of instructional resources, insufficient training, curriculum rigidity, and limited institutional support (Carter, Klenowski, & Chalmers, 2015; Galaura & Simpall, 2025). Furthermore, research by Torpsten (2019) highlighted the lack of dedicated teacher preparation for bridging generic literacy skills with subject-specific instruction.

This study addresses these gaps by investigating the experiences of elementary teachers at Osmeña Colleges regarding the challenges, strategies, and support systems involved in curriculum integration. The findings are expected to provide site-specific insights that can guide curriculum enhancement, teacher development programs, and institutional policy improvements.

This study aligns with several Sustainable Development Goals that promote inclusive, equitable, and sustainable education systems. SDG 4 – Quality Education is strongly reflected in the study because it focuses on improving instructional practices, foundational literacy and numeracy, and the promotion of 21st-century competencies necessary for lifelong learning. The integration of literacy and numeracy across subjects supports inclusive and effective learning environments. SDG 8 – Decent Work and Economic Growth is relevant because strengthening foundational competencies and 21st-century skills contributes to the preparation of future learners for productive employment, innovation, and workforce adaptability. SDG 9 – Industry, Innovation, and Infrastructure is supported through the promotion of innovative instructional approaches, technology integration, and interdisciplinary teaching strategies that improve educational delivery systems. SDG 17 – Partnerships for the Goals is reflected in the study's emphasis on institutional collaboration, teacher support systems, and partnerships with educational agencies such as DepEd, LGUs, and NGOs to strengthen curriculum integration initiatives.

This study contributes to multiple dimensions of sustainability by strengthening educational systems and promoting holistic learner development. In terms of educational sustainability, the study supports the development of sustainable instructional practices that improve literacy, numeracy, and interdisciplinary learning. It encourages teacher capacity-building and curriculum innovation necessary for long-term educational improvement. Regarding technological and innovation sustainability, the study highlights the role of digital platforms, contextualized materials, and innovative instructional approaches in improving learner engagement and competency development. The research also contributes to socio-economic sustainability by helping prepare learners with adaptable skills, critical thinking abilities, and personal qualities necessary for future employment and community participation. From an institutional sustainability perspective, the study provides evidence-based recommendations for policy development, teacher support mechanisms, curriculum enhancement, and resource allocation that can strengthen long-term instructional quality and institutional effectiveness. Finally, the study supports community sustainability by promoting learner competencies that contribute positively to local development, social participation, and lifelong learning opportunities within the broader educational community.

2. Material and methods

2.1 Research Design

The study utilized a descriptive-quantitative research design to systematically investigate and quantify the challenges encountered by elementary teachers in integrating numeracy and literacy across the curriculum. Through a structured survey method, the study explored how these challenges influence teachers' efforts in promoting 21st-century skills, personal qualities, and learner competencies. Numerical data gathered through a standardized questionnaire were used to identify patterns, trends, and relationships in teachers' experiences. According to Fraenkel and Wallen (2000), descriptive research aims to describe existing conditions as accurately and carefully as possible. In this study, the design enabled the researcher to examine the status of curriculum integration practices at Osmeña Colleges and provide empirical evidence for curriculum enhancement and teacher development initiatives.

2.2 Locale of the Study

The study was conducted at the Elementary Department of Osmeña Colleges located in Masbate City during the Academic Year 2023–2024. Masbate City serves as the provincial capital of Masbate and forms part of the Second Congressional District. The institution operates within the context of private basic education and implements curriculum integration aligned with the K to 12 and MATATAG educational frameworks. The locale was selected because of its direct relevance to the investigation of interdisciplinary teaching practices and the integration of numeracy and literacy across learning areas.

2.3 Respondents of the Study

The respondents of the study consisted of elementary teachers from Osmeña Colleges during the Academic Year 2023–2024. The target population included 20 teachers, of which 14 participated in the survey, representing a 70% response rate. The respondents varied in terms of teaching experience and grade level handled, providing relevant perspectives regarding curriculum integration, instructional strategies, and institutional support.

2.4 Sample and Sampling Procedure

The study employed the Census Sampling Method because the research intended to involve all elementary teachers comprising the defined target population. Given the relatively small and manageable population size, the entire group was

considered appropriate for participation. Although the target population consisted of 20 teachers, only 14 completed and returned the survey questionnaires during the data collection period.

2.5 Research Instrument

The study utilized a structured questionnaire-rating scale as the primary research instrument for gathering data. The questionnaire was developed by the researcher with guidance and validation from the thesis adviser to ensure alignment with the objectives of the study. The instrument consisted of sections addressing the demographic profile of the respondents, including teaching experience and grade level taught, followed by three major areas: challenges encountered in integrating numeracy and literacy, strategies employed to overcome these challenges, and institutional support mechanisms available for curriculum integration. The survey items were measured using a five-point Likert scale ranging from Strongly Agree to Strongly Disagree. The instrument was designed to gather quantitative data regarding teachers' perceptions, experiences, and practices related to interdisciplinary instruction and the promotion of 21st-century learner competencies.

2.6 Data Gathering Procedure

The study followed a systematic and chronological data gathering procedure to ensure academic rigor and ethical compliance. The process began with the formulation of the research title, objectives, and statement of the problem in consultation with the thesis adviser. After preliminary approval, the researcher underwent proposal defense, during which the methodology, rationale, scope, and significance of the study were presented and refined based on panel recommendations. Following revisions, formal requests and informed consent letters were submitted to school authorities to secure permission for data collection. Ethical considerations such as confidentiality, voluntary participation, and proper handling of responses were strictly observed throughout the study. The survey questionnaires were then distributed to the respondents, and the data collection period lasted for one week. During this period, the researcher monitored survey completion, clarified respondent concerns, and checked the completeness of the responses. After retrieval of the questionnaires, the responses were encoded into spreadsheets and verified to minimize data entry errors and maintain consistency. The encoded data were subsequently subjected to statistical analysis to generate the findings of the study. The completed study, including the methodology, results, and conclusions, was later presented during the oral defense for further evaluation and refinement.

2.7 Data Analysis Techniques

The study employed percentage distribution and weighted mean as statistical tools for data analysis. Percentage distribution was used to describe the demographic profile of the respondents, including variables such as age, educational attainment, teaching experience, and grade level taught. This statistical measure enabled the researcher to determine the composition and distribution of the respondents. Weighted mean was utilized to analyze responses to the Likert-scale items concerning challenges encountered, strategies employed, and institutional support mechanisms. This statistical tool helped determine the average level of agreement or disagreement of the respondents regarding curriculum integration practices. The computed weighted means were interpreted using the corresponding verbal interpretations to identify prevailing trends and perceptions among the elementary teachers.

3. Results and Discussion

3.1 Profile of the Respondents

3.1.1 Age Profile of Elementary Teachers

The results revealed that most of the respondents were within the 31–35 age bracket, representing 79% of the participants, while 21% belonged to the 26–30 age group. No respondents were recorded in the 20–25, 36–40, or 41 and above categories. This indicates that the faculty is primarily composed of early- to mid-career educators. The findings suggest that the teaching workforce is relatively young and professionally active, making them potentially adaptable to educational reforms and interdisciplinary instructional practices. According to Darling-Hammond (2006), teachers within this age group often demonstrate instructional enthusiasm and increasing mastery of pedagogical approaches, which may support innovation in integrating numeracy and literacy. However, the absence of older and more experienced educators may also limit generational diversity and mentorship opportunities within the institution.

3.1.2 Educational Attainment of Teachers

The findings showed that 79% of the respondents held a Bachelor's Degree, while 14% possessed a Master's Degree and only 7% had a Doctorate Degree. The majority therefore met the minimum academic qualification required for teaching, although few had advanced academic preparation. The results imply that limited graduate-level preparation may affect the teachers' readiness for sophisticated interdisciplinary instruction. Shulman (1987) emphasized that teachers with higher academic qualifications are generally more exposed to interdisciplinary pedagogies and evidence-based instructional strategies. This highlights the need for professional development and institutional support that encourage teachers to pursue advanced studies and strengthen curriculum integration practices.

3.1.3 Teaching Experience of Respondents

The results indicated that 36% of the respondents had 1–5 years of teaching experience, another 36% had 6–10 years, while 28% had 11–12 years of experience. No respondent exceeded 12 years in service, showing that the faculty is moderately experienced. The findings suggest that the respondents are still in a developmental stage of professional practice where instructional skills and classroom management strategies continue to evolve. Veenman (1984) noted that novice to mid-career teachers are often still developing confidence in instructional innovation. The absence of highly experienced educators may also reduce opportunities for mentorship and guidance in implementing interdisciplinary teaching approaches.

3.2 Challenges Encountered in Curriculum Integration

3.2.1 Difficulties in Integrating Numeracy and Literacy

The findings revealed that teachers generally perceived the challenges in curriculum integration as Neutral, with an overall weighted mean of 3.24. The highest-rated challenge was the difficulty of aligning literacy skills with subjects such as Science and Mathematics, which obtained a weighted mean of 3.43. Other notable concerns included lack of instructional materials, rigid curriculum structures, and learner confusion during integration activities, each obtaining a weighted mean of 3.36. The lowest-rated challenge was minimal peer collaboration, with a weighted mean of 2.93. The results indicate that curriculum integration difficulties are largely rooted in institutional and pedagogical limitations rather than teacher unwillingness. Teachers struggle particularly with embedding literacy competencies into content-heavy subjects. Beane (1997) and Drake and Burns (2004) emphasized that successful interdisciplinary teaching requires adequate training and curricular support. Bruner (1960) further argued that effective learning requires scaffolding across disciplines, while Jacobs (1989) highlighted the importance of institutional commitment to interdisciplinary instruction. These findings underscore the need for curriculum flexibility, updated instructional resources, and targeted teacher training programs.

3.3 Strategies Employed for Curriculum Integration

3.3.1 Instructional Strategies Used by Teachers

The results showed that teachers generally agreed that they actively employ strategies for curriculum integration, with an overall weighted mean of 3.55. The highest-rated strategy was differentiated instruction to address diverse learner needs, which obtained a weighted mean of 3.79. Other frequently practiced strategies included project-based activities integrating mathematics and language skills (3.71) and the use of real-life tasks involving reading and computation (3.64). In contrast, thematic teaching and subject coordination received the lowest weighted means of 3.36, indicating limited implementation of collaborative and thematic approaches. The findings demonstrate that teachers are making individual efforts to promote 21st-century skills through learner-centered approaches such as differentiation and project-based learning. Trilling & Fadel (2009) emphasized that creativity, collaboration, and critical thinking are strengthened through innovative instructional practices. However, Saavedra and Opfer (2012) argued that sustainable instructional innovation requires institutional support, access to technology, and collaborative planning structures. The low utilization of thematic teaching and coordination suggests the need for stronger institutional frameworks to support interdisciplinary instruction.

3.4 Institutional Support for Curriculum Integration

3.4.1 Administrative and Structural Support

The findings revealed that institutional support for curriculum integration was generally perceived as Neutral, with an overall weighted mean of 3.06. The highest-rated support mechanism was the ability of teachers to consult school administrators regarding curriculum integration concerns, with a weighted mean of 3.36. School leadership promotion of curriculum integration ranked second with a weighted mean of 3.29. Participation in training and collaborative activities both received weighted means of 3.14. Meanwhile, the lowest-rated support mechanism was the allocation of budget and resources for interdisciplinary projects, which obtained a weighted mean of 2.57. The results suggest that while some forms of administrative support exist, institutional mechanisms remain insufficient for sustaining effective curriculum integration. Fullan (2007) emphasized that meaningful educational reform requires coherent leadership, supportive policies, and adequate resource allocation. Similarly, Hargreaves and Shirley (2012) argued that innovation becomes difficult to sustain without strong institutional culture and financial backing. The findings therefore indicate the need for stronger policy implementation, targeted funding, and institutional recognition systems that encourage interdisciplinary teaching practices.

4. Conclusion & Recommendations

The study concluded that elementary teachers of Osmeña Colleges encounter moderate challenges in integrating numeracy and literacy across the curriculum despite being composed mainly of early- to mid-career educators with moderate teaching experience and sufficient academic qualifications. The findings revealed that the most significant challenge involved aligning literacy skills with subjects such as Science and Mathematics, indicating limitations in interdisciplinary instructional preparation and curriculum alignment. Although teachers demonstrated positive implementation of adaptive strategies such as differentiated instruction, project-based learning, and real-life tasks to promote 21st-century skills,

collaborative and thematic approaches remained underutilized. Furthermore, institutional and external support systems were perceived as insufficient, particularly in terms of budget allocation, policy implementation, and resource provision, which collectively limited the sustainability and effectiveness of curriculum integration efforts.

Osmeña Colleges should strengthen curriculum integration by institutionalizing specialized professional development programs focused on interdisciplinary pedagogy and the integration of literacy and numeracy across subject areas. The institution should also establish formal curriculum mapping, collaborative lesson planning, and mentoring systems to enhance coordination among teachers and promote thematic instruction. In addition, school leadership should provide stronger recognition systems, adequate instructional resources, and sustained financial support for interdisciplinary projects through partnerships with external agencies such as DepEd, LGUs, and NGOs. Lastly, the school should develop a long-term integrated curriculum development plan that embeds numeracy and literacy integration into institutional policies, instructional frameworks, and faculty performance standards to ensure the sustainability of 21st-century learning initiatives.

Compliance with ethical standards

The authors declare no conflict of interest. This study complied with recognized ethical standards for human-participant research by ensuring voluntary participation with informed consent, the right to withdraw without penalty, and strict confidentiality through anonymous, secure, and aggregated data handling. Given the focus on psychological well-being, procedures were non-invasive, and safeguards were observed to minimize discomfort, with guidance to appropriate support services when needed, and required institutional permissions were secured for instrument use and access to academic records.

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