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Readiness of TLE teachers in the public secondary school addressing the 21st century learning skills in 4th district of Pangasinan

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Abstract

This research aimed to study the readiness of the TLE teachers in the public secondary school addressing the 21st Century Learning Skills. 30 junior high school TLE teachers teaching TLE subjects for 5 years and more were chosen from the 5 public mother schools in the 4th district of Pangasinan using purposive sampling. The study involved the gathering of the demographic profile of the respondents along age, sex, civil status, course graduated, major area of specialization, number of years teaching TLE subjects, and related trainings to assess the relationship between profile of the respondents, the readiness of TLE teachers and challenges faced by the TLE teachers towards the 21st century learning skills. A level and challenge-based questionnaire was used to assess their readiness in addressing the 21st century learning skills areas in terms of mastery of subject matter, classroom management, preparation of learning material, and teaching strategies.

On the level of readiness, TLE teachers possess a robust level of readiness to deliver 21st century learning skills across all examined areas and are confronted with a complex array of challenges as they work to deliver 21st century learning skills. Key barriers include rapid technological change, inadequate resources, limited professional development, and the need to adapt to diverse and evolving student needs. Despite these obstacles, TLE teachers remain committed to their roles as facilitators of learning. Addressing these challenges requires systemic support, increased access to updated resources and technology, ongoing professional development, manageable class sizes, and collaborative opportunities for sharing best practices.

Keywords: Technology and Livelihood Education; 21st Century Learning Skills; Readiness of Teachers

1. Introduction

In today's rapidly evolving educational landscape, driven by technological advancement and shifting labor market demands, the role of educators has become more complex and multifaceted. The Bachelor of Technology and Livelihood Education (BTLE) program emerges as a vital response to this challenge, offering a unique integration of technology proficiency and vocational expertise. With the rise of global interconnectedness and 21st-century learning imperatives, there is a growing need for teachers to equip students with key competencies such as creativity, communication, collaboration, and critical thinking skills essential for thriving in a dynamic and increasingly complex world.

The BTLE program, formally established through CHED Memorandum Order No. 17 s. 2017, evolved from the Bachelor of Secondary Education (BSED) major in Technology and Livelihood Education. This transition was prompted by the introduction of the Senior High School Tech-Voc Track in 2018, which required deeper integration of skills development aligned with CHED, DepEd, and TESDA initiatives to support 21st-century learning outcomes. Central to this integration is the readiness of TLE teachers to deliver content using modern, student-centered pedagogies yet limited research has explored how prepared these teachers are to meet such expectations.

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TLE, often described as a life-oriented subject, covers areas relevant to both personal development and practical livelihood. It encompasses a wide range of skills and fields Home Economics, Industrial Arts, Agri-Fishery Arts, and Entrepreneurship and Information and Communications Technology (Southern Leyte State University). These components are deeply rooted in real-life applications, enabling students to acquire valuable competencies that can support future employment and entrepreneurship.

Home Economics addresses household and community management, including child care, food preservation, financial literacy, and consumer education. Industrial Arts involves the creation and repair of items made from materials like wood and metal, often including engine repair and automotive skills. Agri-Fishery Arts focuses on agricultural and aquacultural practices, while Entrepreneurship and ICT develop business and digital literacy—essential tools in the modern economy.

Historically, the use of technology in the classroom has evolved significantly. Xin (2024) noted that James Pillans first introduced the blackboard in 1801, marking a shift in pedagogical tools. By the 1990s, smartboards began transforming traditional teaching, though not without concerns regarding training, costs, and equity. As technology continues to influence education, preparing students for the modern workforce increasingly involves integrating transdisciplinary projects, problem-based learning, and real-world applications. Assessment strategies have also evolved, shifting toward formative practices such as peer feedback, self-assessment, and project-based evaluations to support continuous learning (Okansasira, 2023).

Sen (2024) emphasizes that today's educators must go beyond basic teaching skills. With cultural diversity, rapid innovation, and complex societal challenges, teachers must be lifelong learners capable of using technology effectively, fostering critical thinking, respecting cultural differences, and creating inclusive learning environments. Teachers are not just facilitators of academic content; they serve as role models and leaders shaping the future of society (Rust and Bergey, 2014; White and Chant, 2014).

Smith (2020) further argues that teachers must now manage increasingly diverse classrooms and adapt their instruction to suit varying learner needs. This requires teacher education programs to be closely aligned with real-world classroom demands. Johnson et al. (2019) examined whether the BTLE program effectively equips educators with the required competencies for contemporary teaching, while Doe (2018) explored how BTLE graduates reflect on and apply their training in actual classroom contexts.

The incorporation of technology interactive whiteboards, educational software, online platforms, and digital tools has enriched teaching practices, allowing for personalized learning and better collaboration. At the same time, teachers are challenged to ensure inclusive education, using differentiated instruction to address varied learning needs and cultural backgrounds (Oxford University Press ELT, 2016). As Darling-Hammond and Bransford (2005) noted, modern educators must possess a wide range of skills deep content knowledge, effective use of technology, culturally responsive pedagogy, and the ability to design instruction for diverse learners.

TLE, as part of the Philippine education system, plays a critical role in preparing students for the workforce by providing them with technical skills and life competencies (Ssemugenyi, 2023). When students explore career paths through TLE, their employability and future prospects increase (Jacolbia, 2016). However, teaching TLE presents multiple challenges. Gregorio (2016) identified a lack of tools, learning materials, and trained instructors as barriers to effective implementation. Bawar (2019) found that student interest and performance improve when schools provide sufficient equipment and resources, whereas learning outcomes decline in resource-deficient environments.

Additional issues arise when teachers are assigned to teach TLE subjects outside their area of expertise, which negatively affects both teaching quality and student achievement (Tingzon and Buyok, 2022; Abella et al., 2021). These challenges highlight the need for targeted professional development, improved resource allocation, and strategic teacher deployment.

Despite its importance, few studies have focused on the readiness of TLE teachers to integrate 21st-century skills or examined the practical challenges they face (Alonzo et al., 2023). Given the growing emphasis on career readiness and life-long learning, this study seeks to address that gap by assessing the preparedness of TLE educators and identifying areas for improvement. Doing so will help ensure that the BTLE curriculum continues to evolve and respond effectively to the demands of the modern educational landscape.

Conceptual Framework

This study is grounded in the theory of social constructivism, which posits that learners construct knowledge through experiences and social interactions. Since the 1980s, many educators and researchers have embraced this theory (Mayer, 1996; as cited in Chu et al., 2017, p. 5). Social constructivism emphasizes that students learn effectively by identifying their own misconceptions, setting goals, exploring information, experimenting, revising their thinking, and evaluating their progress (Scardamalia and Bereiter, 2003, p. 1371; as cited in Chu et al., 2017, p. 6).

Aligned with this, 21st-century teacher training should treat teachers as learners—providing opportunities for collaboration, reflection, and problem-solving. Constructivist principles support the idea that teachers gain deeper understanding when they engage in meaningful learning experiences and apply these insights to practice. This approach prepares them to promote student-centered learning and inquiry-driven exploration.

Vygotsky (1978) added that learning transforms mental functions and that understanding learning requires investigating the developmental changes in cognition. Through challenging tasks that disrupt routine habits, such as assigning tool selection or requiring collaboration across language barriers, Vygotsky observed how learners' thinking evolved. These tasks revealed emerging skills and the growth potential within learners.

Piaget (1972) contributed three major ideas: learning must be active, interaction with objects is essential, and learning depends on developmental stages (Brainerd, 1978; Sigel, 1977). He believed schools should focus on individual learners, with teachers acting as facilitators who observe and support students' thinking, encourage exploration, and promote peer learning. Mistakes were seen not as failures but as opportunities for growth.

Complementing these views is Adult Learning Theory, or andragogy, developed by Malcolm Knowles. This theory highlights the distinct needs of adult learners—emphasizing self-direction, relevance to real-life experiences, and problem-solving. King and Lawler (2003) emphasized that professional development, as a form of adult education, must address diverse learning environments and teaching contexts. Gregson and Sturko (2007) supported this by noting that collaboration, feedback, and shared teaching practices foster teacher growth and improve outcomes.

Knowles (1980, 1984) identified five assumptions about adult learners: they are self-directed; bring valuable life experiences; are ready to learn based on social roles; focus on immediate, problem-centered learning; and are motivated intrinsically. For example, in computer training, Knowles (1984) demonstrated that instruction should explain relevance, focus on practical tasks, adapt to diverse learner backgrounds, and allow exploration with support.

In the context of teacher preparation, especially in BTLE programs, these adult learning principles are vital. They help ensure that professional development is practical, learner-driven, and aligned with classroom realities—ultimately contributing to more effective and adaptive teaching.

This study also incorporates transformational leadership theory, developed by James MacGregor Burns. This theory emphasizes the role of leaders in motivating others to reach higher levels of performance. In education, transformational leadership fosters hope, energy, and vision among teachers, creating a culture of continuous growth (Litz, 2021). When applied to professional development, such leadership can empower educators, improve instructional practices, and enhance student achievement by nurturing a shared commitment to excellence.

Together, these theories—social constructivism, adult learning theory, and transformational leadership—form the conceptual foundation of this study. They guide the understanding of teacher readiness, ongoing development, and effective educational leadership in the context of preparing TLE educators to meet the demands of 21st-century teaching.

2. Literature review

According to Barcelona et al. (2020), the core objective of Technology and Livelihood Education (TLE) is to shape students into competent individuals equipped with leadership, social engagement, and employable skills. The goal extends beyond technical expertise to include values formation and community service. Research by Elli and Ricafort (2020) on Grade VI TLE teachers indicated that most were young, female, and in entry-level positions. Though many had begun postgraduate studies, few had significant experience or national certifications. While they generally demonstrated subject matter competence, no strong correlation was found between teacher profiles and competencies in key TLE areas, except in Agriculture, where position title had significance.

The BTLED program, established under Board Resolution No. 44, s. 2018 and aligned with CHED Memorandum Order No. 78, s. 2017, integrates theoretical and practical learning aimed at professional growth and lifelong learning. The

curriculum emphasizes teaching methods, assessment strategies, and educational technologies relevant to TLE, while also embedding business management, financial literacy, innovation, and social responsibility. Specializations in Industrial Arts, Home Economics, and related fields are complemented by hands-on industry training, outreach initiatives, and leadership development, preparing graduates for roles such as educators, curriculum developers, and community officers.

In the K-12 curriculum, TLE courses are aligned with TESDA's Training Regulations to prepare students for high-demand jobs requiring National Certificates. DepEd, under Republic Act 10533, collaborates with CHED and TESDA to strengthen basic education, with TESDA certification serving as evidence of educators' industry-aligned competencies. Despite this alignment, the EDCOM report (2012), as cited by Ariaso et al. (2016), noted declining quality in Philippine education, including low vocational course enrollment. TLE remains vital for imparting financial skills and supporting socio-economic mobility.

Adeniran (2020) highlighted a strong link between effective use of teaching-learning materials and improved instructional performance. Insufficient or poorly utilized resources hinder the implementation of pedagogical content knowledge. Pollard and Tann (2013) emphasized that teacher competence in classroom management, assessment, and pedagogy continues to be a pressing concern. Chappell and Hager (2015) viewed teaching as a two-way, interactive process shaped by the cognitive engagement of both teachers and learners.

Ongoing professional development is critical in helping teachers meet the evolving demands of education. Chu et al. (2017) identified strategies such as peer mentoring, collaboration, and instructional innovations to help educators facilitate 21st-century skills in student-centered classrooms. Yue (2019) added that effective teacher professional development (TPD) should include needs assessment, positive school culture, active learning strategies, integrated ICT, and research-based projects.

Koehler and Mishra (2006) stressed that integrating technology in teacher training enhances adaptability to diverse learner needs. Their "learning-technology-by-design" model emphasizes experiential, project-based learning over traditional instruction. This approach engages educators in authentic tasks such as designing digital tools and fosters reflection, creativity, and collaboration (Mishra and Koehler, 2003; Blumenfeld et al., 1991). In such settings, the teacher's role shifts from content expert to facilitator and problem solver, promoting deeper engagement and applied learning (Brown and Duguid, 1991).

Rauner and Maclean (2008) found that vocational education significantly enhances teacher preparedness by equipping them with industry-relevant skills. A shift in some sectors toward project- and team-based work has challenged traditional hierarchies, prompting some countries to rename VET and open pathways from technical education to higher education via strengthened qualifications and higher apprenticeships.

There is ongoing debate over the role of key competences in vocational programs—often referred to as transferable or soft skills. Green (1998) viewed them as weak substitutes for general education, while Canning (2007) saw them as evolving concepts. The European Commission (2018) identified eight key competences for lifelong learning, including literacy, languages, STEM, digital competence, civic and personal skills, entrepreneurship, and cultural awareness. Warhurst, Tilly, and Gatta (2017) argued that the rise of soft skills reflects a broader shift toward a socially constructed view of skill, particularly in service-oriented economies.

The OECD, through its Programme for the International Assessment of Adult Competencies (PIAAC), promotes the idea that work-related cognitive and noncognitive competencies can be decontextualized and internationally assessed. PIAAC measures the proficiency of adults aged 16–65 in literacy, numeracy, and problem-solving—skills identified by the OECD (2016) as essential for full participation in 21st-century life (p. 22). However, scholars have criticized such international assessments, including PISA, for promoting a universal interpretation of competence and education that may overlook cultural and contextual differences (Addey et al., 2017; Avis, 2012; Hamilton, 2012; Lingard and Sellar, 2013; Takayama, 2013). Critics also argue that PIAAC assumes a seamless transfer of educational skills to workplace settings, ignoring how skills are contextually developed and reshaped by evolving work environments. Despite these critiques, OECD survey outcomes and global rankings continue to influence national education policies. Efforts are even underway to create a similar international assessment for vocational education and training (VET) (Achtenhagen and Winther, 2014).

Changes in VET such as new terminologies, integration of key competencies, and alignment with higher education—are often temporary, limited by conceptual, political, and contextual factors. While well-intentioned, these reforms frequently fail to address the central issue: how to sustainably and flexibly support the development of expertise amid

rapid technological, economic, and cultural transformations. As the division of labor evolves through advancements in cognitive technologies and digital integration, new patterns and approaches to learning and expertise formation emerge.

Darling-Hammond (2012) emphasized that teacher competencies such as technological proficiency, pedagogical knowledge, and cultural awareness are vital for managing diverse classrooms and fostering meaningful learning. Teaching today demands a sophisticated balance between curriculum goals and the diverse needs of students. Teachers must manage open-ended tasks, stimulate critical thinking, and develop students' analytic and performance abilities—moving beyond rote instruction. This complexity requires deep understanding of both content and students, as well as the ability to blend direct instruction with inquiry and problem-solving. Teaching becomes a dynamic process, requiring educators to continuously interpret curriculum demands while adapting to student variability—an intricate task described as navigating both strands of a double helix (Darling-Hammond, 2012; Jackson, 1974).

Furthermore, teacher preparation must bridge the gap between ideal educational practices and the realities of existing school systems. Larmer, Mergendoller, and Boss (2015) stressed that innovative strategies like inquiry-based and project-based learning (PBL) are essential in BTLE programs to enhance student engagement and outcomes. PBL is increasingly adopted worldwide due to its effectiveness in equipping students with essential 21st-century skills such as critical thinking, collaboration, and self-directed learning. When implemented well, PBL enables students to meet authentic challenges, manage time, and apply learning to real-world contexts—key competencies for future success.

Zabala and Adelante (2018) observed that TLE teachers must possess broad subject matter knowledge, yet the expansive scope of the curriculum and variability in available resources complicate this expectation. They noted that resource availability often dictates which learning areas schools can offer, making teacher skills and qualifications a secondary consideration. Gregorio (2016) highlighted a persistent issue: many BTLE teachers lack access to relevant seminars and training, which affects their professional development. She also pointed out that some TLE teachers are assigned to subjects outside their area of specialization, further undermining content mastery and instructional quality.

The limited availability of resources continues to challenge TLE teachers, especially given the wide range of skills, facilities, and learning materials required. As Zabala and Adelante (2018) emphasized, this makes it difficult for teachers to consistently meet competency standards and maximize student potential across varied learning areas.

This research aimed to explore the effectiveness of the Bachelor of Technology and Livelihood Education (BTLED) curriculum in enhancing teacher readiness and student learning in dynamic, diverse classroom settings. It focused on assessing the preparedness of TLE teachers to meet 21st-century educational demands by analyzing their demographic profiles including age, sex, civil status, educational background, teaching specialization, training, and years of experience as well as their readiness in terms of subject mastery, classroom management, learning material preparation, and teaching strategies. The study also examined the challenges teachers faced and investigated whether significant relationships exist between their profiles, readiness, and encountered obstacles.

The hypothesis guiding this research posited that the BTLED curriculum significantly enhances teacher preparedness for contemporary classroom dynamics, especially compared to traditional training models. It was further hypothesized that resource availability does not significantly affect readiness, that subject mastery presents the greatest challenge, and that no significant correlation exists between teacher profiles, readiness levels, and challenges encountered.

The study's findings hold significance for a range of educational stakeholders. TLE teachers can identify professional growth areas, particularly in communication, collaboration, creativity, and digital literacy. Students benefit indirectly by receiving instruction from educators better equipped to address modern educational challenges. Teacher education institutions may use the insights to refine BTLED curricula, thereby improving training programs and institutional prestige. For the Department of Education, the findings can inform policy decisions related to teacher competencies and training standards. School administrators can leverage the results for planning professional development initiatives and resource allocation. At a broader level, improved teacher readiness contributes to a more capable workforce and an informed citizenry. The researcher, as a BTLED major, gains deeper insight into the demands of 21st-century teaching, while the study itself provides a foundation for future research on teacher readiness and instructional innovation.

This study focused on junior high school TLE teachers in public secondary schools across the 4th district of Pangasinan who had five or more years of teaching experience. It assessed their pedagogical competence, technological integration, and adaptability to modern instructional methods aligned with 21st-century education. It also examined how these educators manage evolving classroom dynamics, diverse student needs, and adaptive teaching strategies.

3. Methodology

This study employed a survey method, a widely accepted approach in quantitative observational research, which allows for the numerical description of characteristics from a sample or entire population (Creswell, 2014; Balnaves and Caputi, 2001). Commonly used across various disciplines, the survey method enables researchers to generalize findings from a representative sample to a broader population. It typically involves the use of standardized questions analyzed through descriptive and inferential statistical tools to provide a comprehensive picture of the phenomena being studied. The goal of this method is to develop a generalizable understanding of patterns or trends based on individual contexts, offering insights into respondents lived experiences (Clemente, Julaton, and Orleans, 2016).

Aligned with this objective, the researcher adopted a phenomenological perspective to explore the lived experiences of Technology and Livelihood Education (TLE) teachers. A phenomenological approach is commonly used in social science research to explore how individuals experience a particular phenomenon (Christensen, Welch, and Bar, 2017). Following Creswell's (2013) process for phenomenological analysis, the researcher began by bracketing personal biases, refraining from allowing subjective judgments to affect the research process. This was followed by horizontalization of data, which involved identifying significant statements and developing textual descriptions based on key quotes and experiences. These were then organized into themes or meaning units. The researcher constructed structural descriptions based on these themes and synthesized them to identify the essence of the participants' experiences, as recommended by Padilla-Diaz (2015).

The primary data for this research were obtained through a structured survey questionnaire administered to the respondents. This instrument was carefully designed to assess perceptions of readiness and the challenges faced by TLE teachers in integrating 21st-century learning skills. Secondary data sources, including peer-reviewed studies, academic articles, and relevant literature on technology and livelihood education, teacher training programs, and 21st-century learning competencies, were also reviewed to support the analysis and contextual understanding of the findings.

The study involved thirty (30) TLE junior high school teachers from public secondary schools in the 4th District of Pangasinan who had been teaching for at least five years. The distribution of participants was as follows: nine teachers from Mangaldan National High School, seven from Dagupan City National High School, four from San Jacinto National High School, six from Manaoag National High School, and five from San Fabian National High School. These teachers were purposefully selected based on the assumption that their extended teaching experience gave them in-depth exposure to curriculum implementation, pedagogical strategies, institutional challenges, and student learning needs. With at least five years in the field, the respondents were expected to provide more consistent and reflective insights compared to those with less experience.

To ensure the integrity of the data collection process, the researcher followed a rigorous procedure. A structured questionnaire was created and validated with the help of experts in education, curriculum design, and assessment. This questionnaire was based on a thorough review of literature and educational frameworks and was divided into two parts. The first part gathered demographic information such as age, sex, civil status, educational background, teaching specialization, years of experience, and relevant training attended. The second part consisted of Likert-scale items intended to measure the respondents' readiness in addressing 21st-century skills in the classroom, including critical thinking, communication, collaboration, creativity, digital literacy, and life skills (DeVellis, 2016). The expert panel reviewed the questionnaire items for clarity, relevance, and alignment with the intended constructs. Based on their feedback, the instrument was refined and finalized, with its content validity ensured in accordance with the guidelines of Polit and Beck (2006).

With the instrument validated, the researcher obtained formal permission from school principals before distributing the questionnaires in person. This was done during the teachers' free time or after class hours to minimize disruption to their teaching responsibilities. Each participant was briefed on the study's purpose, assured of confidentiality, and informed that participation was voluntary. Respondents were given a one-week period to complete the questionnaire, with personal follow-ups made when necessary to achieve a high response rate. Upon completion, all questionnaires were collected, organized, and prepared for analysis.

The responses gathered were analyzed using appropriate descriptive statistics. Frequency counts were used to summarize how often each response category was selected, while percentages were calculated to show the distribution of answers across all items. These descriptive methods helped illustrate patterns in the data related to the readiness of TLE teachers. To further interpret the results, the weighted mean was computed for each item to quantify the overall trend of responses. A weighted mean ranging from 3.25 to 4.00 indicated a "Strongly Agree" response, 2.50 to 3.24

indicated "Agree," 1.76 to 2.49 indicated "Disagree," and 1.00 to 1.74 indicated "Strongly Disagree," helping to determine the level of agreement across the indicators of teacher readiness.

To explore potential relationships between respondents' demographic profiles and their readiness or perceived challenges, the Pearson Correlation Coefficient was applied. This statistical measure assessed the strength and direction of associations between continuous variables. Correlation values were interpreted using the standard scale: a coefficient of +1.00 represented a perfect positive correlation, +0.70 to +0.99 indicated a strong positive correlation, +0.30 to +0.69 indicated a moderate positive correlation, and 0.00 to +0.29 represented a weak positive correlation. Negative values followed the same ranges but in the opposite direction, from weak to strong negative correlations. These analyses allowed the researcher to identify patterns that might explain how background factors influenced the teachers' capacity to integrate 21st-century learning skills into their instructional practices.

4. Presentation, Results and interpretation of data

This chapter presents the analysis and interpretation of the data collected during the course of the study. The aim is to systematically examine the data in order to draw meaningful insights and answer the research survey questions. The findings are organized in a clear and logical manner using tables to ensure clarity and coherence. Furthermore, the interpretation of these findings is discussed in the context of the study objectives and relevant literature, highlighting patterns, trends, and relationships that emerged from the data.

This research aimed to study the readiness of the TLE teachers in the public secondary school addressing the 21st Century Learning Skills in the 4th District of Pangasinan. Thirty (30) junior high school TLE teachers who are teaching TLE subjects for 5 years and more were chosen from the five (5) public mother schools in the 4th district of Pangasinan using purposive sampling, to wit: Mangaldan National High School, San Fabian National High School, San Jacinto National High School, Manaoag National High School and Dagupan City National High School. The study also involved the gathering of the demographic profile of the respondents along age, sex, civil status, course graduated, major area of specialization, number of years teaching TLE subjects, and related trainings to assess the relationship between profile of the respondents, the readiness of TLE teachers and challenges faced by the TLE teachers towards the 21st century learning skills. A level and challenge-based questionnaire was used to assess their readiness in addressing the 21st century learning skills areas in terms of mastery of subject matter, classroom management, preparation of learning material, and teaching strategies.

4.1. Profile of the Respondents

4.1.1. Along Age

Table 1 presents the distribution of respondents according to their age.

Table 1 Profile of the respondents along age N = 30

Indicator	Frequency	Percentage
25-30 years old	8	26.67
31-35 years old	8	26.67
36-40 years old	6	20.00
41-45 years old	3	10.00
46-50 years old	1	3.33
50 above years old	4	13.33
TOTAL	30	100.00

As seen in the above table, out of the 30 TLE teachers surveyed, the largest groups were those aged 25-30 years and 31-35 years, each comprising eight (8) respondents each or 26.67% of the total respondents. Teachers aged 36-40 years followed, accounting for six (6) respondents or 20.00%. Those within the 41-45 years age bracket represented 10.00% (3 respondents). A small portion belonged to the 46-50 years group with only one (1) respondent or 3.33%. Lastly, teachers aged 50 and above made up 13.33% (4 respondents).

This distribution suggests that the majority of the respondents are young to mid-career teachers, primarily within the 25 to 40 years age range. Their relatively younger age may imply a higher potential adaptability to 21st century learning skills, such as technology integration, innovation, and collaborative learning, as younger teachers often show greater familiarity and comfort with modern teaching strategies and digital tools. However, the presence of older teachers especially those above 50 years also adds valuable experience and stability to the teaching force, which are important in mentoring and leadership roles. The age profile indicates a dynamic group that combines youthful innovation with professional experience, which may positively influence their readiness to address the demands of 21st century education.

4.1.2. Along Sex

Table 2 shows the distribution of the respondents according to their sex.

Table 2 Profile of the respondents along Sex N = 30

Indicator	frequency	percentage
Male	6	20.00
Female	24	80.00
TOTAL	30	100.00

It is revealed in the above table that 24 respondents, or 80.00%, are female and 6 respondents, or 20.00%, are male. This data indicates that the majority of TLE teachers in the selected public secondary schools are female. The high representation of female teachers may reflect general trends in the education sector, where women are often more predominant. In terms of readiness to address 21st-century learning skills, this demographic trend suggests that female teachers play a crucial role in promoting 21st-century competencies such as communication, collaboration, and creativity among students. The dominance of female TLE teachers could positively influence the nurturing and inclusive environment needed for the development of 21st-century skills among junior high school students.

4.1.3. Along Years of Teaching TLE

Table 3 illustrates the distribution of respondents based on their years of teaching experience in Technology and Livelihood Education (TLE).

Table 3 Profile of the respondents along years of teaching TLE N = 30

Indicator	Frequency	Percentage
1 to 5 years	6	20.00
5 to 10 years	17	56.67
11 to 15 years	5	16.67
16 to 20 years	1	3.33
21 to 25 years	0	0.00
26 to 30 years	0	0.00
31 years and above	1	3.33
TOTAL	30	100.00

The majority of 17 teachers or 56.67%, have been teaching TLE for 5 to 10 years. Six (6) teachers or 20.00% have 1 to 5 years of teaching experience. Five (5) teachers or 16.67% have been teaching for 11 to 15 years. Only one (1) teacher or 3.33% has 16 to 20 years of experience. Another teacher or 3.33% has been teaching for 30 years and above. None of the respondents fall within the bracket of 21–25 years and 26–30 years ranges.

The data shows that the majority of TLE teachers are in the early to mid-stages of their teaching careers, particularly within 5 to 10 years of experience. This suggests that most respondents are relatively seasoned, not new, but still active

learners who are likely adaptable and open to integrating 21st-century learning skills like critical thinking, problem-solving, and digital literacy into their teaching practices. The respondents' years of service profile indicates a workforce that is experienced enough to have classroom mastery but young and dynamic enough to adapt to the evolving educational landscape.

4.1.4. Along Civil Status

Table 4 displays the civil status profile of the respondents. 14 respondents, making up 46.67% of the total indicates that almost half of the teachers surveyed are single. 15 respondents, or 50.00% shows that slightly more than half of the respondents are married, which is the largest group in the data.

Table 4 Profile of the respondents on civil status N = 30

Indicator	Frequency	Percentage
Single	14	46.67
Married	15	50.00
Widowed	1	3.33
TOTAL	30	100.00

One (1) respondent is widowed, which is 3.33% of the total and the smallest in terms of civil status. This civil status profile might help contextualize other factors in the study, such as time management, personal priorities, or work-life balance, which can influence a teacher's approach to addressing 21st-century learning skills.

4.1.5. Along Course Graduated

Table 5 presents the distribution of 30 respondents along course graduated in college.

Table 5 Profile of the respondents along course graduated N = 30

Indicator	Frequency	Percentage
BS Education	21	70.00
BS Industrial Education	6	20.00
Bachelor of Technical Teacher Education	1	3.33
BS Nursing	1	3.33
BS Nutrition and Dietetics	1	3.33
TOTAL	30	100.00

21 out of 30 which is 70% of the respondents are BS Education graduates. This suggests that most respondents have a general education background, which may provide them with foundational pedagogical skills but may vary in terms of specific technical expertise required for TLE. 20% or six (6) respondents have a BS Industrial Education background. This course is closely aligned with TLE, likely equipping these respondents with more specialized technical and vocational skills relevant to 21st century competencies. The Bachelor of Technical Teacher Education, BS Nursing, and BS Nutrition and Dietetics had one (1) respondent each which gained 3.33% as their course background. The low frequency from these courses indicates limited diversity in technical specialization among the respondents, with only a small number having backgrounds directly related to technical or vocational education.

4.1.6. Along Major Area of Specialization

Table 6 shows the distribution of 30 respondents according to their major fields of study, which is directly relevant to their preparedness as TLE teachers for 21st century learning skills.

20 out of 30 respondents or 66.67% majored in Technology and Livelihood Education (TLE). This strong majority indicates that most respondents have specialized training and background in the competencies and content areas directly related to TLE. This specialization likely enhances their readiness to teach and integrate 21st century skills such as problem-solving, critical thinking, and technical proficiency in their classrooms.

Table 6 Profile of the respondents along major area of specialization N = 30

Indicator	Frequency	Percentage
TLE	20	66.67
Filipino	2	6.67
Food Trades	6	20.00
Biological Science	2	6.67
TOTAL	30	100.00

20% or six (6) respondents majored in Food Trades. This major is closely related to TLE, especially in the context of livelihood and technical-vocational education. Respondents with this background are likely equipped with practical and industry-relevant skills, further supporting their capacity to address 21st century learning demands in TLE. Only 6.67% each or 2 respondents majored in Filipino and Biological Science. These majors are not likely to be directly aligned with TLE but may contribute useful interdisciplinary perspectives. However, their small representation suggests that the overall pool is not broadly diversified in terms of academic specialization outside the core TLE and related technical fields.

Level of Readiness of TLE Teachers in Public Schools Towards 21st Century Learning Skills

4.1.7. Along Mastery of the Subject Matter

Table 7 shows that TLE teachers exhibit a very high level of readiness in mastering subject matter as it relates to 21st century learning skills. All indicators received descriptive ratings of "Very High," with an average weighted mean of 3.89.

Table 7 Level of readiness of TLE teachers in public schools towards 21st century learning skills along mastery of the subject matter N = 30

Indicator	Weighted mean	Descriptive rating
I reflect on my teaching practices and seek ways to improve my subject mastery.	4.00	Very High
I effectively explain complex concepts in a way that students can easily understand.	3.97	Very High
I continuously update my knowledge to align with new trends in my field.	3.93	Very High
I use various assessment strategies to measure students' understanding of the subject matter.	3.93	Very High
I integrate industry-relevant practices in my lessons.	3.93	Very High
I collaborate with colleagues to enhance subject content	3.87	Very High
I am confident in demonstrating technical skills relevant to my TLE subject.	3.77	Very High
I have an understanding of the core competencies required in my TLE specialization.	3.70	Very High
AVERAGE WEIGHTED MEAN	3.89	Very High

The highest mean of 4.00 is for *reflecting on teaching practices and seeking ways to improve subject mastery*, suggesting that TLE teachers are highly committed to continuous self-improvement and professional growth. Teachers also scored very high with 3.97 mean in *explaining complex concepts in ways students can easily understand*, indicating strong communication and pedagogical skills.

Updating knowledge with new trends, using various assessment strategies and integrating industry-relevant practices received very high ratings with 3.93 mean, reflecting teachers' commitment to staying relevant, effectively measuring student understanding and value real-world application. *Collaborating with colleagues* also rated very high with 3.87 weighted mean, showing that teachers also value teamwork in enhancing subject content. *Confidence in demonstrating technical skills relevant to TLE subjects* with a weighted mean of 3.77 is slightly lower than other indicators, but still a very high rating. This may suggest a need for ongoing technical training to maintain and further enhance practical competencies. The lowest mean of 3.70 is for *understanding the core competencies required in their TLE specialization*. While still rated very high, this area may benefit from targeted professional development to ensure all teachers have a deep and comprehensive grasp of the essential skills in their field.

4.1.8. Along Classroom Management

Table 8 presents the readiness of TLE teachers in managing classrooms effectively while integrating 21st century learning skills. All indicators received a weighted mean between 3.57 and 3.93, with every descriptive rating classified as "Very High". It also generated an average weighted mean of 3.75 described as Very High. This manifests that TLE teachers generally feel confident and well-prepared to implement classroom management strategies that support 21st century learning skills.

Table 8 Level of readiness of tle teachers in public school towards 21st century learning skills along classroom management N = 30

Indicator	Weighted Mean	Descriptive Rating
I integrate 21st-century learning skills (critical thinking, communication, collaboration, creativity) in my classroom management strategies.	3.93	Very High
I adapt my classroom management strategies to accommodate diverse learning styles and needs.	3.83	Very High
I encourage students to take responsibility for their learning through self-directed activities.	3.80	Very High
I establish a learning environment that promotes active student participation and collaboration.	3.77	Very High
I am confident in handling technology-related classroom management challenges.	3.77	Very High
I utilize technology effectively to support classroom management and student engagement.	3.67	Very High
I handle classroom conflicts effectively using modern classroom management techniques.	3.67	Very High
I use digital tools (e.g., Google Classroom, Kahoot) to manage my class effectively.	3.57	Very High
AVERAGE WEIGHTED MEAN	3.75	Very High

Integration of 21st century skills in classroom management had the highest weighted mean of 3.93, showing that teachers strongly agree that they incorporate critical thinking, communication, collaboration, and creativity into their classroom management strategies reflecting a strong commitment to embedding core 21st century competencies in daily classroom practices.

Adaptation to diverse learning styles had the second high weighted mean of 3.83, shows that teachers are very capable of modifying their classroom management approaches to accommodate diverse student needs and learning styles, which is essential for inclusive education. Teachers *actively promote student responsibility through self-directed*

activities, fostering autonomy and lifelong learning skills with a very high encouragement of self-directed learning with a weighted mean of 3.80. Both *promotion of active participation and collaboration and confidence in handling technology-related challenges* indicators had a mean of 3.77 still a very high rating that establishing a learning environment that encourages student engagement and teamwork is another strong area, supporting collaborative skills vital for the 21st century and teachers feel confident managing classroom issues related to technology, indicating readiness to navigate digital disruptions or challenges.

While still rated very high, *effective use of technology for classroom management and handling classroom conflicts using modern techniques* had a mean of 3.67 a slightly lower score, suggests some room for growth in leveraging technology tools to enhance classroom management and student engagement. Teachers are confident but may benefit from further training or resources to refine conflict resolution strategies using contemporary methods. Lastly, *the use of digital tools for class management* with lowest mean score of 3.57, though still very high, relates to the use of specific digital platforms like Google Classroom and Kahoot for managing classes. This could indicate a need for more professional development or access to technology to maximize these tools' potential.

4.1.9. Along Preparation of Learning Materials

Table 9 presents the self-assessed readiness of TLE teachers in regarding the preparation of learning materials that foster 21st century learning skills.

Table 9 Level of readiness of TLE teachers in public school towards 21st century learning skills along preparation of learning materials N = 30

Indicator	Weighted Mean	Descriptive Rating
I ensure that my instructional materials promote creativity and innovation among students.	3.77	Very High
I use student-centered strategies when designing my learning materials.	3.77	Very High
I incorporate real-world applications in my TLE learning materials.	3.73	Very High
I collaborate with other teachers to enhance my learning material preparation.	3.73	Very High
I use Learning Management Systems (LMS) or online platforms for lesson delivery and material distribution.	3.73	Very High
I develop learning materials that integrate critical thinking and problem-solving skills.	3.70	Very High
I create digital learning materials that support self-paced and blended learning.	3.70	Very High
I integrate multimedia resources (videos, infographics, animations) in my lessons.	3.70	Very High
AVERAGE WEIGHTED MEAN	3.73	Very High

All indicators received a "Very High" rating, with an average weighted mean score of 3.73. This reflects a consistently strong level of confidence and preparedness among TLE teachers in integrating 21st century skills through their learning materials.

Student-centered strategies and *promotion of creativity and innovation* indicators had the highest mean of 3.77 reflecting that teachers ensure their instructional materials encourage students to be creative and innovative, which is vital for 21st century competencies. *The use of student-centered approaches in designing materials* is also a top strength, indicating that teachers prioritize active learning and engagement. Incorporating real-world applications, collaborating with colleagues, and *using Learning Management Systems (LMS) or online platforms* are all rated very high with 3.73 weighted mean, showing that teachers value relevance, teamwork, and technology in material preparation.

Integration of critical thinking and problem-solving, support for self-paced and blended learning, and use of multimedia resources are rated also a very high rating with a mean of 3.70, shows that teachers develop materials that challenge

students to think critically and solve problems, aligning with key 21st century learning outcomes. Teachers can also integrate videos, infographics, and animations, enhancing lesson engagement and catering to diverse learning preferences.

4.1.10. Along Teaching Strategies

Table 10 reflects the self-assessed readiness of TLE teachers regarding their use of teaching strategies that support 21st century learning skills. All indicators received a "Very High" rating, with an average weighted mean of 3.80. This indicates that TLE teachers feel confident and well-prepared to implement a variety of teaching strategies that foster essential 21st century skills such as communication, collaboration, critical thinking, and technology integration.

Table 10 Level of readiness of TLE teachers in public school towards 21st century learning skills along teaching strategies N = 30

Indicator	Weighted Mean	Descriptive Rating
I integrate communication and presentation activities to enhance students' oral and written skills.	3.87	Very High
I use real-world examples and industry-based applications in teaching TLE subjects.	3.87	Very High
I implement differentiated instruction to cater to diverse learning styles and needs.	3.83	Very High
I encourage self-directed learning by guiding students to take responsibility for their learning.	3.83	Very High
I use collaborative learning techniques such as group work and peer discussions.	3.83	Very High
I use project-based learning (PBL) to enhance students' real-world problem-solving abilities.	3.80	Very High
I apply inquiry-based learning by encouraging students to ask questions and explore concepts independently.	3.77	Very High
I incorporate technology (e.g., multimedia, online tools, simulations) in my teaching.	3.60	Very High
AVERAGE WEIGHTED MEAN	3.80	Very High

Indicators on communication and presentation of activities, and *use of real-world and industry-based examples* both had the highest mean of 3.87, a very high rating that shows teachers strongly integrate communication and presentation tasks to improve students' oral and written skills and teachers can also use of practical, real-world contexts and industry applications in teaching TLE subjects that emphasized ensuring lessons are relevant and engaging. The second highest mean of 3.83 are the indicators about *differentiated instruction, encouraging self-directed learning and collaborative learning techniques*. Teachers effectively tailor instruction to meet diverse learning styles and needs, supporting inclusivity and personalized learning. There is also a strong focus on guiding students to take responsibility for their own learning, fostering autonomy and lifelong learning skills. A group work and peer discussions are widely used also to develop teamwork and interpersonal skills.

Teachers employ PBL to enhance students' problem-solving abilities through real-world projects, promoting critical thinking and application had a weighted mean of 3.80, still a very high rating*. In inquiry-based learning, encouraging students to ask questions and explore concepts independently supports curiosity and deeper understanding* had a weighted mean of 3.77. While still rated very high, the use of multimedia, online tools, and simulations in teaching is the lowest-rated indicator, suggesting some room for growth in fully leveraging digital resources.

4.2. Challenges Faced by TLE Teachers

4.2.1. Along Mastery of the Subject Matter

Table 11 presents the challenges encountered by TLE teachers in mastering their subject matter, based on responses from 30 teachers. All indicators received a "High" descriptive rating that showed an average weighted mean of 3.03.

Table 11 Challenges faced by TLE teachers along mastery of the subject matter n = 30

Indicator	Weighted Mean	Descriptive Rating
I find it challenging to stay updated with new trends and advancements in TLE subjects.	3.33	High
There is a lack of teaching resources and updated instructional materials for my subject.	3.20	High
The broad scope of TLE makes it difficult to master all areas of the subject.	3.10	High
The fast-changing curriculum and policies in TLE make it difficult to adapt.	3.10	High
The lack of industry exposure and hands-on experience affects my mastery of technical skills.	3.10	High
Time constraints and heavy workload limit my ability to enhance my subject knowledge.	3.00	High
I experience difficulty in aligning my lessons with 21st-century learning skills	2.77	High
I struggle with integrating technology and digital tools into my TLE lessons.	2.67	High
AVERAGE WEIGHTED MEAN	3.03	High

The most significant challenge with a mean of 3.33 is staying updated with trends. Keeping up with new trends and advancements in TLE subjects, and a rapid change in technology and industry practices make it difficult for teachers to maintain current knowledge and skills. Lack of teaching resources had a mean of 3.20, a high level of difficulty due to insufficient teaching resources and outdated instructional materials. This shortage can hinder effective teaching and limit opportunities for students to engage with up-to-date content.

With a mean of 3.10, broad scope and fast-changing curriculum, and lack of industry exposure had a high difficulty rating. The wide range of topics within TLE and the frequent updates to curriculum and policies both present substantial challenges. Teachers find it hard to master all content areas and adapt quickly to changes. Also, a limited opportunities for hands-on experience and industry exposure negatively affect teachers' technical mastery, which is crucial for TLE subjects that are skill- and practice-based. Time constraints and workload is one with the high rating of 3.00 mean faced by the TLE teachers in terms of mastering subject matter.

Heavy workloads and limited time restrict teachers' ability to enhance their subject knowledge, impacting ongoing professional development. Aligning lessons with 21st century skills had a mean of 2.77, still a high rating. Teachers experience some difficulty in integrating 21st century learning skills into their lessons, indicating a need for more support or training. Lastly, integrating technology and digital tools, the lowest mean, though still rated high. While teachers recognize the importance of digital integration, they face notable barriers such as lack of access, training, or confidence in using these tools.

4.2.2. Along Classroom Management

Table 12 summarizes the challenges experienced by TLE teachers related to classroom management. Most challenges are rated as "Very High", with a computed average weighted mean of 3.38.

Table 12 Challenges faced by tle teachers along classroom management N = 30

Indicator	Weighted mean	Descriptive rating
Managing time effectively to balance content delivery and interactive activities.	3.57	Very High
Handling classroom discipline while allowing students to explore and collaborate freely.	3.50	Very High
Dealing with students' resistance to new teaching methods such as inquiry-based learning.	3.43	Very High
Balancing the use of technology and traditional classroom management strategies.	3.43	Very High
Managing group work dynamics to ensure fair participation and accountability.	3.43	Very High
Ensuring students stay focused and on-task while using digital tools and online resources.	3.43	Very High
Ensuring active student engagement in project-based and collaborative learning activities.	3.30	Very High
Managing large class sizes while implementing student-centered learning.	2.93	High
AVERAGE WEIGHTED MEAN	3.38	Very High

One challenge, managing large class sizes while implementing student-centered learning, is rated "High" with a mean of 2.93. This indicates that TLE teachers face significant difficulties in various aspects of classroom management, especially balancing multiple demands and adapting to modern teaching approaches.

Managing time effectively with a mean of 3.57 a very high rating, shows that the greatest challenge is balancing content delivery with interactive activities. Teachers struggle to allocate sufficient time for both teaching core material and engaging students in meaningful participatory learning experiences. Next is handling classroom discipline while encouraging freedom with a mean of 3.50 a high descriptive rating. Maintaining discipline while allowing students the freedom to explore and collaborate is a major challenge. This reflects the tension between control and autonomy in student-centered classrooms.

Four indicators, dealing with students' resistance to new teaching methods, balancing technology and traditional strategies, managing group work dynamics, and keeping students focused while using digital resources had the same mean of 3.43, still a very high rating of difficulty. Teachers struggle when students resist innovative approaches such as inquiry-based learning, which are essential for developing critical thinking and problem-solving skills. Integrating digital tools effectively without neglecting proven traditional classroom management techniques poses a significant challenge. Teachers try their best to maintain student attention and on-task behavior during activities involving online tools, highlighting challenges in digital classroom management.

Ensuring active engagement in project-based learning had the least mean of 3.30 but still a very high rating of difficulty. Sustaining student involvement in collaborative and project-based tasks is challenging, reflecting the complexity of managing active learning environments. Lastly, one of the challenges faced by the TLE teachers in terms of classroom management is managing large class sizes. A weighted mean of 2.93, shows that there is a high rating of difficulty in handling large numbers of students while implementing student-centered learning. Large classes may limit teachers' ability to provide individualized attention and manage diverse learning needs effectively.

4.2.3. Along Preparation of Learning Materials

Table 13 summarizes the challenges encountered by TLE teachers regarding the preparation of learning materials.

Some challenges received an average weighted mean score of 2.62 with "High" descriptive rating, indicating they are significant barriers for most teachers. And some challenges received a "Low" descriptive rating with a weighted means ranges 2.47 to 2.50, suggesting they are less severe but still present.

The most prominent challenge is adapting materials to fit different student learning styles and needs with a mean of 2.83. This reflects the complexity and diversity of student populations, requiring teachers to invest additional effort and creativity to make materials accessible and effective for all. Lack of reference materials with real-world applications is the next high rated challenges with a mean of 2.73. Teachers struggle to find reference materials that integrate practical, real-world applications, which are essential for engaging students and making learning relevant.

Table 13 Challenges faced by TLE teachers in preparation of learning material N = 30

Indicator	**Weighted Mean**	**Descriptive Rating**
I face challenges in customizing materials to fit different student learning styles and needs.	2.83	High
There is a lack of available reference materials that integrate real-world applications.	2.73	High
There is insufficient time to develop high-quality learning materials.	2.70	High
I face difficulty in aligning learning materials with industry-based standards and practices.	2.63	High
I struggle to design interactive and engaging materials aligned with 21st-century skills.	2.53	High
I find it difficult to access updated digital resources and technology-based materials.	2.50	Low
I have limited technical skills in using digital tools for material preparation.	2.50	Low
I experience difficulty in integrating multimedia elements (videos, simulations, online platforms).	2.47	Low
AVERAGE WEIGHTED MEAN	2.61	High

Time constraints is one of the major issues with a mean of 2.70, still a high rating difficulty, limiting teachers' ability to develop high-quality and well-prepared learning materials. Aligning with industry-based standards with a mean of 2.63, shows that teachers find it challenging to ensure that materials meet current industry standards and practices, which is crucial for TLE subjects that are meant to be practical and industry-relevant. Designing interactive, engaging materials had a weighted mean of 2.53, that teachers show a high difficulty in creating materials that are both interactive and aligned with 21st century skills, such as collaboration, critical thinking, and creativity.

Both access to updated digital resources and limited technical skills in digital tools had a mean of 2.50 shows a low difficulty rating. Some teachers find it hard to access the latest digital and technology-based resources, which can limit their ability to modernize their teaching materials. Integrating advanced multimedia elements such as videos, simulations, and online platforms is also a challenge for some, though this is the least severe among the listed issues with a mean of 2.47.

4.2.4. Along Teaching Strategies

Table 14 presents the challenges experienced by TLE teachers related to the implementation of teaching strategies having an average weighted mean of 2.61 described as "High".

There are weighted mean scores that range from 2.30 to 2.90, with most challenges rated as "High" and a few rated as "Low." This indicates that while several challenges are significant and commonly experienced, some issues are less severe but still present.

Teachers face a significant challenge due to insufficient teaching materials and resources with a mean of 2.90, high difficulty rating which hampers their ability to implement diverse and effective teaching strategies. Same high difficulty rating with 2.90 mean, managing large groups of students restricts the teachers' capacity to apply student-centered approaches, which require more individualized attention and active engagement.

Table 14 Challenges faced by TLE teachers in teaching strategies N = 30

Indicator	**Weighted Mean**	**Descriptive Rating**
Limited availability of instructional materials and resources.	2.90	High
Large class sizes, making student-centered learning difficult.	2.90	High
Students' lack of motivation and engagement in 21st-century learning activities.	2.80	High
Lack of access to technology and digital tools for teaching.	2.67	High
Resistance to shifting from traditional to modern teaching strategies.	2.57	High
Difficulty in integrating problem-solving and critical thinking into lessons.	2.40	Low
Limited knowledge or experience in using collaborative and project-based learning.	2.33	Low
Difficulty in integrating real-world applications into lessons.	2.30	Low
AVERAGE WEIGHTED MEAN	2.61	High

Teachers struggle with low student motivation and participation with a mean of 2.80, high rating of difficulty, which affects the success of innovative and interactive teaching strategies. Resistance to shifting from traditional to modern teaching strategies is one with the high difficulty rating and had a weighted mean of 2.57, showing that both teachers and possibly students show reluctance or difficulty in adopting new instructional methods, which slows the transition to 21st century pedagogies.

With a weighted mean of 2.40, low rating, some teachers find it challenging to embed higher-order thinking skills consistently within their lessons. Also, with a mean of 2.33, limited knowledge or experience in using collaborative and project-based learning is challenging for some teachers. Teachers also face challenges in connecting lessons to practical, real-world contexts, which can enhance relevance and student engagement with a mean of 2.30 a low rating of difficulty.

Relationship Between Profile and Level of Readiness of TLE Teachers in Public Schools Towards 21st Century Learning Skills

Table 15 shows the relationships and significance between the teacher profile on age, sex, years teaching TLE, civil status, course, major and their level of readiness in four areas of 21st century learning skills, mastery of subject matter, classroom management, preparation of learning materials, and teaching strategies.

All p-values (Sig. 2-tailed) are greater than 0.05, indicating that none of the profile variables have a statistically significant relationship with any of the readiness areas. This means that factors like age, sex, years of teaching, civil status, course, and major do not significantly influence TLE teachers' readiness in terms of subject mastery, classroom management, preparation of materials, or teaching strategies.

Table 15 Relationship between profile and level of readiness of tle teachers in public schools towards 21st century learning skills N = 30

		LOR on Mastery of Subject Matter	**LOR on Classroom Management**	**LOR on Preparation of Learning Materials**	**LOR on Teaching Strategies**
Age	Pearson Correlation	0.044	0.000	0.098	0.049
	Sig. (2-tailed)	0.818	1.000	0.605	0.795
Sex	Pearson Correlation	-0.361	0.000	-0.205	-0.056
	Sig. (2-tailed)	0.050	1.000	0.277	0.768
Years Teaching TLE	Pearson Correlation	0.080	-0.138	0.036	0.032
	Sig. (2-tailed)	0.675	0.468	0.850	0.866
Civil Status	Pearson Correlation	-0.225	-0.056	0.069	-0.020
	Sig. (2-tailed)	0.233	0.769	0.716	0.916
Course	Pearson Correlation	-0.265	-0.049	0.036	0.073
	Sig. (2-tailed)	0.157	0.797	0.851	0.700
Major	Pearson Correlation	-0.317	-0.093	0.045	0.139
	Sig. (2-tailed)	0.088	0.625	0.813	0.464

Relationship Between Profile and Challenges of TLE Teachers in Public Schools Towards 21st Century Learning Skills

Table 16 Relationship between profile and challenges of tle teachers in public schools towards 21st century learing skills N = 30

		Challenges on Mastery of Subject Matter	**Challenges on Classroom Management**	**Challenges on Preparation of Learning Materials**	**Challenges on Teaching Strategies**
Age	Pearson Correlation	-.431*	-0.282	-0.074	-0.056
	Sig. (2-tailed)	0.017	0.130	0.698	0.768
Sex	Pearson Correlation	-0.146	-0.225	-0.071	-0.052
	Sig. (2-tailed)	0.440	0.231	0.709	0.785

Years Teaching TLE	Pearson Correlation	0.065	0.079	0.275	0.283
	Sig. (2-tailed)	0.733	0.677	0.141	0.129
Civil Status	Pearson Correlation	-0.216	-0.352	-0.269	-0.125
	Sig. (2-tailed)	0.251	0.057	0.150	0.511
Course	Pearson Correlation	-0.198	-0.231	0.068	0.046
	Sig. (2-tailed)	0.293	0.220	0.722	0.810
Major	Pearson Correlation	-0.108	-0.311	0.135	0.123
	Sig. (2-tailed)	0.569	0.095	0.478	0.518

**. Correlation is significant at the 0.01 level (2-tailed); *. Correlation is significant at the 0.05 level (2-tailed).

Table 17 Relationship between level of readiness and challenges of TLE teachers in public schools towards 21st century learing skills N = 30

		Challenges on Mastery of Subject Matter	**Challenges on Classroom Management**	**Challenges on Preparation of Learning Materials**	**Challenges on Teaching Strategies**
LOR on Mastery of Subject Matter	Pearson Correlation	0.137	0.280	0.111	-0.047
	Sig. (2-tailed)	0.471	0.134	0.561	0.807
LOR on Classroom Management	Pearson Correlation	-0.174	-0.251	-.488**	-.499**
	Sig. (2-tailed)	0.359	0.181	0.006	0.005
LOR on Preparation of Learning Materials	Pearson Correlation	0.011	0.031	-0.303	-0.264
	Sig. (2-tailed)	0.953	0.869	0.103	0.158
LOR on Teaching Strategies	Pearson Correlation	-0.033	0.013	-0.278	-0.185
	Sig. (2-tailed)	0.863	0.947	0.137	0.327

**. Correlation is significant at the 0.01 level (2-tailed).

Table 16 shows the relationships and significance between the teacher profile on age, sex, years teaching TLE, civil status, course, major and the challenges faced in four areas of 21st century learning skills, mastery of subject matter, classroom management, preparation of learning materials, and teaching strategies.

There is a moderate, negative, and statistically significant correlation between age and challenges on mastery of subject matter. This means that as TLE teachers get older, they tend to face fewer challenges regarding mastery of subject matter. In other words, older teachers are less likely to struggle with subject mastery compared to younger teachers.

For all other profile variables, sex, years teaching TLE, civil status, course, major and all other challenge areas, classroom management, preparation of learning materials, and teaching strategies, has no significant relationships found.

Relationship Between Readiness and Challenges of TLE Teachers in Public Schools Towards 21st Century Learning Skills

Table 17 reveals that among the various domains of teacher readiness. Only the level of readiness in classroom management shows a statistically significant relationship with the challenges faced by TLE teachers in public schools in relation to 21st-century learning skills. Specifically, there is a moderate negative correlation between readiness in classroom management and challenges in the preparation of learning materials as well as in teaching strategies, indicating that as teachers become more prepared in managing classrooms, they experience fewer challenges in these areas.

Other domains of readiness, such as mastery of subject matter, preparation of learning materials, and teaching strategies, did not show significant correlations with the challenges encountered.

5. Conclusion

The findings in the level of readiness, indicate that TLE teachers in public secondary schools in 4th district of Pangasinan possess a robust level of readiness to deliver 21st century learning skills across all examined areas. Their strong pedagogical foundation, ongoing commitment to professional growth, and focus on student-centered, relevant instruction position them well to nurture critical competencies-creativity, collaboration, communication, and critical thinking-among their learners. Nonetheless, the data also highlight areas for further enhancement, particularly in the confident integration of digital tools, advanced classroom management techniques, and technical skill mastery. Addressing these through targeted training and resource support will further empower TLE teachers to deliver high-quality, future-ready education that meets the evolving needs of students in the 21st century.

Other findings reveal that TLE teachers in public secondary schools in 4th district of Pangasinan are confronted with a complex array of challenges as they work to deliver 21st century learning skills. Key barriers include rapid technological change, inadequate resources, limited professional development, and the need to adapt to diverse and evolving student needs. These challenges impact all aspects of teaching-from subject mastery and classroom management to material preparation and instructional strategies. Despite these obstacles, TLE teachers remain committed to their roles as facilitators of learning. Addressing these challenges requires systemic support, increased access to updated resources and technology, ongoing professional development, manageable class sizes, and collaborative opportunities for sharing best practices. By providing these supports, schools can better empower TLE teachers to deliver high-quality, future-ready education that meets the demands of 21st century learners.

The absence of significant relationships between profile and readiness levels suggests that TLE teachers' preparation for 21st century teaching is relatively uniform across demographic groups. This uniformity may reflect the effectiveness of professional development programs, institutional support, or individual teacher initiative in preparing for modern educational demands.

While certain aspects of a teacher's profile, specifically age may influence the challenges faced in mastering subject matter, most challenges encountered by TLE teachers in public schools are universal and not strongly linked to demographic or educational background. This underscores the need for broad-based support systems and professional development opportunities that are accessible to all teachers, rather than interventions targeted solely based on profile characteristics.

Recommendations

Although the data did not show a significant correlation between readiness in subject matter and the challenges experienced, it is still essential to continuously update and deepen teachers' content knowledge. The researcher recommends the following:

- To conduct regular subject-specific training sessions, especially in rapidly evolving TLE areas such as ICT, agriculture, and entrepreneurship,
- To encourage TLE teachers to pursue higher studies or certifications relevant to their fields of specialization and facilitate collaborative learning communities or peer mentoring programs where teachers can share best practices and deepen their mastery through team teaching and curriculum alignment.

In terms of classroom management that showed a significant negative correlation with challenges in both teaching strategies and preparation of learning materials, the researcher recommends:

- To provide continuous professional development focused on positive behavior support, differentiated instruction, and proactive classroom routines;
- To implement mentoring programs where novice teachers are paired with experienced mentors to learn effective classroom control techniques; and
- Integrate simulated teaching sessions or role-playing during in-service training to allow teachers to practice and refine classroom management skills in a low-stakes environment.

In terms of preparing learning materials, many teachers still face difficulties in preparing relevant and engaging materials. The researcher recommends:

- To equip schools with sufficient teaching aids, ICT tools, and updated reference materials for TLE subjects;
- To provide training on designing learner-centered and competency-based instructional materials aligned with 21st-century skills; and
- To establish resource-sharing platforms where teachers can access and contribute learning materials and lesson plans.

Lastly, the significant link between classroom management readiness and teaching strategy challenges indicates that instructional success is intertwined with classroom dynamics. Therefore, the researcher recommends:

- To offer training in modern, student-centered teaching methodologies such as project-based learning, problem-solving approaches, and blended learning;
- To encourage the use of technology in the classroom to enhance interactivity and engagement monitor; and
- To evaluate teaching practices regularly, providing constructive feedback and support to ensure the continuous improvement of teaching strategies.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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