Original Research Article

Integrating 21st-Century Teaching Strategies in TVL Education in Tagum City, Philippines: Challenges and Opportunities

ABSTRACT

This study examines the integration of 21st-century teaching strategies in Technical Vocational Livelihood (TVL) education in Tagum City, Philippines, with a focus on inquiry-based, project-based, discovery, and problem-solving learning approaches. These strategies aim to enhance students' critical thinking, collaboration, and digital literacy —essential skills for a modern workforce. The researchers employed a convergent parallel mixed-methods design (Creswell et al., 2003). In this approach, quantitative (numerical) data were collected and analyzed first, followed by qualitative (textual) data to explain or elaborate on the quantitative findings. The quantitative phase employed a 5-point Likert scale survey to measure the frequency with which teachers use 21st-century teaching strategies, with scores categorized as follows: "Always" (93.75% or above), "Most of the time" (75% to 93.75%), "Sometimes" (50% to 74.99%), "Rarely" (25% to 49.99%), and "Never" (75% or less). Results showed that Project-Based Learning (M = 4.56), Discovery-Based Learning (M = 4.53), and Problem-Based Learning (M = 4.50) were rated “Very High,” while Inquiry-Based Learning (M = 4.36) was rated “High,” leading to an overall mean of 4.48 (“High”). These results indicate that TVL teachers frequently utilize these strategies in their practice. The qualitative phase, which involved in-depth interviews, provided insights into the challenges encountered. Teachers reported that the effectiveness of these strategies is hindered by limited tools and technology, insufficient professional development, and inconsistent student engagement due to behavioral and motivational issues. Despite these challenges, educators demonstrated adaptability by combining strategies and leveraging community partnerships. This mixed-methods approach (Rossman & Wilson, 1985) highlighted both the promise and limitations of integrating 21st-century teaching strategies in TVL education. The study emphasizes the need for increased resource investment, targeted TVL teacher training in the Philippines, and stronger collaboration among stakeholders to better prepare students for a technology-driven global workforce.

Keywords: 21st-century teaching strategies, Technical Vocational Livelihood education, inquiry-based learning, project-based learning, critical thinking, collaboration, digital literacy, teacher training, resource constraints, student engagement.

1. INTRODUCTION

In the 21st century, students should not only have good learning conditions but also be able to survive in an extremely changing and dynamic world. To develop basic skills that enable reasoning, critical and creative thinking, effective collaboration, and active engagement in a globally connected world (Ross, 2017). Effective teaching strategies are crucial for improving student performance. This is because the way teachers choose and implement these strategies significantly impacts students' attitudes, class performance, and the development of 21st-century learning (Blanca, 2019).

A study by Varas et al. (2023) revealed a significant lack of consensus in Latin America regarding 21st-century teaching strategies. While frameworks often highlight collaboration, critical thinking, communication, and creativity (the four Cs), particularly for TVL (Technical Vocational Livelihood) subjects with a strong technology component that requires digital literacy and communication skills, most teachers who taught different subjects, including TVL (Technical Vocational Livelihood) in the study, did not mention these specific skills. Even those who mentioned the four Cs reported using the same teaching strategies,

such as project-based learning, discussions, literacy strategies, and group work, regardless of the skill being addressed, to enhance 21st-century learning.

In Malolos, Bulacan, a gap exists between students and the 21st-century teaching strategies used by teachers. Despite teachers reporting high efficacy in these methods, some believe their focus on holistic development may prevent students from fully acquiring competencies. Experienced teachers may also misjudge student needs by assuming the subject is easy (Santos, 2017).

This study will explore effective 21st-century teaching strategies in Technical Vocational Livelihood (TVL) Education for Senior High School in Tagum City, DepEd. The goal is to identify methods that promote critical thinking, problem-solving, and digital literacy (Ezenwafor, 2015; Lear et al., 2019). The research will examine how teaching practices can be improved to better prepare students for the evolving 21st-century workplace (Glinel, 2020).

2. OBJECTIVES

This research aims to investigate the effectiveness and experiences of various 21st-century teaching strategies (specifically Inquiry-based, Project-based, Discovery, and Problem-solving learning) in the teaching-learning process at Tagum City Public Schools, offering the Technical-Vocational Livelihood (TVL) track.

This study seeks to accomplish the following objectives:

- To identify the frequency and extent of utilization of specific 21st-century teaching strategies (namely, Inquiry-based, Project-based, Discovery, and Problem-solving learning) by teachers in the Technical-Vocational Livelihood (TVL) track in Tagum City Public Schools.
- To determine the perceived effectiveness of these 21st-century teaching strategies in enhancing the teaching-learning process and skill acquisition within the TVL programs in Tagum City Public Schools.
- To explore and analyze the experiences, challenges, and opportunities encountered by TVL teachers in implementing the four specified 21st-century teaching strategies in their respective fields of specialization.

Research Questions

Specifically, this study seeks answers to the following questions:

1. What are the most frequent teaching strategies used in 21st-century learning in Teaching and Learning Technical and Vocational Education through these strategies?
   1.1. Inquiry-based learning
   1.2. Project-based learning
   1.3. Discovery learning
   1.4. Problem-solving learning
2. What are the experiences of TVL teachers regarding 21st-century teaching strategies in the teaching-learning process?
3. What intervention plan will be implemented after gathering and interpreting the data? How will it be implemented?

3. MATERIALS AND METHODS

Research Design

To gain a comprehensive understanding of effective teaching strategies for 21st-century learning in Technical Vocational Livelihood (TVL), this study employed a convergent parallel mixed-methods design. According to Taherdoost (2022), a mixed-method design combines both quantitative and qualitative techniques. In this design, quantitative and qualitative data were collected simultaneously and then integrated to provide a more comprehensive understanding of the study. The researcher aims to triangulate the methods by directly comparing the quantitative statistical results and qualitative findings (Creswell & Clark, 2011). During the research process, two data sets were obtained, analyzed separately, compared, and gathered, and the quantitative (numerical) information was analyzed. The qualitative (text) data were collected and processed to explain or elaborate on the result. The reasoning behind this technique was that quantitative data and subsequent analysis provided a broad grasp of the study subject. The qualitative data

and analysis clarified and explained those statistical results by studying participants' viewpoints in greater depth (Creswell et al., 2003).

This study used a mixed-methods approach to examine 21st-century teaching strategies. A quantitative Likert survey was distributed to Technical Vocational Livelihood (TVL) teachers to collect data on the frequency and perceived effectiveness of their teaching strategies. This was supplemented by in-depth, open-ended interviews to gather qualitative insights on their experiences and perceptions of integrating 21st-century skills. By combining these two methods, the study aims to provide a complete picture of how to optimize teaching strategies for TVL students.

Research Instrument

The researchers employed a convergent parallel mixed-methods design. In this approach, quantitative (numerical) data is collected and analyzed first. Subsequently, qualitative (textual) data is gathered and processed to explain or elaborate on the quantitative findings (Creswell et al., 2003).

The study's quantitative phase employed a 5-point Likert scale survey to measure the frequency with which teachers use 21st-century teaching strategies. Scores were categorized from "Always" (scores of 93.75% or above) to "Never" (scores of 75% or less). The qualitative phase involved in-depth interviews to explore teachers' perceptions of the effectiveness of these strategies and the challenges they faced. This mixed-methods approach integrated both quantitative data and qualitative insights to provide a comprehensive understanding of the topic (Rossman & Wilson, 1985).

Respondents of the Study

The study utilized purposive sampling to select all senior high school Technical Vocational Livelihood (TVL) teachers from public schools in Tagum City (Etikan et al., 2016). Participants completed a quantitative survey on their demographics and attitudes toward teaching strategies. A smaller group of teachers also participated in in-depth interviews to share their personal experiences. This mixed-methods approach, which combines quantitative and qualitative data, was used to provide a comprehensive view of TVL teachers' perspectives on 21st-century teaching (Fung, 2017; Renwick, 2022).

Data Gathering

For the quantitative phase, the researchers first secured permission from the school dean or head. They then administered a Likert scale survey to all Technical-Vocational-Livelihood (TVL) teachers in the schools, using purposive and total enumeration sampling. This survey measured the use of various teaching strategies, including Inquiry-Based, Project-based, Discovery-Based, and Problem-Solving Approaches. After the data were collected face-to-face, they were carefully managed to ensure accuracy and confidentiality before being analyzed.

For the qualitative phase, the researchers used interviews and classroom observations to gain deeper insights. After getting permission from school administrators, they coordinated with selected teachers who consented to participate, ensuring ethical standards were met. The interviews used open-ended questions to explore teachers' experiences and challenges. The observations helped validate this information by letting researchers see the strategies in action. All data was systematically documented and transcribed to provide a complete picture of the findings.

4. RESULTS AND DISCUSSION

Different 21st-century teaching strategies used by the teacher in Technical Vocational Livelihood Education

Table 1. Summary of the Different 21st Century Teaching Strategies Utilized in Technical Vocational Livelihood Education

Indicators	Mean	Description
Inquiry-Based Learning	4.36	High
Project-Based	4.56	Very High
Discovery-Based	4.53	Very High
Problem-Based	4.50	Very High
Overall mean	4.48	High

Table 1 highlights the utilization of 21st-century teaching strategies—Inquiry-Based, Project-Based, Discovery-Based, and Problem-Based Learning—with an overall mean score of 4.48, indicating a consistently high level of implementation. Inquiry-Based Learning (4.36) fostered curiosity and critical thinking through exploration and questioning, while Project-Based Learning (4.56) stood out for its real-world applications and student engagement in meaningful projects. Discovery-Based Learning (4.53) emphasized self-directed exploration, and Problem-Based Learning (4.50) promoted collaborative problem-solving and application of knowledge to real-world challenges. Collectively, these results underscore the strong emphasis on student-centered approaches that cultivate critical thinking, collaboration, and practical skills. These findings align with Kumar et al. (2019), Bruce (2016), and Boholano (2017), who emphasize that modern education requires diverse and innovative strategies—supported by technology—to actively engage learners, balance knowledge with skills, and prepare students for success in the 21st century.

Inquiry-Based Learning

Inquiry-Based Learning in Technical-Vocational Livelihood (TVL) Education was implemented at a high level, as reflected in the overall mean score of 4.36. The highest indicator (mean = 4.75) was on observing students apply new skills, highlighting the strong emphasis on active, student-driven learning. On the other hand, asking students to use labels provided in class had the lowest mean (4.08), showing an area for improvement. These results indicate that teachers encourage students to explain concepts and definitions in their own words, which aligns with Mariano (2017), who emphasized that inquiry-based learning stimulates student interest and deepens understanding beyond lectures and memorization. Similarly, Hamdan et al. (2022) found that inquiry-based learning enhances conceptual knowledge, inquiry skills, and soft skills. Overall, the findings suggest that Inquiry-Based Learning in TVL promotes critical thinking, independent exploration, and skill development, though certain areas, such as guided labeling, could be improved.

Project-Based Learning

Project-Based Learning (PBL) emerged as the most highly utilized strategy with an overall mean of 4.56, categorized as very high. The highest item (mean = 4.81) showed that teachers helped students understand why information was given to projects, signifying the importance of clarifying project purposes in fostering comprehension and engagement. This reflects how students achieve deeper learning by working on complex, open-ended, and decision-making activities that enhance problem-solving and creativity. As Syawaludin et al. (2022) highlight, PBL involves projects developed around student-defined difficulties and demands, making the learning process authentic and meaningful. The findings strongly suggest that PBL effectively integrates knowledge with real-world applications, thereby promoting student engagement, collaboration, and critical thinking, ultimately contributing to more impactful learning experiences.

Discovery-Based Learning

Discovery-Based Learning was also highly implemented, with an overall mean of 4.53. The highest mean (4.80) indicated that teachers effectively provided tools and resources to support interactive and hands-on learning. However, some areas, such as providing sufficient resources for data collection (mean (4.25) and verifying findings through further research received comparatively lower scores, indicating areas where support could be enhanced. This aligns with Karan (2023), who emphasizes that discovery-based learning enables students to explore and solve challenges through experimentation, thereby fostering critical thinking and retention. In TVL classrooms, teachers have successfully provided the means for interactive and experiential learning, although resource adequacy and research verification remain areas that need attention. The overall findings show that Discovery-Based Learning cultivates problem-solving and critical thinking, aligning well with its intended principles.

Problem-Based Learning

Problem-Based Learning (PBL) achieved an overall high mean score of 4.50, highlighting its effective use in fostering collaboration. The highest mean (4.69) was on encouraging students to collaborate and share ideas to solve problems, demonstrating that TVL teachers promote teamwork and collective problem-solving. This approach fosters skills aligned with 21st-century competencies, particularly collaboration and critical problem-solving. However, the lowest mean (4.17) was found in assigned independent research projects, indicating a need to strengthen student autonomy and initiative in self-directed learning. Nilsen and Gustafsson (2016) support this by noting the positive relationship between cooperative teaching practices and student engagement. Overall, the findings emphasize that while

collaboration is a strong aspect of Problem-Based Learning, encouraging independence and self-reliance through research activities is equally essential for a balanced instructional approach.

The specific activities employed by the Technical-Vocational-Livelihood (TVL) teachers in using 21st-century teaching strategies in the teaching-learning process.

Following a thorough analysis of participants' responses to their experiences with Technical-Vocational Livelihood within the teaching and learning process, ten prominent themes were identified in the context of inquiry-based learning: 1) Student Engagement, 2) Student-driven Inquiry, 3) Project-based Learning, 4) Hands-on Learning, and 5) Practical Experience. In terms of discovery-based learning, the identified themes included 6) Student Autonomy, 7) Critical Thinking, and 8) Real-world Learning. Additionally, the themes associated with problem-based learning focused on 9) Problem-solving skills, and 10) The Role of the Teacher as Facilitator.

Table 2. Themes and Core Ideas of the Specific Activities Employed by Technical-Vocational-Livelihood (TVL) Teachers in Using 21st-Century Teaching Strategies in the Teaching-Learning Process.

Major Themes	Core Ideas
Student engagement	• Asking students to share their experiences • Motivating students to share their thoughts and ideas. • Share their thought or ideas on a problem.
Student-driven inquiry	• Teacher employs a creative reporting style • Learners formulating their learning.
Hands-on Learning	• Teachers do an activity where students need to learn hands-on by creating and developing. • Students need to have demonstrations and actual procedures. • The demonstrations and performances were followed immediately to upskill the students.
Practical Experience	• There is learning by doing, with more practical demonstrations. • Students learn by themselves through experience.
Experiential Learning	• Employing experiential learning for students to learn through experiences. • Students have an innovation that is not found in the book.
Student autonomy	• Letting the students do what they wanted because they wanted to discover. • Discovering terminologies through experience
Critical thinking	• Finding solutions independently with minimal instructions. • Discovering using technology with minimal instructions.
Real-world learning	• Trial and error while establishing clear boundaries to ensure students do not damage the equipment. • Learning outside the institutions.
Problem-solving skills	• Solving problems using common sense • Problem-solving skills when applying interpersonal and intrapersonal skills.
Teacher as facilitator	• Guide students in solving a problem • Measuring and justifying outputs based on the teacher-provided inputs.

Table 2 above presents the themes and core ideas based on Research Question 2, highlighting the specific activities employed by Technical-Vocational-Livelihood (TVL) teachers in using 21st-century teaching strategies in the teaching-learning process.

Student Engagement

The research findings highlighted student engagement as one of the most rewarding experiences in Technical and Vocational Livelihood Education (TVLE). Teachers observed that students who actively participated in class discussions and collaborative activities developed a deeper understanding and

stronger critical thinking skills. Engagement was fostered through real-world activities, peer-to-peer interactions, and dynamic strategies that encouraged active participation, making learning more relevant to students' experiences. Jaca (2023) emphasized the importance of collaborative learning in TVLE, stressing that real-world applications and peer engagement not only captivate learners but also prepare them with essential skills for the workforce. This highlights that student engagement is a vital component in developing 21st-century competencies and enhancing overall academic and professional readiness.

Student-Driven Inquiry

Another significant finding was the role of student-driven inquiry in fostering independent and meaningful learning. Teachers implemented strategies such as creative reporting styles and opportunities for students to define their own learning goals, which encouraged students to take ownership of the learning process. This learner-centered approach promoted critical thinking and empowered students to pursue topics aligned with their interests. As Mduwile and Goswami (2024) noted, active learning strategies—such as discussions, group projects, and hands-on activities—enhance student involvement, teamwork, and the application of knowledge. This shift to inquiry-driven approaches underscores the increasing importance of autonomy and engagement in equipping students with the skills necessary for lifelong learning and success.

Hands-on Learning

Hands-on learning was a central strategy in TVL classrooms, with teachers emphasizing activities such as performances, demonstrations, and real-world projects. These approaches enabled students to connect theoretical knowledge with practical applications, thereby enhancing their critical thinking, problem-solving, and creativity. Teachers reported that project-based learning provided students with authentic opportunities to confront challenges and apply their knowledge in meaningful ways. Supporting this, Kimani (2024) found that implementing project-based strategies fosters considerable gains in critical thinking, collaboration, and communication skills. By engaging in authentic tasks, students not only enriched their learning experience but also developed competencies necessary for their future careers.

Practical Experience

The findings further emphasized the integration of practical experience into TVL lessons. Teachers often employed demonstrations, simulations, and real-world tasks that allowed students to practice essential skills directly. Such experiences reinforced problem-solving and encouraged students to engage in active, skill-based learning. Herald (2024) emphasized that practical experiences are vital for employability and productivity, equipping learners with competencies that are immediately applicable in various professions. Similarly, Alejandro and Bucad (2024) pointed out that TVL students' readiness depends heavily on practical skills that prepare them for careers and lifelong adaptability. Thus, practical experience serves as a foundation for bridging classroom learning with the demands of the workforce.

Experiential Learning

Experiential learning was also highlighted as a vital teaching strategy, where students learned by experimenting and discovering solutions. Teachers encouraged exploration, creativity, and problem-solving through trial-and-error approaches, fostering active engagement. Tingzon and Buyok (2022) stressed that teachers serve as facilitators in experiential learning, guiding students through processes while allowing them to take ownership of outcomes. Teachers noted that creating space for students to deviate from rigid requirements enhanced discovery and deeper understanding. This approach illustrates how experiential learning encourages independence, innovation, and critical thinking while grounding learning in real-world applications.

Student Autonomy

Student autonomy emerged as an important theme, particularly within discovery-based learning. Teachers recognized the importance of giving students the freedom to explore independently, even when challenges arose. This autonomy encouraged deeper engagement and a stronger sense of responsibility for learning outcomes. Tom (2023) highlighted that this strategy involves providing students with questions or challenges and allowing them to discover solutions independently, with the teacher serving as a guide. By fostering autonomy, teachers helped students develop confidence, initiative, and resilience—skills essential for personal growth and 21st-century success.

Critical Thinking

The study also showed that students were often encouraged to solve problems independently, demonstrating their ability to think critically and apply knowledge effectively. Teachers reported that minimal instruction sometimes prompted students to take greater initiative, allowing them to develop flexibility in problem-solving. Zackariasson (2019) emphasized that supervisors can encourage critical thinking by using contingent questioning and providing minimal yet strategic guidance, thereby prompting students to take responsibility for their own learning. These findings underscore the importance of cultivating independence and problem-solving capacity to prepare students for real-world complexities.

Real-World Learning

Real-world learning was another central theme, as teachers emphasized the connection between classroom knowledge and practical applications. By integrating real-life scenarios, simulations, and problem-solving tasks, students were better able to transfer skills to future careers and daily life. Teachers acknowledged that while discovery learning allowed valuable mistakes, it also required careful resource management to avoid risks. Khabeishvili (2024) highlighted the importance of shifting education toward active, collaborative, and critical learning environments, while Aflatoony et al. (2017) demonstrated how design-thinking approaches enhance real-world application of knowledge across disciplines. These findings suggest that real-world learning is vital for equipping students with transferable skills, adaptability, and creativity.

Problem-Solving Skills

Problem-solving skills were found to be essential outcomes of TVL strategies, encompassing both analytical and interpersonal abilities. Teachers observed that students who practiced systematic problem-solving—identifying issues, generating solutions, and applying knowledge—developed confidence and adaptability in various contexts. Bariyyah (2021) described problem-solving as a structured process requiring both analytical reasoning and informed decision-making, while Choudhar et al. (2022) emphasized its increasing necessity in today's fast-paced world. These insights highlight that problem-solving is not only an academic competency but also a vital life skill for navigating personal, professional, and societal challenges.

Teacher as Facilitator

Finally, the role of the teacher as a facilitator was highlighted as central to 21st-century education. Teachers guided students through problem-solving tasks while encouraging independence and accountability for learning outcomes. This approach struck a balance between support and autonomy, ensuring students had both direction and the freedom to explore solutions. Hattie and Donoghue (2016) emphasized that teachers adopting a facilitative role foster student ownership of learning, while Baker et al. (2020) stressed the importance of accountability in justifying outcomes. By acting as facilitators, teachers nurtured critical thinking, creativity, and responsibility, preparing students for the complexities of real-world problem-solving.

Challenges and Coping can be proposed based on the findings

After analyzing and scrutinizing the responses of the participants about the challenges and which coping can be proposed based on the findings of the results, 7 significant themes were identified: in Challenges, 1) Lack of Physical Resources, 2) Financial Constraints, 3) Lack of Critical Thinking 4) Lack of Interest and in coping 5) Adaptive Support 6) Collaborative Learning and 7) Parental Involvement.

Table 3. Themes and Core Ideas of the Challenges and Coping of Technical Vocational Livelihood Teachers

Major Themes	Core Ideas
Lack of Physical Resources	• Lack of tools and equipment in the food and beverage industry • Lack of tools in motor servicing • Lack of bedding
Financial Constraints	• Lack of money for purchasing materials • Limitation of finances
Lack of critical thinking	• Students do not think about finding solutions • Lack of common sense. • Learners struggle to keep up with the lesson

Lack of interest	• Not complying with the task. • Students do not pay attention
Adaptive support	• Adjusting the learner's situation • Teacher provides resources
Collaborative Partnership	• Support from a partner institution • Provided tools and materials by the government
Parental involvement	• Parents as primary support • Parental consent to the accomplished task.

Table 3: The table above presents the themes and core ideas based on Research Question 3, highlighting the challenges and coping mechanisms of the teachers.

Lack of Physical Resources

The lack of physical resources in Technical-Vocational-Livelihood Education (TVLE), particularly in areas such as Food and Beverage Services (FBS) and Motor Servicing, poses significant challenges in providing students with authentic, hands-on learning experiences. Teachers struggle to demonstrate technical procedures due to the absence of essential tools and equipment, which limits students' skill development and preparation for real-world applications. Studies confirm that insufficient materials and facilities significantly hinder effective TLE instruction (Pamor et al., 2024; Gregorio, 2016; Basal, 2022), underscoring the urgent need for greater investment in educational resources to ensure competency-based learning outcomes.

Financial Constraints

Financial constraints pose significant barriers to teaching and learning, as many students lack the means to purchase the required materials for projects and practical activities. This situation prevents them from fully engaging in project-based learning, which relies heavily on materials for demonstrations and outputs. Teachers emphasize the importance of considering students' economic conditions to ensure inclusivity and fairness, while studies (Capó Vicedo et al., 2021) affirm that the inability to afford educational resources hinders participation, limits skill development, and poses equity challenges in delivering quality education.

Lack of Critical Thinking

Teachers note that many students demonstrate limited critical thinking skills, often preferring to be "spoon-fed" instead of independently analyzing and solving problems. This reliance on external guidance weakens their reasoning, creativity, and decision-making abilities, which are vital for both academic success and real-world readiness. Critical thinking, a key requirement of 21st-century teaching strategies, enables students to evaluate information and develop logical solutions, yet educators continue to face challenges in fostering these skills (Abdulazeez & Ali, 2021), highlighting the need for intentional strategies to strengthen problem-solving and independent learning.

Lack of Interest

A lack of interest among students presents challenges in maintaining engagement and motivation in the learning process. Teachers observe delayed submissions, weak task compliance, and difficulty keeping up with lessons, all of which hinder the mastery of concepts and participation in active learning. This passivity undermines strategies that rely on collaboration and critical thinking, as students gravitate toward rote memorization and grade-driven approaches (Nagashibaevna, 2019; Omela & Martin, 2020; Du et al., 2020). Addressing this challenge requires innovative motivational approaches that can spark curiosity and sustain student involvement.

Adaptive Support

Adaptive support highlights teachers' efforts to adjust teaching strategies and resources to accommodate students' diverse needs and circumstances. Educators demonstrate fairness and inclusivity by considering students' situations in decision-making, providing alternative learning resources, and ensuring equitable access despite limitations. Research (Gordon et al., 2016) stresses the importance of addressing equity in learning environments, underscoring that adaptive support enables teachers to foster inclusivity and create opportunities for all students to succeed, even in resource-constrained contexts.

Collaborative Partnership

Collaborative partnerships between schools, local governments, and external institutions play a vital role in bridging gaps in resources and support for education. Teachers acknowledge the City Government of Tagum's contributions, including consumables, tools, and free assessments, which enhance the delivery of technical and vocational education. Studies (Harris & Jones, 2019; Ogunbiyi, 2017; Gipit et al.,
2020) affirm that schools cannot independently meet all their resource needs, making partnerships with government and community institutions essential for sustaining educational quality and enabling the effective implementation of 21st-century teaching strategies.

Parental Involvement

Parental involvement is a key factor in supporting students' education, as parents serve as primary partners in addressing resource gaps and enhancing learning experiences. Teachers highlight how parents contribute by providing materials, granting consent for activities, and assisting in supplementary tasks that strengthen the school-home connection. Research (Epstein, 2018) emphasizes that parental support—whether financial, emotional, or practical—significantly contributes to student success, helping them overcome academic challenges and promoting shared responsibility for educational outcomes.

Table 4. Joint Display of Salient Quantitative and Qualitative Data

	Quantitative Data Findings	Qualitative Data Findings	Data Integration
Inquiry-based learning	Table 1 reported the highest means on the following: Item 10: observed students as they applied new skills. (M= 4.75)	Student Engagement	The findings highlight the importance of inquiry-based learning and student engagement in Technical and Vocational Livelihood Education (TVLE). Quantitative data (M = 4.75) demonstrate the effectiveness of observing students apply new skills, highlighting the role of teacher monitoring in enhancing engagement. Qualitative insights from IDI_1, IDI_2, and IDI_5 emphasize the benefits of collaborative strategies, such as sharing experiences and problem-solving, which foster critical thinking and peer learning. These results indicate that student engagement is vital for developing 21st-
	Item 9: observed students as they applied new concepts. (M=4. 51)	Student-driven inquiry	Quantitative and qualitative findings highlight the importance of student-driven inquiry in TVL education. A high mean (M = 4.51) for Item 9 shows that teachers frequently observe students applying new concepts, which aligns with qualitative insights emphasizing learner-centered approaches. Teachers employ strategies such as "creative reporting" and collaborative problem-solving to empower students to take ownership of their learning, as noted by IDI_5 and IDI_2. These findings demonstrate that student-driven inquiry fosters engagement, critical thinking, and independence, confirming its value in preparing students for real-world challenges and 21st-century teaching and learning.

	Table 1 reported the lowest means on the following: Item 7: expected students to use the labels provided in class. (M=4.08)	Critical Thinking	The findings reveal a contrast in TVL education between structured guidance and student independence. Quantitative data show that students prefer structured support, with the lowest mean score indicating a lesser reliance on labels in class. In contrast, qualitative observations highlight students' initiative and problem-solving with minimal instructions, suggesting the benefits of unstructured learning. Overall, the results indicate a need for a balance between providing guidance and fostering independence in education.
Project-based learning	Table 2 reported the highest means on the following: Item 2: helped students understand why information was given to the project. (M=4.81)	Experiential learning	The findings underscore the importance of experiential learning in TVL education, highlighting both teacher guidance and student autonomy. Quantitative results (M = 4.81) indicate that teachers play a crucial role in helping students understand project objectives. Qualitative insights emphasize the need for creativity and problem-solving through hands-on activities, like design experimentation and project-based tasks. This balance between structured guidance and independent exploration is vital for skill development and real-world application.
	Item 3: helped students learn to conclude a given project. (M=4.65)	Practical Experience	The results highlight the importance of practical learning in education, as evidenced by a high mean score (M = 4.65), which reflects the effectiveness of hands-on strategies in facilitating student project completion. The quantitative data support this claim, while qualitative insights highlight the role of practical demonstrations in bridging the gap between theory and practice. Additionally, it emphasizes the significance of experiential learning both in the classroom and through real-world experiences.
	Table 2 reported the lowest means on the following: Item 10: related their observation to their previous project. (M=4.45)	Hands-on learning	The quantitative and qualitative data align in recognizing that students struggle with connecting observations to previous projects, as reflected by the low mean score of M = 4.45. However, the qualitative findings suggest that project-based learning involving hands-on activities and real-world applications can improve students' ability to make these connections. Teachers' use of performance-based demonstrations and practical learning strategies can help students relate current experiences to past projects identified in the quantitative data.

Discovery-based learning	Table 3 reported the highest means on the following: Item 4: Provide tools and resources for interactive learning. (M=4.80)	Adaptive support	Discovery-based learning and adaptive support underscore the importance of equitable resources and inclusivity in education. Quantitative data (M = 4.80) indicate the effectiveness of providing tools for interactive learning, while qualitative insights reveal teachers' strategies, such as assessing student needs and offering alternative resources, to foster participation. Despite challenges like limited student reciprocation, these findings underscore the importance of adaptive support in facilitating discovery-based learning and meeting diverse student needs.
	Item 3: Created learning experiences that directly build career skills. (M=4.75)	Real-world learning	Real-world learning focuses on career-oriented educational experiences that equip students with transferable skills. Quantitative data (M = 4.75) support the effectiveness of integrating real-world applications in education. Qualitative insights from teachers emphasize the need to balance exploration with resource consciousness. While discovery learning promotes learning from mistakes, it also poses risks, such as equipment damage, necessitating
	Table 3 reported the lowest means on the following: Item 9: Provided sufficient resources for data collection activities. (M=4.25)	Collaborative partnership	The quantitative and qualitative data underscore the crucial role of collaborative partnerships in addressing educational resource gaps. A mean score of 4.25 for Item 9 indicates a lack of sufficient resources for data collection, pointing to a need for improvement. Educators express gratitude for support from the City Government of Tagum, which provides consumables and free student assessments. However, teachers still rely on external institutions to fill some gaps, indicating that the resources offered are not entirely sufficient. This underscores the necessity for ongoing support to fully meet the material and financial needs of educational institutions. While partnerships are essential for bridging these gaps, there is a continuous need to strengthen connections to ensure adequate resources for effective teaching and learning.

Problem-based learning	Table 4 reported the highest means on the following: Item 5: Encourage students to work together and share ideas to solve problems. (M=4.69)	Problem-solving skills	Students report a high mean score of M = 4.69 for collaboration in problem-solving, supported by qualitative findings that highlight the importance of interpersonal skills, such as common sense and effective communication. Both data sets emphasize the value of teamwork and effective problem-solving skills.
	Item 2: Ensure that problem-solving exercises align with curriculum and industry objectives. (M=4.67)	Teacher as facilitator	The quantitative data from Item 2, with a mean score of M = 4.67, indicate that students perceive problem-solving exercises as well-aligned with curriculum and industry objectives, underscoring the significance of meeting educational standards. This is supported by qualitative findings that highlight the teacher's role in guiding students through problem-solving while promoting accountability. Both data sets emphasize a balanced approach: the quantitative data focuses on alignment, while the qualitative insights reveal the teacher's role in fostering autonomy and independent problem-solving skills.
	Table 4 reported the lowest means on the following: Item 8: assigned independent research projects. (M=4.17)	Financial constraints	Quantitative data indicate a mean score of M = 4.17, suggesting moderate student engagement in independent research projects. However, qualitative findings reveal that financial constraints hinder material acquisition, which in turn affects project completion and student engagement. Both data highlight challenges in project-based learning, with qualitative insights emphasizing financial barriers.

Illustrated in Table 4 is the joint display of data and information gathered for both quantitative and qualitative results, specifically the Convergent Parallel Design. The joint display of quantitative and qualitative data in Table 3 illustrates key findings on inquiry-based learning, project-based learning, discovery-based learning, and problem-based learning within Technical Vocational Livelihood Education (TVLE). Quantitative results highlight high mean scores for teacher observations, such as monitoring students applying new skills (M = 4.75) and understanding project objectives (M = 4.81), underscoring the importance of structured guidance and experiential learning. Qualitative data reinforces these findings, highlighting strategies such as collaborative problem-solving, hands-on activities, and adaptive support to foster critical thinking, independence, and real-world application. However, lower mean scores, such as reliance on provided labels (M = 4.08) and resource sufficiency (M = 4.25), reveal challenges in balancing teacher guidance with student independence and addressing persistent resource gaps. Discovery-based learning, with tools for interactive activities (M = 4.80) and problem-solving exercises aligned with curriculum objectives (M = 4.67), further highlights the integration of 21st-century skills through innovative teaching strategies.

Both data sets emphasize the role of teacher facilitation, adaptive support, and external partnerships in addressing challenges while advancing student engagement, practical skill development, and alignment with industry standards in Technical Vocational Livelihood. Magulod (2019) emphasizes the importance of understanding students' learning styles to tailor instruction and enhance academic outcomes, while Rahim and Oh (2024) argue that effective 21st-century teaching often requires substantial resources, including access to technology and ongoing professional development for instructors. Many schools, particularly in disadvantaged areas, struggle to provide these critical resources,

which creates disparities in educational quality and access. Similarly, Crosswell and Beutel (2017) stress that in the 21st century, teachers' roles have become increasingly complex due to heightened accountability, bureaucratic obligations, and public scrutiny. Therefore, Table 3 highlights that while teacher guidance, collaborative problem-solving, and discovery-based strategies effectively promote 21st-century skills, challenges remain in resource sufficiency, student independence, and the growing demands placed on educators.

5. CONCLUSIONS AND RECOMMENDATIONS

Conclusion

The study's conclusion reveals that the level of utilization of 21st-century teaching strategies among Technical Vocational Livelihood (TVL) teachers in Tagum City is high, as indicated by the quantitative results. Teachers frequently employ inquiry-based, project-based, discovery, and problem-solving learning strategies in 21st-century teaching. These strategies are effective in fostering critical thinking, problem-solving, and practical skills, as supported by qualitative data that highlight teachers' positive experiences with these strategies.

The qualitative findings also align with the quantitative results, illustrating the consistent use and perceived effectiveness of these strategies in real-world applications. The themes emerging from the qualitative data include learner-centered strategies, such as project-based and inquiry-based learning, which focus on active student engagement through hands-on activities and experiential learning. Another prominent theme is resource challenges, with teachers reporting insufficient tools and financial constraints that hinder the effective implementation of their programs. Additionally, themes of student engagement and inclusivity reflect concerns about variability in students' interests and the need for better support systems for diverse learners.

Overall, both the quantitative and qualitative findings converge to demonstrate that while TVL teachers effectively use 21st-century teaching strategies, significant challenges remain. Addressing these challenges through resource provision, stakeholder support, and professional development will enhance the alignment of teaching practices with the goals of 21st-century learning.

Recommendation

To maintain and improve teaching strategies, Technical-Vocational Livelihood teachers should continue to utilize 21st-century teaching strategies, such as inquiry-based, project-based, discovery, and problem-solving learning, which have been found to be effective in fostering critical thinking, problem-solving, and practical skills. Regular professional development and training programs are crucial for keeping teachers informed about innovative practices and emerging technologies. Encouraging collaboration among educators can also foster the exchange of best practices and promote continuous improvement.

Specifically, educators should integrate modern tools and digital resources into their teaching to enhance engagement and align with 21st-century learning goals. Institutions should address resource gaps by providing adequate tools, equipment, and financial support to ensure the effective implementation of teaching strategies. Policymakers should prioritize funding for TVL programs and establish partnerships with industries and stakeholders to enrich the curriculum and provide real-world learning opportunities.

Moreover, schools should promote inclusivity by implementing support systems for students with diverse needs and fostering parental involvement to enhance student motivation and engagement. By addressing these areas, teaching effectiveness can be significantly enhanced, ensuring that students are better prepared for the challenges of the modern workforce.

For Future Researchers. The rapidly evolving demands of the 21st century have transformed the educational landscape, underscoring the need for innovative teaching strategies in technical and vocational education. This study has illuminated the effectiveness of strategies such as project-based, inquiry-based, and discovery-based learning in fostering critical thinking, problem-solving, and career readiness among students. However, there is a significant area of unexplored potential that future research can address. The same study will be conducted in other localities to counter-verify the teachers' implementation of 21st-century teaching strategies, as there is a contradiction between the findings of quantitative and qualitative research.

One critical area for future research is the long-term impact of 21st-century teaching strategies on students' employability and professional success. While current studies highlight the immediate

benefits of these strategies in skill development and engagement, longitudinal studies could examine how they influence students' adaptability, creativity, and competence in real-world work environments. Such research could help refine these strategies to better align with industry demands and workplace expectations.

Another avenue for exploration is the role of teacher professional development in implementing these strategies. Research could investigate the effectiveness of various training programs in equipping educators with the necessary skills to implement innovative strategies, particularly in technical and vocational education. This could include examining the challenges teachers face in integrating these strategies and identifying best practices for overcoming these barriers.

Additionally, comparative studies between traditional and modern teaching strategies in technical and vocational settings could provide deeper insights into their relative advantages. This includes understanding how resource availability, institutional support, and cultural factors influence the effectiveness of these strategies. Such research would be particularly valuable in addressing regional disparities and ensuring equitable access to quality education.

In conclusion, while the current study underscores the significant benefits of 21st-century teaching strategies, there is a pressing need for further research to explore their broader and long-term implications. By examining their impact on employability, the effectiveness of teacher training programs, and comparing them with traditional strategies, as well as the role of emerging technologies, future studies can provide a comprehensive framework for enhancing technical-vocational education. These efforts will ensure that students are not only equipped with the necessary skills for today's workforce but also prepared to adapt to the ever-changing demands of the global job market.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that they have no known competing financial interests, non-financial interests, OR personal relationships that could have appeared to influence the work reported in this paper.

Disclaimer (Artificial Intelligence)

The Authors hereby declare that generative AI technologies, such as Large Language Models, etc., have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology, as well as all input prompts provided to the technology.

Details of the AI usage are given below:

1. **Tool Used:** ChatGPT (OpenAI)

Version/Model: GPT-4

Source: https://chatgpt.com/

Purpose of Use and Prompts:

- **Data Integration and Deep Understanding:** Used to assist in integrating and exploring data findings to deepen understanding of the study's implications.
    - **Prompt:** "Given the qualitative findings and the quantitative findings results, what potential overarching themes or relationships should I consider for deeper analysis?"

    - **Prompt:** “Based on the collected data, generate possible interpretations or frameworks to explain the observed patterns?”

- **Clarity and flow Improvement:** Used for enhancing the clarity, coherence, and flow of the text, specifically within the introduction and discussion sections.
    - **Prompt:** “Review the following paragraph from the introduction and suggest ways to improve its logical flow and academic tone.”
    - **Prompt:** “Refine the language of this discussion to ensure a clear and concise presentation of the study’s implications.”

2. **Tool Used:** Google Gemini

Version/Model: Gemini 2.5 Flash

Source: https://gemini.google.com/

Purpose of Use and Prompts:

- **Literature Summary and Synthesis:** Utilized for summarizing and synthesizing existing literature and findings to aid in a comprehensive understanding of the research.
    - **Prompt:** “Summarize the main arguments and findings from recent studies on a topic related to the literature review.”
    - **Prompt:** “Synthesize the key points from these research abstracts to identify common methodologies and conclusions.”

3. **Tool Used:** Grammarly (Grammarly Inc.)

Version/Model: Premium/Free Grammarly

Source: https://www.grammarly.com/

Purpose of Use: Used for general language refinement, grammar correction, spelling verification, punctuation accuracy, and the overall clarity and flow of the manuscript. Additionally, in the case of tools like Grammarly, specific prompts are generally not provided, as it operates as an automated editing system.

The authors confirm that all content generated or modified with the assistance of the aforementioned AI tools has been carefully reviewed, critically assessed, and significantly revised by the human authors. The authors attest that the final content accurately represents their original research, analysis, and conclusions, and they assume full responsibility for the intellectual content and integrity of the published manuscript.

REFERENCES

Abdelkarim, A., Schween, D. C., & Ford, T. (2018). Advantages and Disadvantages of Problem-Based Learning from the Professional Perspective of Medical and Dental Faculty. https://www.semanticscholar.org/paper/Advantages-and-Disadvantages-of-Problem-Based-from-AbdelkarimSchween/e553958a79e648dd8e369f7a4d77afb3083d8a1c

Abdulazeez, A. R., & Ali, S. A. (2021). Teaching critical thinking skills in Sulaimani City High Schools: challenges and obstacles. *Journal of Raparin University, 8*(4), 212–224. https://doi.org/10.26750/vol(8).no(4).paper10

Aflatoony, L., Wakkary, R., & Neustaedter, C. (2017). Investigating the benefits of a Secondary-Education Interaction-Design-Thinking course inside and outside the classroom. *The International Journal of Design Education, 11*(2), 1–19. https://doi.org/10.18848/2325-128x/cgp/v11i02/1-19

Alejandro, R., & Bucad, M., Jr. (2024). READINESS OF TECHNICAL VOCATIONAL AND LIVELIHOOD (TVL) STUDENTS OF SIMPUCAN NATIONAL HIGH SCHOOL. *Studies in Technology and Education, 3*(1), 72–79. https://doi.org/10.55687/ste.v2i2.68

Baker, R. S., Inventado, P. S., & Kauffman, R. (2020). Educational Data Mining: A Review of the State of the Art. In Handbook of Learning Analytics (pp. 1-12). Society for Learning Analytics Research.

Bariyyah, K. (2021). Problem solving skills: esssential skills challenges for the 21st-century graduates. *Deleted Journal, 7*(1), 71. https://doi.org/10.29210/120212843

Basal, D. V. (2022). INSTRUCTIONAL COMPETENCIES OF TECHNOLOGY AND LIVELIHOOD EDUCATION (TLE) TEACHERS: BASIS FOR a COMPETENCY-BASED MODULE. *International Journal of Research Publications, 96*(1). https://doi.org/10.47119/ijrp100961320222948

Blanca, A. (2019). Effective Strategies in Teaching Technology and Livelihood Education to Selected Grade 9 Students in Batangas National High School, *Ascendens Asia Journal of Multidisciplinary Research Abstracts,* Vol. 3 No. 2D. https://ojs.aaresearchindex.com/index.php/AAJMRA/article/view/8611

Boholano, H. B. (2017). Smart social networking: 21st-century teaching and learning skills. *Research in Pedagogy*, *7*(2), 21–29. https://doi.org/10.17810/2015.45

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Bruce, O. (2016). Strategies That Promote 21st-century Skills. *Just ASK Publications & Professional Development.* https://justaskpublications.com/just-ask-resource-center/e-newsletters/just-for-the-asking/strategies-that-promote-21st-century-skills/

Capó Vicedo, J. C., Benito, A., Montava-Jorda, S., & Sanchis, R. (2021). PROJECT-BASED LEARNING IN FINANCIALS ADVICE. *EDULEARN Proceedings, 1,* 7522–7528. https://doi.org/10.21125/edulearn.2021.1526

Choudhar, S., Bi, N., Singh, P. N., & Talwar, P. (2022). Study on problem solving skills and its importance. *World Journal of English Language, 12*(3), 47. https://doi.org/10.5430/wjel.v12n3p47

Creswell, J. W., V. L. Plano Clark, M. Gutmann, and W. Hanson. (2003). Advanced mixed strategies research designs. In Handbook on mixed strategies in the behavioral and social sciences, ed. A. Tashakkori and C. Teddlie, 209–40. Thousand Oaks, CA: Sage. https://www.scirp.org/reference/ReferencesPapers?ReferenceID=2112609

Creswell, J.W. and Plano Clark, V.L. (2011) Designing and Conducting Mixed Methods Research. *2nd Edition, SaGE Publications, Los Angeles. - References - Scientific Research Publishing*. (n.d.). https://www.scirp.org/reference/ReferencesPapers?ReferenceID=1596237

Crosswell, L., & Beutel, D. (2017). 21stcentury teachers: how non-traditional pre-service teachers navigate their initial experiences of contemporary classrooms. *Asia-Pacific Journal of Teacher Education*, *45*(4), 416–431. https://doi.org/10.1080/1359866x.2017.1312281

Epstein, J. (2018). School, family, and community partnerships (2nd ed.). https://doi.org/10.4324/9780429494673

Etikan, I., Musa, S.A., & Alkassim, R.S. (2016). Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics, 5,* 1. https://www.semanticscholar.org/paper/Comparison-of-Convenience-Sampling-and-Purposive-Etikan-Musa/4cabae8c5b53b7c4404c76568690c9c601d131ce

Ezenwafor, J. (2015). Rating of strategies for transforming technical vocational education and training for the 21st-century by tertiary institution lecturers in south east Nigeria. *International Journal of Educational Policy Research and Review. 88 - 97*. https://www.researchgate.net/profile/Justina-Ezenwafor/publication/317036044_Rating_of_strategies_for_transforming_technical_vocational_education_and_training_for_the_21st_century_by_tertiary_institution_lecturers_in_south_east_N

i geria/links/5f27fe36a6fdcccc43a62a76/Rating-of-strategies-for-transforming-technical-vocational- education-and-training-for-the-21st-century-by-tertiary-institution-lecturers-in-south-east- Nigeria.pdf
Frost, C. (2020, July 17). The Inquiry, Inquiry: Constructivism & Cycles. *Christopher Frost*. https://www.frostchristopher.com/post/the-inquiry-inquiry-constructivism-cycles
Fung, Han Ping. (2017). Mixed strategies. Retrieved from: https://www.researchgate.net/post/Mixed-strategies/596767a2615e27427d3892f8/citation/download.
Gipit, F., Benavides, N., & Labo, A. (2020). "School-Community Partnerships in Bulan District," International Journal of Science and Research (IJSR), Volume 9 Issue 5, May 2020, pp. 1137-1141, https://www.ijsr.net/getabstract.php?paperid=SR20513084310, DOI:https://www.doi.org/10.21275/SR20513084310
Glinel, C. (2020). Teaching 21st-century Skills: An Integrative Literature Review. https://spectrum.library.concordia.ca/id/eprint/987432/1/Glinel_MA_F2020.pdf
Gordon, E. W. E., Bridglall, B. L. E., & Meroe, A. S. E. (n.d.). Supplementary Education: the hidden curriculum of high academic achievement. https://eric.ed.gov/?id=ED489047
Gregorio, M. S. R., EdD. (2016, April 21). Technology and Livelihood (TLE) instruction of technical vocational and selected general secondary schools in Catanduanes. Gregorio, Ed.D. | *International Journal of Learning, Teaching and Educational Research.* https://www.ijlter.org/index.php/ijlter/article/view/671/290
Hamdan, M. K. K. H., Salleh, S. M., Shahrill, M., & Asamoah, D. (2022). Improving Conceptual Knowledge and Soft Skills among Vocational Students through Inquiry-Based Learning in a Flipped Classroom. *International Journal of Social Learning (IJSL), 2*(2), 235–249. https://doi.org/10.47134/ijsl.v2i2.140
Harris, A., & Jones, M. (2019). Teacher leadership and educational change. *School Leadership and Management*, *39*(2), 123–126. https://doi.org/10.1080/13632434.2019.1574964
Hattie, J., & Donoghue, G. M. (2016). Learning Strategies: A Synthesis and Conceptual Model. *Educational Psychologist, 51*(2), 109-119.
Herald, W. (2024, October 15). Reasons TVL is a 'Must' to Learn for Young Learners - The Wednesday Herald. The Wednesday Herald. https://thewednesdayherald.net/news/reasons-tvl-is-a-must-to-learn-for-young-learners/
Jaca, C. a. L. (2023, September 22). Hybrid Collaborative Model of Technical-Vocational-Livelihood (TVL) track in senior high school in the Philippines. TECHNICAL VOCATIONAL LIVELIHOOD EDUCATION (TVL)@Asia. https://Technical Vocational Livelihood Education (TVL)-online.asia/18/hybrid-collaborative-model-of-technical-vocational-livelihood-tvl-track-in-senior-high-school-in-the-philippines/
Karan, E. (2023). Discovery-Based Strategies Combined with Active Learning to Improve Student Learning Experiences for STEM Students. *Journal of Education and Training Studies, 11*(4), 16. https://doi.org/10.11114/jets.v11i4.6205
Khabeishvili, G. (2024). Rethinking our Classrooms: Teachers' perceptions on integrating transferable skills in the classrooms to create an active learning environment. *European Scientific Journal ESJ, 20*(8), 194. https://doi.org/10.19044/esj.2024.v20n8p194
Kimani, B. (2024). Effectiveness of Project-Based Learning in Enhancing Critical Thinking Skills among High School Students. ajpojournals.org. https://doi.org/10.47672/ajep.1901
Kumar, Rajesh & Singh, Siddhant & Singh, Akanksha & Goswami, Deepak & Doungel, Letginlen. (2019). *Indian Journal of Lifelong Learning & Educational Guidance, Volume: 4*. http://www.unipune.ac.in/dept/mental_moral_and_social_science/adult_education/Journal/V7N3_All%20Pages_30.092019.pdf#page=41
Lear, J. L., Bridges, D., Van Horn, B., & Hodge, K. A. (2019). Teaching Strategies That Promote Learning for the 21st-century Student. *NACTA Journal, 63*(2), 127–132. https://www.jstor.org/stable/26769627
Magulod, G. (2019). Learning styles, study habits and academic performance of Filipino University students in applied science courses: Implications for instruction. *Journal of Technology and Science Education*, *9*(2), 184. https://doi.org/10.3926/jotse.504
Mariano, C. P. (2017). IBA (INQUIRY-BASED STRATEGIES) TEACHING STRATEGY AND THE GRADE 11 STUDENTS' ACHIEVEMENT IN PROTEIN SYNTHESIS. *International Journal of Physics & Mathematics (IJPM), 2*(1), 23–29. Retrieved from https://ijpm.ielas.org/index.php/ijpm/article/view/2

Mduwile, P., & Goswami, D. (2024, May 31). Enhancing Student Engagement: Effective Strategies for Active Learning in the classroom in Secondary schools. https://journal.institercom-edu.org/index.php/multiple/article/view/350

Nagashibaevna, Y. K. (2019). Students' lack of interest: how to motivate them? *Universal Journal of Educational Research, 7*(3), 797–802. https://doi.org/10.13189/ujer.2019.070320

Nilsen, T., & Gustafsson, J. (2016). Teacher quality, instructional quality and student outcomes. In IEA research for education. https://doi.org/10.1007/978-3-319-41252-8

Omela, E. T., & Del Mundo Martin, M. (2020). Teachers' motivational strategies employed in teaching passive pupils. *EDUCATUM Journal of Social Sciences, 6*(1), 1–11. https://doi.org/10.37134/ejoss.vol6.1.1.2020

Ogunbiyi, M. (2017) Assessing the Load-Bearing Capacity of Soils in Different Areas of Osogbo, Osun State, Nigeria Case Study of Alekunwodo, Oke-Baale and Osun State University Campus, Oshogbo*. International Journal of Innovative Research in Science, Engineering and Technology, 6,* 3907-3914. - References - Scientific Research Publishing. (n.d.). https://www.scirp.org/reference/referencespapers?referenceid=3393335

Pamor, I. L., Legarda, M. B., & Bauyot, M. M. (2024). Experiences of Technology and Livelihood Education Teachers in the Division of Davao del Norte: a phenomenological study. *Asian Journal of Education and Social Studies, 50*(7), 438–450. https://doi.org/10.9734/ajess/2024/v50i71475

Rahim, R. A., & Oh, G. S. (2024). Rethinking the role of educators in the 21st-century: navigating globalization, technology, and pandemics. *Journal of Marketing Analytics*, *12*(2), 182–197. https://doi.org/10.1057/s41270-024-00303-4

Renwick, D. (2022) Participant Recruitment in Qualitative research How many participants do I need for qualitative research Crux Publications, New York. - References - Scientific Research Publishing. (n.d.). https://www.scirp.org/reference/referencespapers?referenceid=3301531

Ross, D. (2017). Empowering Our Students with 21st-Century Skills for Today. https://www.gettingsmart.com/2017/04/empowering-students-21st-century-skills

Rossman, G. B., & Wilson, B. L. (1985). Numbers and words: Combining quantitative and qualitative strategies in a single large-scale evaluation study. *Evaluation Review, 9*(5), 627–643. https://doi.org/https://doi.org/10.1177%2F0193841X8500900505

Salleh, N. N. H. M., Puteh, S., Hassan, N. F., & Sanusi, A. M. (2018). Study on Issues of 21st-century Skills for Students of Technical and Vocational Education. *Advanced Science Letters*, *24*(11), 8488–8491. https://doi.org/10.1166/asl.2018.12595

Santos, J. M. (2017). 21st-century Learning Skills: A Challenge in Every Classroom. *International Journal of Emerging Multidisciplinary Research*, *1*(1), 31–35. http://ijemr.ascons.org/digital-library/2017/1/1/31

Singh, C. K. S., Singh, T. S. S., Ja'afar, H., Tek, O. E., Kaur, H., Moastafa, N. A., & Yunus, M. (2020). Teaching Strategies to Develop Higher Order Thinking Skills in English Literature*. International Journal of Innovation, Creativity and Change, 11*(80), 211-231.

Syawaludin, A., Prasetyo, Z. K., Jabar, C. S. A., & Retnawati, H. (2022). The effect of project-based learning model and online learning setting to analytical skills of discovery learning, interactive demonstrations, and inquiry lessons on the Pre-Service Elementary teachers. *Journal of Turkish Science Education, 19*(2), 608–621. https://doi.org/10.36681/tused.2022.140

Taherdoost, H. (2022). What are Different Research Strategies? Comprehensive Review of Qualitative, Quantitative, and Mixed Method Research, Their Applications, Types, and Limitations. *Journal of Management Science & Engineering Research*, *5*(1), 53–63. https://doi.org/10.30564/jmser.v5i1.4538

The Farnsworth Group. (2023). How to achieve trustworthiness in qualitative research. Retrieved on March 30, 2023 from https://www.thefarnsworthgroup.com/blog/trustworthiness-qualitativeresearchTingzon, L. L., & Buyok, H. J. A. (2022). LIVED EXPERIENCES OF NON-TLE TEACHERS TEACHING TLE SUBJECTS: A PHENOMENOLOGICAL INQUIRY. *European Journal of Education Studies, 9*(11). https://doi.org/10.46827/ejes.v9i11.4538

Tom, T. (2023, December 13). Teaching strategies to promote critical thinking. TeachHUB. https://www.teachhub.com/teaching-strategies/2014/09/teaching-strategies-to-promote-critical-thinking/

Varas, D., Santana, M., Nussbaum, M., Claro, S., & Imbarack, P. (2023). Teachers' strategies and challenges in teaching 21st-century skills: little common understanding. *Thinking Skills and Creativity*, *48*, 101289. https://doi.org/10.1016/j.tsc.2023.101289

What Are 21st-Century Skills? - Southwest Charlotte STEM Academy. (2021, January 18).

Scstemacademy.org. https://scstemacademy.org/what-are-21st-century-skills/#:~:text=Initiative%20often%20means%20working%20on

Zackariasson, M. (2019). Encouraging student independence. *Journal of Applied Research in Higher Education, 12*(3), 495–505. https://doi.org/10.1108/jarhe-01-2019-0012