Volume 4, Issue 4 **(Fall 2025)**
e-ISSN: **3006-869X**
DOI: **10.55737/tk/2k25d.44120**
Pages: **200 – 215**

https://doi.org/10.55737/tk/2k25d.44120 THE KNOWLEDGE | RESEARCH ARTICLE

Articulation of 21st Century Skills: Evidence of Pedagogical Skills of Teacher-Educators Regarding Collaboration, Communication, Critical Thinking, and Creativity

Syed Mir Syed [1] **Naila Siddiqui** [2]

Abstract

This study looked into the problems that elementary students encounter while trying to learn English. This was a quantitative study, and the researchers went for a descriptive approach to gather their data through surveys. The research focused on all the elementary school students in Tehsil Kotli, AJ&K, and the researchers picked a sample of 219 students using a random sampling method. They used a five-point Likert scale questionnaire that they developed themselves to collect the responses. For crunching the numbers, they turned to SPSS (Statistical Package for the Social Sciences). The analysis included looking at frequencies, percentages, means, and standard deviations to really get the full picture. The study found that students are dealing with a bunch of challenges while learning English. Some common issues included a lack of confidence, not speaking enough English during class, wrestling with vocabulary, and just finding grammar rules really tough to grasp. To tackle these problems, the study suggests that teachers may model proper pronunciation for students, encouraging them to repeat words and phrases regularly. The study also recommends that school authorities set up language labs where students can get more practice. Furthermore, the school administration may promote online learning resources to help students out in learning English. Overall, it is about creating a supportive environment to help these students thrive in their English learning journey.

Key Words

21st Century Skills, Communication, Critical Thinking, Collaboration, Creativity, Pedagogical Skills

Corresponding Author

Syed Mir Syed: PhD Scholar, Department of Education, University of Karachi, Sindh, Pakistan.
Email: syedmirsyed@yahoo.com

How to Cite

Syed, S. M., & Siddiqui, N. (2025). Articulation of 21st Century Skills: Evidence of Pedagogical Skills of Teacher-Educators Regarding Collaboration, Communication, Critical Thinking, and Creativity. *The Knowledge, 4*(4), 200-215. https://doi.org/10.55737/tk/2k25d.44120

Introduction

The globalization and technological progress in the 21st century have generated new requirements and difficulties for individuals, institutions, communities, and nations to participate, compete, and innovate in the worldwide economy. The historical concept of the global economy that was tightly connected to industrial revolution has now changed to knowledge, information and innovation-driven one. Hilman (2012) identified that technological developments that have occurred in the last twenty years have made the world a global village with far-reaching interconnection. The current issues of concern in the world have no longer remained within the local or international domain but have taken a global or borderless form. To understand the difficulties of our globalized world, people need to develop new talents to successfully cooperate and live in this globalization period. As a result of this interconnectivity, the globalized world has become more interdependent (Li, 2024).

[1] PhD Scholar, Department of Education, University of Karachi, Sindh, Pakistan. Email: syedmirsyed@yahoo.com
[2] Assistant Professor, Department of Education, University of Karachi, Sindh, Pakistan. Email: naila_ss@yahoo.com

The labour market in the contemporary world has changed into global market. This implies that well trained people in rich nations are competing against those whose qualifications match with those of other countries with low pay. However, 20 years ago, jobs were predominantly localized and only people of the respective country could compete in terms of employment (OECD, 2012). As noted by Karaca-Atik et al., (2023), over 80 percent of the employment in the world shifted out of the manufacturing industry into the service sector. Such a movement requires workers who are skilled and which have the skills they need in the 21st century.

Going by the discussion above it is clear that it is essential to equip our graduates with specialized skills so that they can be able to compete and survive in the contemporary globalized world. This is possible through instilling the students, particularly students in tertiary education with knowledge and skills needed in the 21st century. This is necessary to address needs of a knowledge based economy in the current global society.

Research Objectives

The objectives determined for this study were:

1. To determine current practices at the teacher education program for 21st-century skills.
2. To explore the factors affecting the implication of 4Cs in teacher education programs
3. To identify the gaps in promoting 21st-century skills among prospective teachers with special reference to 4Cs
4. To suggest possible strategies for desired outcomes to articulate 21st-century skills in teacher education programs.
5. To reveal the perception the perception of the prospective teacher regarding the implications of communication, collaboration, critical thinking and creativity.
6. To investigate the methods of teaching 21st-century skills among teacher-educators in teacher education programs of Public and Private affiliated colleges, Karachi, Sindh

Research Questions

The following key questions were examined in the study.

1. What are the current practices at the teacher education program with respect to 21st-century skills?
2. What are the factors affecting the implementation of 21st-century skills in instructional practices?
3. What are the gaps in promoting 21st-century skills among prospective teachers with special reference to 4Cs?
4. What may be possible strategies for desired outcomes to articulate 21st-century skills in teacher education programs?
5. What is the perception of the prospective teacher regarding the implications of communication, collaboration, critical thinking, and creativity?
6. What are the different methods of teaching 21st-century skills among teacher-educators in teacher education programs of Public and Private Universities of Karachi, Sindh?

Literature Review

The phrase "21st-century skills" encompasses fundamental abilities that institutions must impart in order to equip individuals to be global citizens in the 21st century. The phrase "21st-century skills" often refers to a structured collection of abilities that are not only important but also essential for sustainable living and learning in the 21st century (Purwanto, Hartono, & Wahyuni, 2023). Considering the shifting priorities in the global landscape, OECD (2012) recognizes that the labour market has transformed into a global market. This means that highly skilled individuals in wealthy nations now compete for jobs with equally qualified individuals in countries with lower wages.

In contrast, two decades ago, job opportunities were primarily localized and only individuals within the same country were competing for those positions.

The information and communication technology (ICT) drives the current economic system and is a monumental change to the economy of the 20th century. The twenty-first century economy in major countries is majorly concentrated on innovation, production, and creation of commodities and services, and not on the production on physical objects. Higher education is playing a complex role towards the achievement of goals of the new millennium (Chen, 2023).

According to Nuccio, and Mogno, (2023), the world economy is shifting towards a knowledge-based model as opposed to an industrial one and it has to create 21st-century skills in order to achieve economic prosperity in the contemporary interconnected world. The institutions of higher learning are facing serious challenges, such as social, moral, political, and economical challenges. It depends on how people are going to deal with these issues to determine the future of higher education (Rao, 2003). Knowledge and skills that were considered essential in the 20th Century are no longer applicable in the 21st Century (Zhao, 2010). Conceptual and analytical thinking are some of the essential talents needed in the 21st century. Educators and institutions who fail to prepare learners for the challenges of the 21st Century will be responsible for endangering the nation.

Given the current state of the higher education system in Pakistan and the fast evolving priorities in the global landscape, it is imperative to equip our new generation with the necessary skills and knowledge to thrive in life beyond their college and university degrees. In order to achieve this objective, it is necessary to integrate 21st-century skills and competences into the current traditional academic subjects. This is because our education system should not just focus on memorization of facts and statistics, but rather on developing learners who can critically analyses and evaluate knowledge and information. Hence, it can be inferred that failing to incorporate new skills and abilities into the education system of a technologically advanced world would result in our nations being held accountable for jeopardizing their future.

The education delivery system significantly influences the development of 21st-century competencies among learners. Factors such as pedagogy, curriculum, school regulations, atmosphere, assessments, and benchmarking skill acquisition play a crucial role in the development and monitoring of 21st-century abilities (Aghazadeh, 2019). However, the classroom is the main setting where all of these aspects come together to facilitate the acquisition of knowledge and the development of skills. Moreover, the classroom serves as the environment where students may witness their professors demonstrating these abilities and have the opportunity to practice them. Hence, it is equally crucial to adequately equip and educate teachers not just in acquiring 21st-century abilities but also in effectively imparting these talents. Conducting an assessment of the classroom procedures and teacher practices that facilitate and promote the acquisition of 21st-century skills might be a crucial initial measure.

The skill set required in the 21st century is commonly recognized to include a variety of abilities, such as critical thinking, problem-solving, creativity, self-awareness, communication, proficiency in digital and technology tools, civic duty, and global consciousness (Dede, 2010). Nowhere is the cultivation of these skills more crucial than in developing nation settings, where a significant lack of progress in educational achievements has shown the pressing need to enhance the quality of instruction. An obstacle to achieving the required changes is the absence of a comprehensive grasp of teaching practices that are relevant to the environment, as well as effective methods of assisting teachers in their professional growth (Kim, Raza & Seidman, 2019). How can we enhance the proficiency of instructors in 21st-century abilities to facilitate the development of 21st-century learners?

With this fast changing world, each and every person must be prepared to face any unexpected difficulties that might come across in future. At this moment, the strong competition, the high speed of the information exchange,

the significant technical progress, and the globalization have already changed the way people live, communicate, and work greatly. Such changes can cause a major change in the future. To succeed in life, people should learn how to formulate meaningful goals, cooperate with people who have different perspectives, find opportunities, and develop a great number of solutions to the problems (Afandi, et al., 2019). The changing world needs to be accommodated in the educational system better, as it has a vital place in shaping the information, skills, attitude, and values required to make the individuals worthy of making a contribution to and benefiting an inclusive and sustainable future (Erdogan & Cavli, 2019). In education, the one-sided dependence on student academic achievement as an indicator of their future achievement has reduced. Rather, more attention is paid to the acquisition of skills in the second language and the achievement of basic skills (collaboration, critical thinking, problem-solving, creativity, and research gathering). The 21st century skills movement was the first movement in the United States of America to propose the reformation of education (Anderson, 2023).

The Partnership of 21st-century learning (P21) developed what it referred to as the Framework of 21st Century learning as a way of changing education. This model refers to 18 key skills required by students to succeed (Rahman, 2019). The four main skills, also known as 4C (critical thinking, cooperation, communication and creativity), are generally understood as the key factors that enable students to be successful during the current era (Radifan, & Dewanti, 2020). The acquisition of critical thinking and creativity is crucial to problem-solving, whereas the skill of teamwork and communication is crucial to the interactions and collaboration with other people and groups.

It is important to ensure that teacher candidates can successfully implement 4C skills in their classrooms because they need to be competent to enable them to accomplish successful implementation (Radifan & Dewanti 2020). In two scenarios, the 4C abilities are very critical to teacher candidates. The first would be the case with university students who have to develop their 4C skills (learning requirements), and the second would be the one that would force students to learn how to develop the 4C skills of their future students (target needs). The attainment of 21st-century skills is accomplished through enhancing the caliber of education, fostering student engagement, tailoring learning experiences to individual needs, prioritizing project and problem-based learning, promoting collaboration and communication, enhancing student motivation and involvement, nurturing creativity and innovation in education, utilizing suitable educational tools, designing learning activities that are applicable to real-life situations, empowering metacognition, and fostering student-centered learning (Zubaidah, et al., 2017).

Effective learning activities for enhancing students' critical thinking abilities include actively engaging in the collection, selection, and organization of knowledge sources. Students are no longer only reliant on lecturers or professors as the primary source of knowledge. The pupils must undergo training to actively and autonomously pursue and gather knowledge from diverse sources (multi-sources). The sources of information are not limited to books and research journals. They can be allowed to observe the classrooms directly or make simple interviews with several children and teachers in order to find out information about the learning process. Then they are able to discuss their personal findings and consult the instructor with peers. The first task implies the accumulating, selection, and systematization of data which presupposes the fact that students have to find and analyze the material that may help them develop critical thinking (Syawaludin, Gunarhadi, & Rintayati, 2019). The second action is to observe the simulation process. To develop critical thinking skills, it is important to emphasize the fact that the key focus of education is on the processes, as opposed to only the final products of learning. That is why it is urgent that the knowledge and theories taught in the classroom go beyond the retention of the pupils. The measures that can be taken to improve the critical thinking skills of the pupils are several. First, once they have understood the concepts taught in the classroom, they are expected to perform simple simulations related to the topic and theories they have learned. Later students will be asked to closely follow and pay proper attention to the

simulations that are performed by other students. Then they can compare the theoretical information provided in the book and the practical simulations done in class (Shah, Ali & Ahmad, 2024). As they will be personally observing the process of the simulation, they will be able to assess the strengths and weaknesses which can be generated. Moreover, the students may also be able to learn to address and solve the limitations and difficulties they can face in a classroom during the instruction, thereby developing their problem-solving skills. Finally, the students will be able to make inferences based on the observations they have made. The exercises have managed to conform to the steps of critical thinking (Ali et al., 2023).

The students are in a process of finding content and theory that they will present, set a goal in their group simulation, brainstorm about the ways of achieving the goal, simulate the strategies, evaluate the simulation, and analyze the recordings. To achieve this assignment, the students are first divided into a large number of groups. Video analysis can be conducted in two possible ways. One such choice is for students to document the learning experience in class by creating a video. Alternatively, students might examine the current video-based learning methodology for the second choice. The initial method is assigning students to groups and instructing them to visit several schools to document a certain learning activity taking place in the classroom. During the video recording, only authorized individuals are permitted to enter the classroom. The purpose of this is to minimize distractions and alleviate the pain experienced by students and teachers throughout the learning process in the classroom. Subsequently, pupils are required to meticulously examine and analyze this film. They have the ability to watch and directly witness real-life occurrences in the field, allowing them to make comparisons with the theoretical knowledge they acquire in the classroom. The second alternative is students working in groups to see and analyze educational videos conducted in many nations. Subsequently, they may juxtapose the attributes and cognitive mechanisms occurring in these nations and contrast them with the theoretical frameworks they have acquired in the classroom.

Creativity

The current studies of creativity in pre-service teacher are scanty and address the weaknesses within the classroom in various ways: compliance with the curriculum and standards, measuring of creativity, and insufficient training of creating creativity (Kokotsaki, 2011). According to the self-reported data, these studies asked pre-service instructors a series of questions regarding their preferences concerning the behavior of students in the classroom discussions. Uniqueness in responses was defined by the use of the innovative cognitive processes by the pupils that included generating original thoughts, taking different perspectives and coming up with creative associations. Conversely, it was said that relevant answers were answers that responded directly to the question and demonstrated an individual who was competent in their studies and who was not out of the stipulated curriculum. Practicality over distinctiveness was preferred by most pre-service instructors. However, it is important to note that creativity must require originality and applicability (Plucker, Beghetto, & Dow, 2004). Therefore, it is imperative to educate aspiring teachers on how to recognize, cultivate, and evaluate these components, as well as motivate their students to enhance their creative abilities (Beghetto, 2007). According to limited research on creativity, it has been proposed that some subject areas are seen to have fewer possibilities for originality compared to others (Bolden et al., 2010). For instance, irrespective of the level of education, research has indicated that pre-service teachers do not view mathematics as a topic that fosters creativity and hence consider creativity to be a possible hindrance (Beghetto, 2007).

Furthermore, pre-service teachers showed a lack of ability to differentiate between the concepts of teaching creatively and teaching for creativity. They also had challenges in recognizing strategies for promoting and evaluating this talent within the mathematics classroom (Bolden et al., 2010). Nevertheless, pre-service teachers expressed that all other academic disciplines provide greater prospects for creativity via dialogues, study of

concepts, and autonomy of selection. While it is possible that these impressions arise from limitations in the curriculum, it is crucial for teacher education programs to actively cultivate, demonstrate, and evaluate the concept of creativity (Kokotsaki, 2011).

Critical Thinking

Typically, research in teacher education has concentrated on critical thinking by examining the process of critical reflection in both classroom and fieldwork. The primary objective is to motivate pre-service teachers to engage in thoughtful self-evaluation of their teaching methods, analyses the impact of their instruction on student learning, and cultivate enduring habits in this regard (Ward & McCotter, 2004; Akram, Sewani & Ahmad, 2024)). In order to achieve this objective, educators specializing in teacher training have developed projects that enable aspiring teachers to engage in and showcase critical thought. The researchers assessed the progress and effectiveness of critical reflection skills using a standardized framework. A low level of skill was characterized by a self-centered approach and a focus on teaching tasks, while a high level of skill was indicated by a focus on pedagogy and considering multiple perspectives. This higher level of skill led to a significant transformation in teaching practice (McDonald & Kahn, 2014).

The findings suggest that most essays have a tendency towards lower levels of critical reflective thinking, namely, pre-service teachers primarily concentrate on themselves, and the responsibilities related to teaching (Ward & McCotter, 2004). Pre-service teachers may naturally priorities their own tasks and the tasks of teaching, rather than engaging in a higher degree of critical reflection. Nevertheless, pre-service teachers have the ability to transition from a limited and specific mindset about oneself to considering many viewpoints within the framework of teaching and learning. Ward and McCotter (2004) discovered that engaging in critical self-assessments led to increased self-awareness, enhancements in teaching practice, and advancements in the ability to consider diverse views. Furthermore, engaging in action research or small-group conversations that include peer feedback enhances the critical reflection abilities of pre-service teachers (Hagevik et al., 2012; Ahmad).

Teacher educators have a significant impact on the enhancement of critical reflection abilities in pre-service teachers by providing coaching and scaffolding. In their study, McDonald and Kahn (2014) discovered a clear correlation between the extent of critical reflection exhibited by pre-service teachers and the quantity of prompts, questions, and comments provided by professors. Furthermore, Ward and McCotter (2004) suggested that teacher educators employ thought-provoking inquiries and advanced prompts and feedback to aid pre-service teachers in cultivating these abilities. When pre-service teachers enter their first year of teaching, they will not only be expected to perform critical reflection in their practice. They should also demonstrate critical thinking skills, ideally demonstrate as role models of critical thinking, and demonstrate their ability to teach students how to develop critical thinking skills in different academic subjects and classroom settings (Akram, Khan, & Ahmad, 2022). Moreover, researchers claim that teacher educators are supposed to offer direct advice to pre-service teachers with the aim of increasing their critical reflection skills. As a result, teacher education programs must be purposeful in their efforts to cultivate, exemplify, and evaluate these skills.

Communication and Collaboration

The research on communication and collaboration is frequently discussed together, since efficient communication is crucial for and results in a prosperous cooperation. An illustrative instance of the amalgamation of these two proficiencies in education is professional learning communities (PLCs), which center on teacher dialogues and partnerships. As an illustration, Kagle (2014) devised a Professional Learning Community (PLC) specifically designed for undergraduate pre-service teachers to enhance their abilities in cooperation, critical reflection, and

pedagogy. A protocol offers a systematic framework for pre-service teachers to present a teaching issue to their peers in order to receive feedback. Specifically, they encountered a common language, cultivated abilities for critical analysis, constructed practical knowledge, and grasped the need of collaborating with peers. Teacher education programmes should clearly offer chances for the cultivation of communication and collaborative skills to enhance instructional practice. PLCs also foster the cultivation of critical introspection and evaluation, both on an individual basis and within a collective. The primary objective of this study was to examine effective strategies for delivering constructive criticism in a manner that promotes active engagement and fosters a cooperative atmosphere through effective leadership. Throughout the research, pre-service teachers acknowledged and appreciated the significance of critique in enhancing their teaching methods. Undoubtedly, although acquiring the skills to provide and receive constructive criticism may be challenging, the outcomes of education and instruction may be substantial. The research suggests that pre-service teachers have the opportunity and should actively engage in cooperation to foster critical reflection on their teaching practices (Kagle, 2014). Consequently, the existing research provides minimal evidence for the necessity of teacher education programs in fostering the acquisition of these competencies among its pre-service teachers.

Teaching Abilities

The importance of pedagogy in the twenty-first century is equal to the task of identifying the new skills that learners of today must acquire. Conventional methods that focus on rote learning or the implementation of basic techniques will not enhance learners' ability to think critically or be independent. In order to cultivate the advanced cognitive abilities, they now require, individuals must actively participate in purposeful inquiry-based learning that holds authentic significance and pertinence to their own lives and the communities they belong to. The combination of practical experiences and ongoing involvement and cooperation provides learners with chances to create and structure information, participate in thorough study, investigation, writing, and analysis, and successfully communicate with audiences (Barron & Darling-Hammond, 2008).

What are the most effective ways for instructors and educators to assist learners in developing crucial skills for the twenty-first century? Individuals acquire knowledge through many methods; hence educators have the task of identifying the most efficient tactics that facilitate optimal learning. Without a thorough understanding of a learner's abilities and requirements, it is challenging to determine which learning approaches and pedagogy would effectively benefit that individual (Akram, Ahmad, & Sewani, 2024). However, research indicates that certain pedagogical approaches are consistently more effective than others in facilitating students' acquisition of a profound comprehension of twenty-first-century abilities. Effective pedagogical approaches that facilitate profound learning encompass personalized learning techniques, collaborative learning, and informal learning (Redecker & Punie, 2013; Ahmad, Mankash, & Sewani, 2024).

Saavedra and Opfer (2012) contend that learners must promptly refine their abilities and augment their learning in order to effectively tackle enduring global concerns. Nevertheless, despite a global consensus on the need of learners acquiring skills such as critical thinking, effective communication, innovation, problem-solving via negotiation and cooperation, pedagogy has failed to adjust to meet these emerging issues. The transmission or lecture model continues to be the primary teaching strategy in education over a large part of the world (Saavedra & Opfer, 2012). This method commonly results in a lack of interest, lack of motivation, and for the majority of students, a feeling of tedium. However, learners must allocate time to engage with mentors and peers, as well as practice and implement recently gained skills and information. Assessment and sharing of new knowledge should occur through carefully planned collaborative experiences, which assist individuals in applying their learning to different issues and situations. In the absence of opportunities to engage in practical application and implementation of newly acquired knowledge across diverse situations, the process of adapting to and

incorporating this knowledge will not be accomplished (Ahmad, Noorani, & Ali, 2024). Put simply, if learning settings fail to provide chances for exchanging fresh information and resolving intricate issues through teamwork, it will suppress innovation (p. 8). In light of all factors, the 'transmission' approach is exceedingly inefficient in imparting twenty-first-century abilities.

According to Saavedra and Opfer (2012), it is necessary to clearly instruct learners in order for them to build the complex and hard competencies and abilities of the twenty-first century. It is widely accepted that learners should acquire these abilities via discipline study rather than taking separate courses. Teaching and Learning International Survey (TALIS) showed that teachers from twenty-two out of twenty-three nations that took part in the survey, mostly from Northern or Eastern Europe, expressed a preference for constructivist teaching methods. Nevertheless, this survey reveals that in the nations involved, there is a lack of emphasis on twenty-first-century abilities, even when teachers employ active learning tactics like discussion and planned classroom talks (Saavedra & Opfer, 2017).

According to Leadbeater, and Wong (2010), the effective transformation of educational systems globally relies on the alteration of teaching methods and the restructuring of learning activities. The approach also involves encouragement of self-directed learning and encouraging innovation. It is possible that technologies can be used to ease pedagogical change, though it is essential to note that the experiences of the twenty-first century learning have to extend beyond just technology. Another fact, as pointed out by Leadbeater, and Wong (2010), is that the learning strategies of the 21 st century will be not limited to the four walls of education institutions. They will include learning from peers, collaborating across different generations, and building relationships within the community. Educational activities can occur beyond the confines of educational institutions, such as at libraries, museums, community centers, local businesses, or adjacent farms, among other locations. Robinson (2006) argues that the concept of school as the exclusive source of education must undergo a significant and fundamental change. The contemporary perspective on education in the twenty-first century recognizes the necessity of incorporating novel approaches and objectives in global educational agendas in order to enhance the caliber of learning. Nevertheless, even while there are many reasons in favor of changing teaching methods to effectively promote the development of twenty-first-century abilities, there is a lack of attention given to the subject of the most effective and intentional ways to teach these skills (Acedo & Hughes 2014)

Methodology

The study was qualitative in nature, and the data were collected through interviews from teacher educators teaching in affiliated colleges of university of Karachi and their own observations and experiences were indicated through “thematic approach” to highlight the articulation of Articulation of 21st Century Skill of Teacher-Educators Regarding Collaboration, Communication, Critical Thinking, and Creativity. The data was analyzed through thematic analysis.

Target Population

The target population of the study was 5 teacher educators of private and public sector institutions teaching in affiliated colleges in university of Karachi to B.Ed (Hons.) elementary and secondary level prospective teachers.

Findings of Qualitative Questions

Thematic Analysis:

Themes Emerged from Teacher Educators Interviews

Theme 1: Required Resources and Assistance for Improving Pedagogical Abilities

Technological Aids

Respondent 01described as “Computer Technology, Internet, Updated Classrooms, multimedia and government grant”.

Respondent 5 elaborated as “Technological aids like access to internet, digital library & multimedia resources".

This study raised a serious issue about the use of technology in teacher education programs. For example, Respondent 01 pointed out that for one to understand the significance of computer technology, internet, updated classrooms, multimedia and government grants as key resources needed. Similarly, respondent 5 also mentioned that the technological aids such as internet, digital library and multimedia resources which are essential in today’s teaching methods are important in helping educators impart knowledge effectively.

Theme 2: Challenges in Integrating 21st-Century Skills

Curriculum Constraints

Respondent 3 & 4 stated "Lack of professional development among teachers, Rigid Curriculum"

"Obliging teachers to teach specific curriculum"

Teacher educators who attempt to incorporate twenty-first-century skills in their teaching face several challenges. According to Respondents 3 and 4, lack of professional development among teachers and a rigid curriculum are the major obstacles. A prescribed curriculum places pressure on teachers to follow it strictly without room for incorporating new skills and methods into their practice. For instance, Respondent 4 pointed out that being obliged to “teach specific curriculum” prevents innovation and adaptation in the classroom.

Limited Resources

Respondent 4 mentioned as “Lack of resources, Lack of budget"

Respondent 5 mentioned as "Many of the activities couldn’t be done due to the large number of students"

Resource constrained is the plight that many schools are facing, such as limited access to technology which is vital for digital literacy and teamwork in a virtual world. Such limitations can severely hinder the effective use of 21st-century skills. Also, course-wide lessons exemplifying successful teaching methods and strategies for comprehensively developing students’ 21st-century skills are the third important theme.

Theme 3: Successful Strategies for Teaching 21st-Century Skills

Activity/Task-Based Learning

Respondent 1 described as "Conducting activity/task-based class focuses on autonomous as well as collaborative learning." While Respondent 5 elaborated as “Activity-Based Learning, Conducting task-based class focusing on autonomous as well as collaborative learning"

Several successful implementations of various strategies were found during the interviews. Activity or task oriented approach was pointed out as one of the major techniques. “Autonomous and collaborative” this method was named by Respondent 1 – who’s very constituting abilities are seen as important by the supporters of learning for the 21st century. In support of Respondent 5, “activity based learning” and “task-based class” features were also indicated for personal and collective education. The strategies mentioned above help to access students’ outreach while also developing skills that suit today’s work environment.

Theme 4: Measuring Students' Growth in 21st-Century Abilities

Task Assignments

Respondent 1 explained "By assigning tasks that demand technological integration and other 21st-century skills."

To evaluate students' progression in mastering their 21st-century competencies, different evaluation techniques are employed. According to respondent one, "there is need to give assignments that require integration of technology or other 21st century skills so as to ascertain students' capabilities". This approach guarantees that assessments match what is being taught and serves as an evident measure on how much students have advanced.

Evaluation Methods & Portfolios and Feedback

Respondent 1 mentioned as "By giving them different tasks such as quizzes, worksheets, presentations, and assignments" and respondent 3 describes as "Formative and summative evaluation, conceptual questions in monthly tests and final examinations"

Regarding portfolio respondent 1 explained as "Portfolio making is one of the important tasks for students in which they reflect on teachers' teaching" and respondent explained as "360-degree feedback, peer observation" (Ref #4).

Student growth can also have an effect on assessment methods. As part of the assessment procedure, Respondent 1 mentioned using quizzes, worksheets, presentations, and assignments. In addition to that Respondent 3 pointed out that formative and summative evaluation, conceptual questions in monthly tests and final examinations are used in tracking students' development. Portfolios were also mentioned as a valuable tool by Respondent 1 who said they are 'important tasks for students to reflect on teachers' teaching'. Also noted by Respondent 4 were "360-degree feedback" or "peer observation" as ways of providing comprehensive evaluations of students' performance and growth.

Theme 5: Evidence of Teaching Impact on 21st-Century Skills

Student Application

Respondent1 explained as "My students are teachers now and they are implementing those strategies and pedagogies in their classrooms very effectively"

Respondent 5 elaborated as "The tasks I assign my students cannot be done without utilizing or acquiring 21st-century skills".

It is clear that teaching methodologies affect students' 21st-century abilities which they later use in their careers. This was noted by Respondent 1 who said, "My pupils have become teachers themselves and effectively use these strategies and pedagogies in their own classrooms." This is an indication of the effectiveness of skills taught. Similarly, in Respondent 5, she noted that, "My assignments cannot be achieved without the use or acquisition of 21st century skills" highlighting the degree to which such kind of training can be applied in accomplishing successful assignments and eventually student performance.

Observable Improvement

Respondent 4 stated that "the continued growth of students, their behaviors, self-assurance, accomplishments, and expertise in different areas are my evidence."

The continuous development of students regarding their behavior, confidence levels, achievements and areas of mastery can be significant to understand what constitutes educational success. Such progress serves as not only a hallmark of quality education but also an evaluation tool for the capacity of institutions. On this note, there is a need to consider various dimensions such as academics, social lives and emotional aspects in order to adequately

define holistic student development. Thus, these elements objectively correlate with present-day studies about students' outcomes. Respondent 4's perspective that these elements serve as proof of educational success aligns with contemporary research on student outcomes.

Discussion

The following findings are derived from the thematic analysis of teacher educators' responses. To develop pedagogical skills the teachers have to be provided with different technological resources, as without these resources such as internet, multimedia and digital library these abilities cannot be incorporated and explained for teacher educators themselves. One interviewee said: "As far as my experiences go, I understand that there are some problems that hinder me from incorporating technology in my training practice like network issue, lack of general knowledge on digital technology (e-digital literacy) and wrong materials posted on sites."

Integrating technology into education is an avenue of opportunities and threats. The Technological Pedagogical Content Knowledge (TPACK) framework established by Mishra and Koehler (2006) acknowledges that it must be used in ways that support pedagogical objectives. On the other hand, the digital divide has been highlighted by Warschauer (2004), who indicates that every other learner should have access to devices as well as knowhow on how they will be used to take advantage of the materials available in their environments. There is a need to invest specifically on infrastructure, professional development, and curriculum design in order to handle these challenges. Sweller (2020) believes that increased access and utilization of the tools and resources provided by educational technologies enhances the quality of teaching. Educational support instruments like multimedia resources, computer programs and software applications can enhance conventional teaching methods while also appealing to digital learners through guidance and counselling (Ahmad, Sewani & Khoso, 2024).

The issue of lack of suitable technologies to help their teaching methodologies was one of the major concerns raised by teacher educators (Pirzada, Tabassum & Ahmad, 2024). Computer technology, Internet, updated classrooms, multimedia and government grant were noted by Respondent 01 as the most important resources. Likewise, Respondent 5 also emphasized that access to "technological aids like the internet, digital library & multimedia resources," is very important. These resources are critical for modern teaching approaches and helping teachers deliver quality lessons.

In order to meet the current issues, the students are obliged to be equipped with the 21 st century skills like critical thinking, communication, collaboration and creativity that are significant in education as they are rapidly evolving. However, these skills have not been easily applied because there are different barriers in the curriculum. 1. Traditional Academic Models in most educational systems, the curricular model has remained the same since the early twentieth century with emphasis on rote learning and standardized tests rather than skill acquisition. This limits the teachers' ability to teach in the innovative method of imparting the 21 Century learning skills.

Fixed Standards and Assessment Curriculums are usually strict in following a set of standards that focus more on the content understanding, instead of developing abilities. These approaches stimulate myopic thinking on exam preparation rather than a comprehensive education.

Poor Instructors Training Instructors Most teachers do not have requisite training programs and resources to teach effectively the 21st century competencies. The present professional development programs seldom reach out to the possibility of how possible integration into other existing syllabuses may occur.

Rigid Curricular Structures The inability to achieve the necessary elasticity could arise as a result of this inflexibility in adapting the lessons to the 21 st century modalities The lack of connection between education and life in practice.

According to those surveyed, industry practitioners were also concerned about resource constraints. Respondent 4 expressed that "There is a lack of resources, including budgetary funds," which have an effect on the directions for implementing tool strategies. To further explain his comments, Respondent 5 noted that 'it is rather heavy work or rather we can say it is quite difficult to engage in certain activities which may require huge amounts of resources or time bearing in mind there are so many students – whereby individual attention may be needed.' In our century 21st century/21st century, it becomes necessary for teachers to have competencies on how to build and manage classroom activities effectively; communicate effectively; use technologies effectively; and continuously reflect upon and improve upon learning practices (Selman, 2020; Naeem, Ali, & Ahmed, 2022). There has been a call for schools to develop programs that would help teachers understand learners' needs as well as teaching strategies which would match them accurately so as to create knowledge about their delivery options while taking into consideration different learners' differences (Oad et al., 2024; Kolachi et al., 2024).

There are different techniques which are used to evaluate the progression of students about 21st-century competencies. Specifically, Respondent said that 21st-century learners must be assigned tasks which necessitate technology and other skills applicable for learners in this era. Thus, the technique ensures that assessments match the skills taught and can literally measure how well the students perform.

The results of the education may be measured on the level of the constant development of a student. The increase in conduct, self-belief, achievement, and ability is an indicator of the impact of the institute on personal experiences. This type of development is an indication of what quality education is therefore supporting the argument that student achievement is a genuine indicator of school performance. Most of the modern theories of student development are oriented towards the general academic, social and emotional maturity or development. Pascarella and Terenzini (2005) affirm institutional experiences are critical in influencing student outcomes therefore constant development must always be express through them (Akram, Fatima & Ahmad, 2024).

Recommendations

In line with the comprehensive review on the application of 21 st -century skills in education, the section proposes recommendations and suggestions to the educationalists and decision-makers among other stakeholders. These suggestions rest on the available literature and research results and provide practical guidelines of how collaboration, communication, critical thinking and innovativeness can be incorporated in education. Teachers are supposed to adopt and integrate pedagogies which are student centered inquiry pedagogies which can promote 21 st century skills such as project based learning (PBL) and problem based learning (PBL). Develop and introduce curriculum units which include PBL such that learners are able to practice solving real life problems. Use web-based tools and resources to publicize group projects hence supporting interactive learning strategies. Institutions need to offer ongoing professional growth opportunities that are aimed at ensuring that the teachers are empowered to teach and assess the competencies of the 21st century with success. Create professional developmental initiatives that include training on creative ways of teaching and evaluation of skills of the 21st century together with competency of utilizing technology effectively. Develop community of practices between educators in which they can exchange experiences, resources, and exemplary practices in teaching 21st century skills.

Policy-makers need to drive forward and make the implementation of changes in curriculum and policy that will introduce the concept of 21st century skills in each tier of learning and learning discipline. Once again, the curricula must be revisited to allow flexibility to enable the teachers incorporate the 21st century skills in the programs. Also, in the education reform, funding of research and innovation in the sector will offer effective means of imparting skills that will equip students with the skills needed in the 21st century and in the same breath provide a footing on which policy can be based. This is whereby educators and institutions are supposed to use technology

strategically to enhance the acquisition of 21st century competencies that would guarantee equity in access and promotion of digital literacy. An example of such technologies can be online discussion forums multimedia resources and digital collaboration tools that allow cooperative learning to occur using various modalities. Besides these, we should also close the digital divide by making sure that all the students have the required tools and resources needed in addition to training on how they can learn to be digitally literate. The other aspect to consider would be the methods of assessment that extend beyond the practice of traditional testing and turn their attention towards performance based tests and portfolios which can accurately assess the 21st century competences of students. In addition, rubrics must be created and implemented in such a manner that they outline standards of emotional assessments or project based ones that measure 21st century skills Facilitate help to construct and use nontraditional evaluations that provide useful reports concerning the progress of pupils in these specialized skills. Reduce disparities in technology access and access to computer education programs by all learning institutions as one of the efforts to ensure that all learners acquire the required 21st century competencies. By using online platforms or at schools, roll out a program to provide every child with digital devices and high speed internet, to use. Market digital literacy in the curriculum at all levels of education ensuring that students are able to employ technology appropriately and cautiously.

Conclusion

Therefore, teachers, policy makers and the entire education fraternity need to collaborate in order to apply these recommendations. It can be ensured that education systems are designed to produce 21st century skills that students require to succeed in the modern world by using new pedagogies; professional growth; advocacy of policy; use of technology; alternative assessment besides providing solutions to equity challenges through the innovations of stakeholders. The success of such initiatives will be determined by a shared dedication to reforming education to keep up with the demands of the 21 st century basing on empirical research and ongoing debate. The need to integrate the 21st-century competencies into the education process requires a multifunctional approach that addresses the pedagogical, systemic, or technological challenges. Based on empirical research and theories, this evaluation focuses on the innovation in instruction methods, teacher education programs, policies, which facilitate equity in accessing technology among others. Also, in the context of a constantly evolving system of schools over the years, the thoughts expressed by teacher-educators with literature references are helpful in equipping students to survive in the complexities of the 21st century.

References

Acedo, C., & Hughes, C. (2014). Principles for learning and competences in the 21st-century curriculum. *PROSPECTS*, *44*(4), 503-525. https://doi.org/10.1007/s11125-014-9330-1

Afandi, A., Sajidan, S., Akhyar, M., & Suryani, N. (2019). Development frameworks of the Indonesian partnership 21st-century skills standards for prospective science teachers: A Delphi Study. *Jurnal Pendidikan IPA Indonesia*, *8*(1), 89-100. https://doi.org/10.15294/jpii.v8i1.11647

Aghazadeh, S. (2019). Assessment of 21st century skills (NIE Working Paper Series No. 14). Singapore: National Institute of Education. https://hdl.handle.net/10497/22420

Ahmad, N., Mankash, M. A., & Sewani, R. (2024). The Dynamic Link between Teacher Effectiveness and Student Success in Secondary Education in Karachi. *Journal of Social & Organizational Matters, 3*(2), 14–26. https://doi.org/10.56976/jsom.v3i2.61

Ahmad, N., Noorani, Z. & Ali, Z. (2024). Factors Influencing on Job Satisfaction of Secondary School Teachers in Karachi Pakistan. *Research Journal for Societal Issues, 6*(2), 138–152. https://doi.org/10.56976/rjsi.v6i2.213

Ahmad, N., Sewani, R., & Khoso, F. J. (2024). Assessing Secondary School Teachers' Perceptions of Counseling and Guidance in Karachi, Pakistan. *Global Social Sciences Review, IX*(I), 134-144. https://doi.org/10.31703/gssr.2024(IX-I).12

Akram, M., Ahmad, N., & Sewani, R. (2024). Comparing Special Education Teachers' Psychological Wellbeing Based on their Demographics. *International Journal of Social Science Archives, 7*(3), 23-32. https://doi.org/10.2139/ssrn.5165865

Akram, M., Fatima, S. A., & Ahmad, N. (2024). Comparing Students' Science Motivation and their Achievement in Science Subjects at Secondary Level. *Global Social Sciences Review, IX*(II), 72-83. https://doi.org/10.31703/gssr.2024(IX-II).08

Akram, M., Khan, A. Y., & Ahmad, N. (2022). Exploring Influence of Learning Management System On Management Functions Of E-Leadership. *Webology*, *19*(2), 9550–9575.

Akram, M., Sewani, R., & Ahmad, N. (2024). Policy Perspective of Special Education Teachers Regarding Quality of Work Life. *Journal of Policy Research. 10*(2), 658–665. https://doi.org/10.61506/02.00282

Ali, Z., Younis, S., Ahmad, N., Saba, F., & Ullah, N. (2023). Teachers' Perspective of Technology Integration Effects on Students Learning At University Level. *GRADIVA*, *62*(5), 29–38.

Anderson-Levitt, K. (2023). 21st century skills in the United States: A late, partial and silent reform. In *Contextualizing Global Flows of Competency-Based Education* (pp. 99-114). Routledge.

Barron, B., & Darling-Hammond, L. (2008). Teaching for meaningful learning: A review of research on inquiry-based and cooperative learning. Book excerpt. *George Lucas Educational Foundation.*

Beghetto, R. A. (2007). Does creativity have a place in classroom discussions? Prospective teachers' response preferences. *Thinking Skills and Creativity*, *2*(1), 1–9. https://doi.org/10.1016/j.tsc.2006.09.002

Bolden, D. S., Harries, T. V., & Newton, D. P. (2009). Pre-service primary teachers' conceptions of creativity in mathematics. *Educational Studies in Mathematics*, *73*(2), 143-157. https://doi.org/10.1007/s10649-009-9207-z

Chen, D. (2021). Toward an understanding of 21st-century skills: From a systematic review. *International Journal for Educational and Vocational Guidance*, *23*(2), 275-294. https://doi.org/10.1007/s10775-021-09511-1

Dede, C. (2010). Technological supports for acquiring twenty-first-century skills. *International Encyclopedia of Education*, 158-166. https://doi.org/10.1016/b978-0-08-044894-7.00739-9

Erdoğan, E., & Cavlı, E. (2019). Investigation of organizational commitment levels of physical education and classroom teachers. *Universal Journal of Educational Research*, *7*(1), 259-265. https://doi.org/10.13189/ujer.2019.070133

Hagevik, R., Aydeniz, M., & Rowell, C. G. (2012). Using action research in middle level teacher education to evaluate and deepen reflective practice. *Teaching and Teacher Education*, *28*(5), 675-684. https://doi.org/10.1016/j.tate.2012.02.006

Hilman, M. H. (2013). Information system as a service: Issues and challenges. *Jurnal Sistem Informasi*, *8*(2), 71. https://doi.org/10.21609/jsi.v8i2.328

Indicators, O. E. C. D. (2012). Education at a Glance 2016. *Editions OECD*, *90*.

Kagle, M. (2014). Professional Learning Communities for Pre-Service Teachers. *National Teacher Education Journal*, *7*(2).

Karaca-Atik, A., Meeuwisse, M., Gorgievski, M., & Smeets, G. (2023). Uncovering important 21st-century skills for sustainable career development of social sciences graduates: A systematic review. *Educational Research Review*, *39*, 100528. https://doi.org/10.1016/j.edurev.2023.100528

Kim, S., Raza, M., & Seidman, E. (2019). Improving 21st-century teaching skills: The key to effective 21st-century learners. *Research in Comparative and International Education*, *14*(1), 99-117. https://doi.org/10.1177/1745499919829214

Kokotsaki, D. (2011). Student teachers' conceptions of creativity in the secondary music classroom. *Thinking Skills and Creativity*, *6*(2), 100-113. https://doi.org/10.1016/j.tsc.2011.04.001

Kolachi, I. A., Shah, S. G., Ahmed, I., Ali, Z., & Ahmad, N. (2024). Factors affecting English language teachers' participation in professional development at private universities in Karachi, Pakistan. *Journal of Policy Research*, *10*(2), 697-705. https://doi.org/10.61506/02.00287

Leadbeater, C., & Wong, A. (2010). Learning from the extremes: A white paper. *San Jose, Calif., Cisco Systems Inc*.

Li, L. (2022). Correction to: Reskilling and upskilling the future-ready workforce for industry 4.0 and beyond. *Information Systems Frontiers: A Journal of Research and Innovation*. https://doi.org/10.1007/s10796-022-10318-w

Mcdonald, D., & Kahn, M. (2014). So, You Think You Can Teach?"-Reflection Processes That Support Pre-Service Teachers' Readiness for Field Experiences. *International Journal for the Scholarship of Teaching and Learning*, *8*(2).

Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A framework for teacher knowledge. *Teachers College Record (1970)*, *108*(6), 1017–1054. https://doi.org/10.1177/016146810610800610

Naeem, S., Ali, D. Z., & Ahmed, D. N. (2022). Evaluation of the causes of interest decline in the subject of chemistry amongst secondary and higher secondary school students in Karachi Pakistan. *International Journal of Social Science & Entrepreneurship*, *2*(2), 175–184. https://doi.org/10.58661/ijsse.v2i2.48

Nuccio, M., & Mogno, S. (2023). Knowledge, skills, and competences (KSC) in the knowledge-based economy. In *Mapping Digital Skills in Cultural and Creative Industries in Italy: A Natural Language Processing Approach* (pp. 1–22). Springer.

Oad, L., Shah, R., Sewani, R., Ahmad, N., Akhtar, N., & Imran, M. (2024). Empowerment of Artificial Intelligence in Learning Optimisation Student Perceptions in Karachi, Pakistan. *INTERNATIONAL JOURNAL OF EDUCATIONAL SCIENCES, 47*(2), 34-44. https://doi.org/10.31901/24566322.2024/47.02.1374

Pascarella, E. T., & Terenzini, P. T. (2005). *How College Affects Students: A Third Decade of Research. Volume 2*. Jossey-Bass, An Imprint of Wiley. 10475 Crosspoint Blvd, Indianapolis, IN 46256.

Pirzada, G., Tabassum, R., & Ahmad, N. (2024). WHY IS TVET NOT WORKING IN PRISONS? AN EXPLORATION OF PRISONS-BASED VOCATIONAL TEACHERS' PERSPECTIVES. *JOURNAL OF SOCIAL SCIENCES DEVELOPMENT, 3*(3), 165–178. https://doi.org/10.53664/JSSD/03-03-2024-14-165-178

Plucker, J. A., Beghetto, R. A., & Dow, G. T. (2004). Why isn't creativity more important to educational psychologists? Potentials, pitfalls, and future directions in creativity research. *Educational Psychologist*, *39*(2), 83-96. https://doi.org/10.1207/s15326985ep3902_1

Purwanto, M. B., Hartono, R., & Wahyuni, S. (2023). Essential skills challenges for the 21st century graduates: Creating a generation of high-level competence in the Industrial Revolution 4.0 era. *Asian Journal of Applied Education (AJAE)*, *2*(3), 279-292. https://doi.org/10.55927/ajae.v2i3.3972

Radifan, M. F., & Dewanti, R. (2020). The incorporation of 4C skills in senior high school English teachers' lesson plans. *Stairs*, *1*(2), 75-87. https://doi.org/10.21009/stairs.1.2.4

Rahman, M. M. (2019). 21st Century Skill "Problem Solving": Defining the Concept. *Asian Journal of Interdisciplinary Research, 2*(1), 64-74. https://doi.org/10.34256/ajir1917

Rao, D. B. (2003). *Higher Education in the 21st Century*. Discovery Publishing House.

Robinson, K. (2006). *How schools kill creativity (online video). TED Conference 2006. Monterey, Calif.*

Saavedra, A. R., & Opfer, V. D. (2012). Learning 21st-Century skills requires 21st-Century teaching. *Phi Delta Kappan*, *94*(2), 8-13. https://doi.org/10.1177/003172171209400203

Selman, Y. F. (2020). Evaluation of The Implementation of 4C Skills in Indonesian Subject at Senior High Schools. *JPI (JurnalPendidikan Indonesia)*, *9*(2), 244-257.

Shah, S. G. M., Ali, Z., & Ahmad, N. (2024). Analytical study of Awareness of Metacognitive Reading Strategies and Reading Comprehension among College Students. *Voyage Journal of Educational Studies*, *4*(1), 34–46. https://doi.org/10.58622/vjes.v4i1.120

Sweller, J. (2019). Cognitive load theory and educational technology. *Educational Technology Research and Development*, *68*(1), 1-16. https://doi.org/10.1007/s11423-019-09701-3

Syawaludin, A., Gunarhadi, G., & Rintayati, P. (2019). Enhancing Elementary School Studentsâ€™ Abstract Reasoning in Science Learning through Augmented Reality-Based Interactive Multimedia. *Jurnal Pendidikan IPA Indonesia*, *8*(2), 288-297. https://doi.org/10.15294/jpii.v8i2.19249

Ward, J. R., & McCotter, S. S. (2004). Reflection as a visible outcome for preservice teachers. *Teaching and Teacher Education*, *20*(3), 243-257. https://doi.org/10.1016/j.tate.2004.02.004

Warschauer, M. (2004). *Technology and social inclusion: Rethinking the digital divide*. MIT press.

Zhao, J. (2010). School knowledge management framework and strategies: The new perspective on teacher professional development. *Computers in Human Behavior*, *26*(2), 168-175. https://doi.org/10.1016/j.chb.2009.10.009

Zubaıdah, S., Fuad, N. M., Mahanal, S., & Suarsını, E. (2017). Improving creative thinking skills of students through differentiated science ınquiry ıntegrated with mind map. *Journal of Turkish Science Education*, *14*(4), 77-91. https://www.tused.org/index.php/tused/article/view/175