2030 Work Skills as Predictors of Pre-Service Science Teachers' Readiness to Implement 21st Century Learning

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Abstract

This study focused on the 2030 work skills recommended by the Organisation for Economic Cooperation and Development that predicts the readiness of the Pre-Service Science Teachers in implementing 21st century learning. The researcher used a descriptive-correlational quantitative research design and regression analysis that was adopted, and statistical tools were used to assess the relationship between independent and dependent variables. It was conducted in Laguna State Polytechnic University campuses; Los Banos, San Pablo, Siniloan and Sta. Cruz. Based on the findings, the study revealed that there is a significant relationship between cognitive and metacognitive, social and emotional, and practical and physical skills to their readiness to implement 21st-century learning. In regression analysis, it revealed that as the practical and physical skills of the pre-service teacher's increases, their readiness to implement also increases. The findings of the study may provide pre-service science teachers a guide on the skills needed in 2030 so they can focus more on what area or aspect they need to improve. Likewise, the teachers may create a learning environment where pre-service teachers will be more engaged and help them utilize their full capacity. Furthermore, the University or any educational institution may offer webinars/seminars regarding the skills needed by the pre-service teachers as well as training. Future researchers may be motivated to conduct further studies by employing other variables.

Keywords: Work Skills, Work Readiness, 21st-Century Learning, Pre-Service Science Teachers

1. Introduction

Teaching skills are essential while working as an educator. Skills being possessed by an individual, specifically teachers are what assist to keep the students engaged and interested in learning even when changes in environmental set-up occur. Skills also enable instructors to communicate with students and perform purposeful topic area explorations. It is an extremely valuable tool that is used for lesson preparation and implementation.

According to Tumanduk (2020) from Science and Teacher Publication, a teacher's readiness and preparation is a necessary condition for effective teaching. If the teacher's willingness to teach is diminished, the learning process is also diminished, which has an influence on student learning accomplishment.

Pre-service teachers that are more flexible, especially with the skills they have are better equipped to adapt to the changing nature of education and manage a complicated environment when the time comes that they will be the one handling students and managing classroom set-ups. Skills experienced and gained in 2020 by the pre-service teachers may differ from those required in 2030 to their future students, depending on the level of progress happening. Learners in 2020 have different skills than those who will be in 2030 as a result of advancements in technology, knowledge, and environment. Adaptability of skills being possessed boosts the chances of success, since teachers are having different batches of students while working in school. There are moments in life when we are confronted with unexpectedly terrible events. Being adaptive enables teachers to remain afloat when difficulties arise at school. To stay competitive, teachers must continuously acquire new skills, which involves adaptability, a good attitude toward lifelong learning, and a healthy dose of curiosity.

The development of skills called the 21st century skills is gaining focus and attention as a method of enhancing the instructional quality of teachers in today's set-up in school. It is also known as the age of knowledge, which shows that alternative strategies of meeting basic human needs in a variety of circumstances will increasingly be based on information. This 21st century skill enables students to succeed in an ever-changing world where learning never ends. However, a significant barrier to achieving desired changes is a dearth of context-specific knowledge about teaching techniques and relevant strategies to promote teacher professional development. Learning outcomes are critical components of the learning process. This is because learning outcomes can be used to identify the amount to which students experience changes after their learning experiences. These changes are observed and quantified in the form of knowledge, attitudes, and abilities (Sumyadi, 2020).

21st century learning is defined as student-centered learning. The focus on students as active discoverers who own their experiences is a hallmark of 21st century learning. Many active learning proponents believe it better prepares pupils for circumstances that need more than a memorized answer. Collaborative, digital literacy, critical thinking, and problem-solving are some of the fundamental abilities that help them survive in today's environment. As John Dewey said, "Give the pupils something to do, not something to learn; and the doing is of such a nature as to demand thinking; learning naturally results.". With this idea, students are learning in the hands of the teachers. Having skilled and better-performing teachers with the knowledge of what is needed to be learned will result in skilled and better-performing students.

The focus of this research is to emphasize if the 2030 work skills can be used as a predictor in readiness of implementing 21st century learning in education. According to the Organization for Economic Co-operation and Development (2018), there are 3 different types of skills needed in 2030. These are cognitive and meta-cognitive skills which are the possession of facilitating the use of language, numbers, logic, and knowledge and a combination of verbal and nonverbal talents and metacognitive skills which is the capacity to recognize one's knowledge, abilities, attitudes, and values, social and emotional skills which are collections of personal abilities that help individuals to grow and create connections at home, school, job, and in the community and practical and physical skills which are the use of physical devices, procedures, and functions. They include manual skills like using modern machinery and ICT

gadgets. Practical skills are needed to utilize and handle materials, tools, equipment, and artifacts.

Education is being updated and upgraded as the globe changes. Daily headlines are filled with intriguing scientific discoveries, technical advancements, and new technologies, but there are also many challenges. According to Kuddus (2018), the remarkable advancement of technology has had a considerable impact on the area of education, particularly language teaching and learning. The use of information and communication technologies, as well as the most recent technical advancements, in language instruction, has been spectacular. This changing world necessitates that we have the necessary skill set to address these concerns. To address challenges, both decision-makers and ordinary individuals must be adaptable, have the strength to take the initiative, and think creatively.

The support systems that organize the conditions in which people learn best–systems that fit the specific learning demands of each learner and promote the good human interactions required for effective learning–are the 21st century learning environments (Ubaidillah, 2017). Due to the conditions and complexity of the twenty-first century, individuals living in the information and technology society are expected to possess higher-level skills such as critical thinking, decision-making, communication, creative thinking, and problem solving, rather than relying solely on content-based teaching and talent development processes.

Teachers are crucial in fostering and altering future work abilities. According to Jan (2017), teachers in the twenty-first century must think about their students' needs and prepare them to confront future challenges. A teacher's job is regarded as challenging and demanding. A high-quality professional teacher development program is required for the development of a high-quality professional teaching force. The incorporation of technology in education must be integrated into the development program.

According to OECD Future of Education and Abilities 2030 (2018), the Learning Compass 2030 differentiates three categories of skills: cognitive and metacognitive skills, social and emotional skills, and practical and physical skills.

Cognitive abilities are a collection of cognitive processes that allow people to use language, numbers, reasoning, and learned information. To enhance learners' cognitive skills, it is vital to include them in mutual learning strategies and collaborative activities, such as modeling and coaching one another (Goksun, 2017).

Social and emotional skills are a collection of individual capacities that can be manifested in persistent patterns of thoughts, feelings, and behaviors that allow people to grow themselves, build connections at home, school, work, and in the community, and fulfill civic obligations. A collection of abilities to employ physical tools, procedures, and functions is referred to as physical skills. Training in emotional competencies is required so that both children and teachers can effectively adjust. This is vital not just for building such abilities in pupils and preventing mental health difficulties in instructors, but also for fostering suitable learning environments (Palomera, 2008).

Since stakeholders are the ones who act on the educational change, readiness is regarded to be a vital precursor to successful implementation. When stakeholder preparedness is high, they are more involved in the change effort, put in more effort in the change process, and are more persistent in the face of hurdles or setbacks, all of which help to the effective implementation of the new program. The ability to adapt to changes in the educational system contains persistent, situational, and conditional components. It is the degree to which an individual or community is conditioned to accept, embrace, and implement the reform (Buenvinida, 2020).

According to Panergayo, Gregana & Panoy (2021), a teacher should be involved in a community that is practicing the process of scientific inquiry for practical skills, which will assist them in implementing the approach needed in their various classrooms. Adapting in daily life may be simple, but various factors might influence the situation, including the present and future. Having skills may help anybody survive in an ever-changing environment. Preparing oneself via situated learning and education can aid in the development of decent citizens in society in the future.

The Department of Education is the Philippine government's executive branch in charge of providing access to, promoting equity in, and enhancing the quality of basic education. It is the primary agency in charge of managing and governing the Philippine basic education system.

2. Literature Review

2.1 Cognitive and Metacognitive Skills

Cognitive flexibility is critical in the workplace on both a local and macro level. It enables anyone to juggle many notions simultaneously and so enhances their cognitive performance. On a regular basis, people might exercise cognitive flexibility without recognizing it. This occurs when people multitask or transition between tasks. It also occurs when individuals communicate with one another and go from speaking with a consumer to speaking with other peers. Without mental flexibility, individuals would be unable to switch their brains from one scenario to the next. (Miller, 2021).

According to Thienngam, et al. (2020), the metacognitive process is the process through which learners enhance their intellectual capacity and ability to make sound judgments, as well as their capacity to be more comprehensive and learn more effectively. Metacognitive skills are critical and advanced cognitive abilities that teachers should develop for themselves and early childhood learners in order to develop early childhood learners' cognition and ability to solve problems efficiently in the future. They are also critical skills for the twenty-first century. Metacognitive learning is the process of strengthening learners' intelligence and enabling them to make sound judgments, as well as assisting them in becoming more comprehensive and enhancing their learning.

Cognitive abilities such as creativity and self-regulation, as well as social abilities such as accountability, involve the capacity to analyze the repercussions of one's actions, to weigh risk and reward, and to take responsibilities for one's work products. This demonstrates moral and intellectual maturity, the capacity to reflect on and analyze one's conduct in light of one's

experiences, personal and social objectives, what one has been taught and told, and what is good or wrong (Organisation for Economic Co-operation and Development, 2018).

According to Gabrys (2018), from the Department of NeuroScience, cognitive control and cognitive flexibility are critical components of an individual's capacity to adapt to changing situations. Along with supporting goal-directed activity, cognitive control and flexibility have been linked to emotion regulation, and deficits in these capacities have been associated with mood and anxiety disorders. It also has been linked to a variety of goal-directed activities, including creativity, problem-solving, multitasking, and decision-making.

Cognitive flexibility is the capacity to make transitions between mental processes in order to create appropriate behavioral responses, develops slowly and is impaired in a number of common neurodevelopmental disorders. It is unknown if cognitive flexibility is a result of unique neural substrates from the executive control network or of the interaction of nodes within this and other networks (Uddin, 2017).

Flexible thinking is critical for creativity, the capacity to generate new ideas, develop unique connections between existing ideas, and create new creations. Additionally, it promotes academic and professional abilities such as problem solving. Also, it may assist defend against a variety of biases, including confirmation bias. This is because cognitively flexible individuals are more adept at seeing possible flaws in themselves and devising solutions to overcome them (Sahakian, 2021).

Metacognition is a process that encompasses one's own perception, comprehending, memorizing, and which forms the surface framework of data processing and supervises and controls cognitive processes. In other words, it shows that the individual understands the structure and operation of his own cognitive system, as well as what he is learning and how to learn it (Coskun, 2018).

According to Iftikhar (2014), metacognition is described as "cognition about cognition" or "knowing about knowing." It is the recognition and comprehension of one's own cognitive processes. It may also be described as knowledge and awareness of one's own cognitive processes and strategies, as well as the ability to deliberately evaluate and react on that knowledge of cognition to alter those processes and tactics (Dogomeo & Aliazas, 2022).

According to Kim et al. (2015), intelligence, scientific problem-solving, metacognition, motivation to learn, and learning styles are some of the notions and methodologies used in cognitive skill development. While the concepts and applications of each of these categories varied significantly, it becomes obvious that cognitive skills development is one of the most essential college student outcomes due to its "applicability and value across a wide variety of diverse curriculum areas."

2.2 Social and Emotional Skills

According to Aygun (2017), social-emotional learning is concerned with children's self-awareness, social consciousness, decision-making abilities, ability to form connections, and capacity for self-management. As a result, it plays a critical role in the lives of children. Teachers should constantly take into account social-emotional learning issues such as violence,

child abuse, hostility, anti-social, and maladaptive behavior, which are on the rise globally. Social-emotional learning programs are designed to help instructors improve their classroom management abilities, build teacher-student connections, and assist students in developing social skills. Teachers who possess these abilities can handle pupils who are experiencing social and emotional difficulties or who are experiencing new difficulties.

Emotional intelligence is important because it enables individuals to enhance their interpersonal interactions on a personal and professional level. Self-awareness, self-regulation, motivation, empathy, and social skills are the five components of emotional intelligence at work. The advantages of emotional intelligence in the workplace include the ability to better comprehend nonverbal clues, alter behavior appropriately, make sound judgments, and develop into a recognized leader (Indeed, 2021).

According to Huppke (2013), the ability to comprehend and regulate one's emotions is referred to as emotional intelligence. Self-awareness, self-regulation, motivation, empathy, and social skills are all components of emotional intelligence. It has recently become a bit of a buzzword in human resources departments the world over, but academics believe it is past time for emotional intelligence to be treated seriously. Accepting the complexities of human emotion in the workplace may result in pragmatic advantages such as increased employee cooperation and a happier workplace.

According to Cherry (2020), emotional intelligence is critical not just for personal well-being, but also for professional success. It is generally acknowledged as a vital talent that aids in the improvement of workplace communication, management, problem-solving, and relationships. Additionally, experts feel that it is a talent that can be enhanced via training and practice. It is critical in a manner that individuals will always face obstacles at work; what matters is how they will deal with those things emotionally.

Social intelligence is critical for developing efficient communication, conversation, and collaboration abilities necessary for fostering an optimum and productive work environment (Fideli & Aliazas, 2022). To operate successfully and efficiently as a team, it is necessary to identify and control one's own and others' emotions, while also being able to use them to one's benefit. Emotional intelligence is only beneficial when combined with social intelligence - the capacity to recognize and express emotions but also to utilize them correctly in social situations and interpersonal interactions. According to neuroscientific studies, rather than two autonomous brains (individuals) operating and responding to one another, the brain chemicals in a socially competent person become merged and behave as if they were a single entity. As a result, they become more empathic and understanding (Bharati, 2021).

Intra and interpersonal abilities such as communication, teamwork, and cooperation are examples of social skills. To varied degrees, social skills as personality qualities, social grace, linguistic proficiency, personal habits, friendliness, and optimism. In recent years, social skills have become increasingly crucial to academic capabilities and are closely connected with success in life and work, which has piqued the curiosity of many studies. Educators bear a higher responsibility for social skills development in the educational area since they have a

substantial effect on the development of their students' talents. Furthermore, social skills are crucial in their everyday life at school, with classmates, and with their families (Tadjer, 2018).

2.3 Practical and Physical Skills

The capacity to design, adapt to student requirements and interests, give, get feedback on, adjust, and re-deliver scientific teaching explanations is a key talent for physics and chemistry instructors. Such explanations rely not only on teachers' science topic expertise, but also on their understanding of their pupils, as well as their rapport and interactions with them.

According to Allery (2009), the four-step methodology for teaching practical skills consists of the following steps: (1) real-life demonstration – the trainer shows the skill in its entirety in real time and without commentary. This allows trainees to observe the skill's mastery. (2) Trainer talks through - the trainer repeats the technique, describing each step and maneuver, addressing trainee questions, and clarifying any points. (3) Learner talks through - the trainee guides the trainer, giving the trainer guidance on each step and technique while the trainer does the task. (4) learner does - the trainee does the skill under close observation, offering feedback on each action as it is performed.

Practical skills play a vital role, but they cannot carry the entire weight and must be utilized in conjunction with other teaching methods. More precisely, practical work is critical for providing students a "feel" for measurement problems and an understanding of the pervasiveness of uncertainty (or measurement error). It is also a useful teaching tool for experimental design (Millar, 2004).

The Life Skills program is a comprehensive behavior modification strategy that focuses on the development of life skills such as communication, decision–making, thinking, regulating emotions, assertiveness, self–esteem building, resisting peer pressure, and interpersonal skills.

It fosters the capacity to operate confidently in groups as well as alone. It improves critical thinking abilities and challenges students to make conclusions and judgements based on evidence, some of which may be partial or faulty. It helps pupils become more self-sufficient and less reliant on knowledge supplied by the teacher. Practical work, on the other hand, is not always simple, and perseverance is essential for skills and confidence to develop (Geelan, 2020).

2.4 Readiness in 21st Century Learning

As per 21st-century education standards, the globe has become increasingly globalized. The era of globalization and internationalization is drawing to a conclusion in education in the twenty-first century. Every person needs 21st-century talents in order to thrive in today's globalized world.

Today's educational orientation necessitates those teachers enhance their abilities, adapt, and prepare themselves to meet changes. They must be prepared. The condition of an individual to respond to specified conditions is characterized as readiness.

In the context of language teaching, readiness refers to being ready to instruct students. Knowledge, attitude, and preparedness to apply lessons in the classroom are all examples of

preparation. When it comes to preparing for 21st-century education, preparedness may be defined as being prepared to confront the changes expected by the new age of the 21st century (Padmadewi L. P., 2020).

According to Rosdiana (2019), the physical environment of a school is critical and must be well-designed to support the teaching and learning processes of the twenty-first century. In order to meet the needs of the twenty-first century, it is vital to use learning approaches that necessitate collaboration between instructors and students in order to foster active, communicative, and creative learning. Additionally, learning must be effectively organized so that the teaching and learning processes become more successful, and completed learning must be evaluated so that the subsequent learning process may discover shortcomings that need to be addressed and strengths that need to be developed. It is also inextricably linked to the instructor, who must be familiar with each student's personality. Teachers' ratings provide insight into their pupils' personalities.

Teachers are expected to be highly capable of developing and executing teaching and learning strategies that meet the demands of immersing 21st century learning abilities through effective, entertaining, and interactive pedagogical practice. Furthermore, learning may be carried out in meaningful ways by employing a method that stimulates learners to think and acquire meaningful knowledge (Yunos, 2015).

To encourage these 21st-century abilities, educators must be creative in their teaching and learning methodologies in order to increase their students' engagement in the learning environment. To foster these future talents, educators should employ new tactics and current learning tools that assist to combine cognitive and social skills with material knowledge, as well as improve student engagement in the learning environment (McGuire, 2015).

A teaching practicum is a component of a student's preparation to become a novice teacher. However, before a trainee teacher may teach at a school, he or she must first complete a number of prerequisites. A lack of institutional preparation might have a substantial impact on trainee teachers' preparedness to teach in schools.

Teachers' readiness is defined as their capacity and abilities to apply instruction in the classroom. Changes in national education policy are believed to have a good influence on the sustainability of the education system, although teachers might find it difficult to adjust to these changes at times. Teachers are caught between established practice and new ideas because of the difficulty and complexity of change (Endot, 2021).

According to Silm, et al. (2017), teachers' greater sense of effectiveness is connected to their willingness to try novel teaching approaches. As instructors' opinions are key indicators of adopting new approaches, such as inquiry (Javier & Aliazas, 2022). It is founded on the idea that understanding is created by people working together to solve problems, make discoveries, and extensively test those discoveries. Furthermore, using a variety of learning techniques can aid in the better transmission of knowledge. It might lead to new discoveries and learning.

Teachers' expertise and attitudes are extremely valuable to the system since these professionals may resolve any gaps between formally defined education programs and their actual delivery,

in terms of curriculum modification and adjustments acceptable for students with special needs (Ecoben, 2019). In many aspects, expertise is essential to education. It provides critical information on learning and knowledge acquisition, which may aid in the improvement of teaching and training methods. Further, attitude plays an important part in managing life's highs and lows. A teacher in the twenty-first century must have a positive attitude in order to help their students manage. Because attitude dictates how a person copes, your point of view will always have an impact on your performance and how you deal with failure.

Teachers must not only comprehend the details of the curriculum or instructional methodologies they are to execute, but also support the rationales behind their adoption and be given the chance to apply them in their own professional practice (Trombly, 2014). The curriculum guide, mission, and vision of the school where they work must not only be relayed in the twenty-first century, but they must also go behind it. Learn how to adapt to the world around them. Cope up on the information they're obtaining while also supporting the professional practice they're dealing with.

The essential abilities for learning and innovation that are thought to help pupils flourish in today's digitally and internationally interconnected environment are referred to as 21st century learning skills. These include creativity and invention, critical thinking and problem solving, communication and teamwork, as well as knowledge of information, media, and technology (Waemusa, 2019).

According to Strakova (2015), being ready to take on the tasks of the teaching profession at the start of one's career appears to be highly crucial in order to begin creating and keeping a positive attitude toward one's employment. Educators, in particular, appear to be at danger of disillusionment, feeling a high level of uncertainty, and burnout due to a variety of variables affecting the teaching profession. Uncertainty about how to act as a teacher, as well as sentiments of not being properly prepared for the profession, did not appear to exist among the group of pre-service teacher trainees at the end of their training. It could be fascinating to follow up on their progress after a year of teaching to see if their strong belief in themselves had altered or been influenced by the realities of teaching.

In order to meet the demands of students and the expectations of the global world, teachers in the basic education curriculum must have 21st century abilities. Teachers in grades K-12 and in the twenty-first century are expected to be multi-skilled, multi-literate, and multi-specialists, among other things. Kids preparing to become future teachers of students in grades K-12 must be evaluated in terms of the aforementioned skills, which include learning and innovation skills, information, media, and technology skills, and life and career skills (Tan, 2016).

3. Methodology

The research design that was used in conducting the study is a descriptive-correlational design which tends to describe and establish the relationship between pre-service science teachers' readiness to implement 21st century and work skills 2030.

The descriptive method is also known as statistical research according to Calderon (2008). It contains information and characteristics about the population or phenomenon under

investigation. Frequencies, averages, and other statistical computations are calculated using this research method. Before moving on to the analysis of the hypothesized link to be researched, the researcher used questionnaires as the primary tool to collect all the data required by a survey inquiry to address the problem.

The majority of respondents are from Sta. Cruz Campus, with a frequency of twenty-nine (29) and a percentage of forty (40), followed by Los Baños Campus, with a frequency of ten (10) and a percentage of fourteen (14), San Pablo Campus, with a frequency of nineteen (19) and a percentage of twenty-six (26), and Siniloan Campus, with a frequency of fourteen (14) and a percentage of twenty (20). It seems that the majority of responders are from Sta. Cruz, followed by San Pablo, Siniloan, and finally Los Baños.

A revised adapted questionnaire was the primary instrument that generated the data for this study. The instrument used to measure the cognitive and metacognitive skills were from Robert Gabrys' research entitled "Cognitive Control and Flexibility in the Context of Stress and Depressive Symptoms: The Cognitive Control and Flexibility Questionnaire". In social and emotional skills, instrument from L. Faria and Santos in their study Validation of the Emotional Skills and Competence Questionnaire (ESCQ) in the Portuguese academic context were utilized. Lastly, Norazlin Mohd Rusdin's instrument from her research entitled Teacher's Readiness in Implementing 21st century learning was used to know the readiness of pre-service science teachers' readiness in implementing the 21st century skills. The questionnaire underwent thorough research through reading various references such as journals, books, unpublished materials, online resources, and related studies. It was validated by a group of validators with characteristics similar to the study subjects but who are not directly involved in the research.

A revised adapted questionnaire was the primary instrument that generated the readiness of pre-service science teachers in implementing the 21st century learning. Five (5) Science Teachers and one (1) English teacher outside the University took the questionnaire and completed the validation process. The instrument undergone pilot testing to the non-respondents from students of Pamantasan ng Lungsod ng San Pablo (PLSP), Laguna College (LC) and Philippine Normal University (PNU) – Manila and the data gathered was analyzed by the statistician for internal reliability and consistency. The result below shows the Cronbach's alpha of the 2030 Works skills and the result in their readiness in implementing the 21st century learning.

4. Results and Discussion

Table 1. Cognitive and Metacognitive Skills

Statements	Mean	SD	Interpretation
1. I work at creative solutions to problem I am encountering.	3.65	0.48	High Extent
2. I find workable solutions to seemingly unsolvable problems.	3.58	0.52	High Extent
3. I listen and consider alternatives for handling a problem and when making solutions.	3.67	0.56	High Extent
4. I consider all the available facts and information when attributing causes to come up with a solution.	3.72	0.45	High Extent
5. I think of more than one way to resolve a difficult situation and filter the best one.	3.60	0.55	High Extent
6. I approach the problem with its multiple situations before thinking of the best solution.	3.67	0.47	High Extent
7. I think multiple coping options before deciding the best one in the given situation.	3.68	0.47	High Extent
8. I consider a variety of options before making a decision.	3.71	0.54	High Extent
9. I filter my ideas and select the best method in a given situation.	3.67	0.50	High Extent
10. I understand my intellectual strengths and weaknesses.	3.78	0.42	High Extent
OVERALL	**3.67**	**0.36**	High Extent

Legend: 3.26-4.00 (High Extent); 2.51-3.25 (Moderate Extent); 1.76-2.50 (Low Extent); 1.00-1.75(No extent)

Table 1 displays the mean and interpretation of the respondent's skills in terms of their cognitive and metacognitive aspect.

The data revealed that indicator 10 yields the highest mean value of 3.78 and standard deviation of .42 with a remark of "High Extent". This means that the respondents in terms of their cognitive and metacognitive skills can understand their intellectual strengths and weaknesses which they can utilize in the field of work. On the other hand, indicator 2 got the lowest mean value of 3.58 and standard deviation of .52 but still with a remark of "High Extent". This shows that some of the respondents are having a hard time figuring out what solutions to use and utilize with some of the problems they think are unsolvable.

In terms of the highest mean, this result supports the findings of Tang et al. (2019) which states that considering the role and function of intellectual strength is valuable. People should recognize that overcoming intellectual blindness might be advantageous for enhancing self-efficacy and self-confidence, which could have a positive effect on individual well-being. Understanding how character strength which can be measured by caring, inquisitiveness, and self-control is associated with students' end-of-year academic achievements and the study used strength as a mediator and concluded that knowing a student's strengths and weaknesses can improve their academic performance.

In terms of the lowest mean, this supports the findings of O'Hara et al. (2019) about the importance of possessing these skills when teaching from the Book "*Teaching with and for Metacognition in Disciplinary Discussions*" which stated that teaching with metacognition helps instructors to develop knowledge and control over how they think and teach by planning, monitoring, assessing, and altering their instructional objectives and teaching practices according to the needs and sociocultural context of their students. Additionally, the study of Bardach and Klassen (2020) states that teachers have a significant impact on student learning and accomplishment, and it is evident that some teachers are more effective than others at fostering positive educational results. For successful learning, cognitive skills are likely to be predictive of a teacher's efficacy in the classroom (Aliazas, Del Rosario, & Andrade, 2022).

The overall mean of the Cognitive and Metacognitive skills is 3.67 and a standard deviation of 0.36. In summary, the respondents have been found to have high extent in their cognitive and metacognitive skills. This only means that pre-service science teachers can manage to create solutions, consider alterations in the knowledge they need to know, consider available facts and information and understand their intellectual strength.

Table 2. Social and Emotional Skills

Statements	Mean	SD	Interpretation
1. I act in accordance with the feelings of people around me.	3.65	0.53	High Extent
2. I am optimistic especially when there is a problem ahead of us that needed solution.	3.57	0.55	High Extent
3. I understand oneself and hold insights into the reasons for my own behavior.	3.63	0.52	High Extent
4. I socialize and express my thoughts with manners to people around me.	3.60	0.57	High Extent
5. I look at problem situations as "challenges" and not as "burden".	3.54	0.60	High Extent
6. I control my emotions and feelings by putting the situation in context.	3.67	0.53	High Extent
7. I manage my emotions so it will not interfere my ability to concentrate.	3.51	0.63	High Extent
8. I set-aside unpleasant emotions and feelings especially when dealing with people.	3.57	0.53	High Extent
9. I do what is meant to act in a right way when socializing with other people.	3.64	0.56	High Extent
10. I focus on the brighter side of a situation rather than being affected emotionally.	3.67	0.50	High Extent
OVERALL	**3.60**	**0.38**	High Extent

Legend: 3.26-4.00 (High Extent); 2.51-3.25 (Moderate Extent); 1.76-2.50 (Low Extent); 1.00-1.75(No extent)

Table 2 exposes those two statements got the highest mean of 3.67 interpreted as High Extent, one has a standard deviation of 0.53 which is indicator 6 and the other one has standard deviation of 0.50 that denotes the indicator 10. As a future educator, it is important to control the emotions as there could be a lot of challenges to face in the world of work. It is very evident in the result that they are socially and emotionally prepared to face the students in the work

field. Moreover, the lowest mean is 3.51 with a verbal remark of "High Extent" which can be seen in the indicator 7. The result of every indicator implies that the pre-service science teachers are ready in terms of their social and emotional aspect.

This supports the findings of Frenzel et al. (2021) which states that it has been demonstrated that teachers' enjoyment of teaching and emotional exhaustion differs depending on teacher team support and school organizational cultures. Teachers' emotions are considered as subjective experiences containing action inclinations and physiological as well as expressive reactions; hence, it is crucial that they regulate their emotions in the classroom in order to establish rapport with their students which implies the indicators with the highest mean.

This supports the findings of Aygun (2017) which states that social-emotional learning is concerned with student's self-awareness, social consciousness, decision-making abilities, ability to form connections, and capacity for self-management. As a result, it plays a critical role in the lives of children and the teachers should constantly take into account social-emotional learning issues such as violence, child abuse, hostility, anti-social, and maladaptive behavior, which are on the rise globally and also should start from within them which implies the indicator with the lowest mean.

The overall mean of social and emotional skills is 3.60 and a standard deviation of 0.38. In summary, the pre-service science teachers have been found socially and emotionally skilled and interpreted as high extent. This only means that they can act and control their needed emotions, socialize and express their thoughts and focus on the brighter side of the situation.

Table 3. Practical and Physical Skills

Statements	Mean	SD	Interpretation
1. I know what task to prioritize to increase productivity and output.	3.57	0.58	High Extent
2. I substitute other tools when presenting or teaching for the one that is lacking.	3.56	0.55	High Extent
3. I use the easiest way of solving a problem rather than thinking of complex ones.	3.63	0.52	High Extent
4. I act according to what is needed to happen inside the classroom.	3.71	0.46	High Extent
5. I can apply processes and techniques to a task.	3.54	0.58	High Extent
6. I constantly maintain self-discipline when confronted with obstacles and hardships.	3.58	0.55	High Extent
7. I can create a creative presentation that can be used especially in classroom and in the future.	3.72	0.48	High Extent
8. I am mindful and aware in different applications.	3.61	0.57	High Extent
9. I can demonstrate and present activities using various tools.	3.68	0.50	High Extent

10. I can maximize the use of a specific device like cellphone, computers and laptop.	3.78	0.45	High Extent
OVERALL	3.64	0.39	High Extent

Legend: 3.26-4.00 (High Extent); 2.51-3.25 (Moderate Extent); 1.76-2.50 (Low Extent); 1.00-1.75(No extent)

The data in table 3 shows that students gave the practical and physical skills a "High Extent" rating. The aggregate mean value of 3.64 indicates that pre-service teachers assessed their ability to use a particular gadget to its fullest as "High Extent." This shows that the students think that their physical and practical skills will become more important as they advance in their careers.

On the other side, when pre-service teachers apply processes and approaches to a task, they comment with the lowest mean score of 3.54, "High Extent." This demonstrates the student's capacity to apply strategies and techniques to a specific assignment. Pre-service teachers approach problem-solving in many ways. Make the most of just one tool for solving issues. Students can maintain self-discipline in the face of challenges by using tools when presenting or instructing, as well as by applying procedure and technique to a piece of work.

The results show that physical skills are related to the capacity to use useful instruments, processes, and functions. Students are able to readily execute assignments using a range of approaches and techniques as they maximize the usage of useful tools and equipment. The utilization of modern equipment and gadgets for information and communication can help create effective presentations or output for the classroom.

Practical work entails learning through carefully chosen contexts that foster students' motivation and engagement as a result of pertinent learning episodes drawn from real-world situations and occurrences.

Based to Musasia, A., Ocholla, A., & Sakwa, T. (2016), practical activity gives students the chance to comprehend and manipulate the complex and abstract character of science in order to effectively induce conceptual transformation. Practical activity assists in identifying and correcting pupils' misconceptions. Students are inspired and drawn to the subject of science. As a result, practical activity encourages students to confirm existing knowledge and discover new information about it. They control their own capacity to explore and analyze nature.

Taking charge, fostering differentiation by outcome, task, and questioning, cultivating students as self-learners for independent learning, students working at their own pace, at their own level (2014). Children can grow personally, academically, and cognitively through using a variety of learning techniques, cooperating with others, handling items and materials, seeing the use of all senses, and having informal conversations with classmates and teachers (PLTs).

Table 4. Readiness in Implementing 21ˢᵗ century learning

Statements	Mean	SD	Interpretation
1. I have excellent understanding about 21ˢᵗ learning skills.	3.61	0.49	Strongly Agree
2. I am aware that involving students in activities can promote creativity.	3.79	0.41	Strongly Agree
3. I know that involving students in activities can promote innovation.	3.78	0.42	Strongly Agree
4. I am aware that involving students in activities can promote critical thinking.	3.75	0.44	Strongly Agree
5. 21st century skills are important in determining pupils' success at workplace in the future.	3.79	0.41	Strongly Agree
6. I need professional development to increase my knowledge about 21st century skills.	3.81	0.40	Strongly Agree
7. I need professional development in assessing 21st century pupils.	3.74	0.47	Strongly Agree
8. Technology plays important part in 21ˢᵗ century learning.	3.78	0.45	Strongly Agree
9. I need professional development in assessing 21st century pupils.	3.74	0.50	Strongly Agree
10. I am aware that involving students in activities can enhance their communication and collaboration.	3.74	0.47	Strongly Agree
OVERALL	3.75	0.30	Strongly Agree

Legend: 3.26-4.00 (Strongly Agree); 2.51-3.25 (Agree); 1.76-2.50 (Disagree); 1.00-1.75(Strongly Disagree)

The level of preparation for implementing 21ˢᵗ Century Learning is shown in Table 4. With a mean rating of 3.75, the pre-service teacher's overall preparedness score is "Strongly Agree," suggesting that the student needs professional development to improve my understanding of 21st century skills. Furthermore, the pupils appear to understand 21st century learning skills based on the lowest mean of 3.61 and verbal interpretation of "Strongly Agree."

Teachers and school administrators can both directly impact how well students perform in the workforce. advocates for improved professional development by providing proof of its efficiency to show a return on learning time. According to Padmadewi, et al. (2020), a student should be able to use a variety of skill competencies alongside content knowledge mastery and do so in real-world contexts to be considered ready for pre-service teacher and careers. Being ready to confront the changes required by the new period of the 21st century might be viewed as being ready to face 21st-century education. So, preparation has a direct relationship with the modifications. To educate pupils to survive in this century, teachers must also keep up with the changes brought about by the development of 21st-century education. And preparedness has to do with how well teachers are prepared to deal with adjustments required to enhance the caliber of their teaching-learning process.

To succeed in the workplace, one must have an understanding of 21ˢᵗ century skills in addition to these core skills. A key feature of the twenty-first century is the quickening pace of

technological growth. The kids will be prepared for the innovations of the twenty-first century if they can continue to cope. The student is "Much Ready" to adopt 21st century learning, according to the results. They are aware of the ways in which involving kids in activities can encourage both creativity and innovation. Participating in activities with students helps enhance their collaboration and communication. People can easily increase their learning while adapting because technology plays such an important role.

Table 5. Correlation between work skills and readiness in implementing 21st century learning

Skills	Readiness to implement 21st century learning	Remarks
Cognitive and Metacognitive Skills	.524**	Significant
Social and Emotional Skills	.492**	Significant
Practical and Physical Skills	.661**	Significant

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

Table 5 shows the relationship of work skills such as cognitive and metacognitive skills, social and emotional skills and practical and physical skills in their readiness in implementing 21st century learning.

It can be glanced from the table that in terms of the cognitive and metacognitive skills of the respondents, it has a significant relationship in their readiness in implementing the 21st century learning. This infers that the pre-service science teachers have the mental capabilities that students need to have successful learning in their science subjects in school. A teacher that is cognitively and metacognitively prepared can use this as a strong foundation to use their knowledge to effective and efficient implementation of learning. This means that being cognitively and metacognitively skilled has an influence in their readiness and not the main cause or reason for it.

The findings regarding these skills supports the literature of Vosniadou et al. (2021), that learners are believed to employ metacognitive methods to help them plan, monitor, and assess their cognitive processes. These interventions might begin by instructing pre-service teachers on how to become more successful learners. Pre-service teachers can observe the positive effects of strategic learning on their own academic achievement if they comprehend how learning occurs and how they can become more adept at regulating and directing their own learning.

Social and emotional skills have also a significant relationship with their readiness to implement the 21st century learning. It can be concluded that if a pre-service science teacher is socially and emotionally ready, it has great impact for them to develop self-awareness so that in a learning environment, they can classify their own emotions and those of others. This also assists teachers in identifying their own emotions and ideas, recognizing their strengths and weaknesses, and building self-confidence.

To support the findings and analysis of the study, the study of Aldrup, et al. (2020) stated that teachers' social-emotional competence is considered important in a classroom setting in order to master the social and emotional challenges inherent in their profession and to build positive

teacher-student relationships. Thus, this is essential for both the professional happiness of teachers and growth of their students, making them comfortable in learning in school.

Furthermore, Practical and Physical skills is significant, it connotes that the pre-service science teachers are well-equipped in using technologies which can help in teaching their future students as well as they are ready to manage things in a practical way. It signifies that they know what task to prioritize, how it will be done and what tools are needed in order to increase productivity and output in managing the classroom.

This finding is in consonance with the literature of Stirling Institute of Australia (2018) which states that possessing physical and practical skill enables students to gain a deeper comprehension of the course's content and to develop the fast adjustments necessary for daily problems and situations. It will demonstrate a unique capacity to help students apply their talents outside of the classroom. While it is vital to master the theory behind a topic or subject, applying the theory in a real-world setting allows you to improve upon your current talents, such as problem-solving.

Table 6. Regression analysis of the respondent's readiness in implementing 21st century learning based on the skills.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	β	Std. Error	Beta		
1 (Constant)	1.690	.317		5.338	.000
Practical and Physical Skills Average	.406	.118	.526	3.446	.001

Regression analysis was employed to explain the readiness of the respondents based on the given set of skills provided by the OECD. The table shows that in terms of all skills given, Practical and Physical skills have the positive coefficient. This indicates that as the value of the respondent's Practical and Physical skills increases, the mean of their readiness to implement the 21st century learning also tends to increase.

The reason why, among all, this skill only predicts their readiness to implement the 21st century is that the instruments used were about maximizing the use of technologies, actions needed inside the classroom and productivity and output. 21st century learners are known for being well-equipped in using technologies whether as a primary source of information or as a tool to use when discussing or presenting

In general, the table also revealed that the average of practical and physical skills (**β** = .406, p =.001) which both indicator shows a non-zero value, significantly predict the readiness of pre-service science teachers as revealed by their standardized coefficients and p-values. The positive β (.406) in the Practical and Physical Skills tells that it is a significant predictor compared to the other variables present in the study. On the other hand, in standardized coefficient, if the value is between -1 to +1, it shows that the strength of the prediction is strong. The positive beta value (.526) indicates a strong change in the readiness of the pre-service

science teachers caused by a unit change in respect of it while keeping all the other independent variables constant/unchanged.

The Std. Error of the table, also known as the standard error of the estimate, tells that if it is a non-zero value, therefore it is a predictor. In the table presented, the value is .118 which means that the coefficient is a significant predictor to the dependent variable which is their readiness in implementing 21st century learning.

In terms of the t-value, according to Hayes (2022), t-value in regression are numbers that shows if there is a big difference between the two sample sets. The t-value shows how similar the two sample sets are. The smaller the value, the more similar the sets are. In the given data, the t-value of Practical and Physical skills is 3.446 and shows a small difference in the constant (5.338) which means there are more similarity exists between the Practical and Physical skills as well as their readiness to implement the learning.

Lastly, the significant value on the table indicates that changes in the Practical and Physical Skills correlate with shifts in the readiness to implement the 21st century learning. 0.01 Significant value indicates that the coefficient is significant at the 99.99+% level. The value presented is discussed by Abhigyan (2020) which states that the value given in the regression can formulate the percentage level of the prediction the regression wants to justify. In this case, 0.01 was the value so the percentage level presented can be used to predict the readiness of the pre-service science teachers' readiness to implement the learning.

5. Conclusion

Work Skills provided by the Organisation for Economic Cooperation and Development which are Cognitive and Metacognitive Skills, Social and Emotional Skills and Practical Skills can influence the readiness of the pre-service science teachers' readiness in implementing 21st century. In regression analysis, the Practical and Physical skills can be used as a predictor upon their readiness, the higher they are practically and physically skilled, the more ready they are.

To conclude, based on the results of the study, the following were formulated:

1. There is a significant relationship between the 2030 future work skills and the pre-service science teachers' level of readiness to implement 21st century. Thus, the hypothesis posited is sustained.
2. The 2030 future work skills and the pre-service science teachers' level of readiness significantly influence to implement 21st century. Thus, the hypothesis posited is sustained.

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