

21st Century Skills of Junior High School Science Teachers: A Training Needs Assessment

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ABSTRACT

Classroom teachers need to be familiar with 21st century skills and integrate them throughout the curriculum as these directly impact teaching and learning. This study assessed the 21st century skills of Junior High School Science teachers of Cotabato City Division as a form of training needs assessment for professional development. This study also answered the level of proficiency of the respondents in terms of Learning and Innovation Skills, information, media and technology skills, and career and life skills. This study used descriptive quantitative approach using a questionnaire adapted from framework developed by the Partnership for 21st Century Learning (P21). The analysis and interpretation used descriptive and inferential statistics. The Learning and Innovation Skills got the lowest grand mean, while the information, media and technology got the highest grand mean. There is no statistically significant difference between the mean ratings of the proficiency of the skills of the teachers and the administrators. This study concludes that the Junior High School Science teachers of Cotabato City Division have highly practiced/applied 21st Century Skills. The means revealed that the respondents are most proficient information, media and technology skills and are less proficient in Learning and Innovation Skills.

Keywords: 21st century skills, Learning and Innovation Skills, Information, media and Technology Skills, Career and Life skills, Level of Proficiency, Professional Development Assessment

INTRODUCTION

Classroom teachers are expected to teach the “basics”, including reading, writing, science, and mathematics. However, currently in the twenty-first century, Larson & Miller (2012) assert that it is timely to take a closer look at the by word “21st century skills”, because as what Kivunja (2014) puts it “teaching our students so that they become well-equipped with the 21st century skills is the new learning paradigm”. Traditional skills of literacy and numeracy plus the skills

of the 21st century will ensure that on graduation, learners will be job-ready as they possess the skills that are most in-demand in the 21st century Digital Economy.

The 21st century skills are a combination of cognitive process and technology tools that enable a person to make an impact. In a report compiled by Salpeter (2008), she states that literacy in the 21st century means more than the mastery of key subjects or basic skills. The learners of today are growing up in a digital world that is fast-paced and revolutionary. For learners to cope with the demands of the 21st century, they need to know how to use their knowledge and skills by “thinking critically, applying knowledge to new situations, analyzing information, comprehending new ideas, communicating, collaborating, solving problems, and making decisions”. Salpeter (2008) adds that both basic and 21st century skills are essential because one reinforces the other.

Essentially, the 21st century skills emphasize what learners can do with knowledge and how they apply what they have been taught to actual situations (Larson & Miller, 2012).

This study aimed to evaluate the 21st century skills of public junior high school science teachers of Cotabato City Division as a form of training needs assessment for professional development that will be a basis for proposing training designs.

Specifically, this study sought to answer the following questions: What is the profile of the teacher-respondents? What is the level of proficiency of the teacher-respondents in Learning and Innovation Skills in terms of: a. creativity and innovation, b. critical thinking and problem-solving, and c. communications and collaboration; What is the level of proficiency of the teacher-respondents in Information, Media and Technology Skills in terms of: a. information literacy, b. media literacy, and c. ICT (Information, Communications, and Technology) literacy; What is the level of proficiency of the teacher-respondents in Career and Life Skills in term of: a. flexibility and adaptability, b. initiative and self-direction, c. social and cross-cultural interaction, d. productivity and accountability, and e. leadership and responsibility. What is the perception of the school administrators on the level of proficiency on 21st century skills of the teacher-respondents? Is there a significant difference in the proficiency skills of teachers on 21st century skills between the mean ratings of teachers and administrators in the areas of: a. Learning and Innovation skills; b. information, Media and Technology Skills; c. Career and Life Skills. 7) Based on the needs identified, what training design can be proposed?

METHODOLOGY

This study utilized the descriptive method of research in assessing the 21st century skills of the target respondents. This method signifies the practices of the 21st century skills, which are true or untrue among the respondents upon reflection of themselves.

The respondents of the survey were junior high school teachers of Cotabato City Division teaching science subjects for the school year 2018-2019. There were a total pf 177 teacher respondents distributed in the following Science subject areas: General Science (58), Biology (40), Chemistry (40), and Physics (39). A complete enumeration was conducted. To support the findings, a survey was also done to selected school administrators of Cotabato City Division using the same instrument. This is in order to rate their Science teachers on what extent they

possess such skills of the 21st century. The respondents comprised of three (3) School Heads, three (3) Assisting Principals, and four (4) Academic Coordinators.

This study used structured survey questionnaire adapted from the framework developed by the Partnership for 21st Century Learning. There was a total of 70 items clustered into three categories of Learning and Innovation Skills, Information, Media and Technology Skills, Career and Life Skills. The items were measured on a four-point Likert Scale of Reflect Me that ranged from 1 (Not Practiced/Applied) to 4 (Highly Practiced/Applied).

Consents for data collection were requested from the school principals and the target respondents. The researcher administered the survey, and the respondents were given ample time in answering the questionnaire during the actual evaluation. The researcher also conducted a Key Informant Interview with the selected school administrators.

Descriptive statistics such as frequency count, percentage, mean and standard deviation (SD) and inferential statistics (t-test) were used in the data analysis. Frequency count and percentage were used in describing the profile of the respondents. Mean, and Standard Deviation (SD) were used to reveal the assessment of the respondents on their 21st century skills.

T-test was used to determine if there is a significant difference between the mean ratings of the proficiency skills of the teacher-respondents and that of the administrators.

The following scales with interpretation were used:

Scale	Range of Mean	Interpretation
4	3.26 – 4.00	Highly Practiced/Applied (HP/A)
3	2.51 – 3.25	Likely Practiced/Applied (LP/A)
2	1.76 – 2.50	Less Practiced/Applied (LEP/A)
1	1.00 – 1.75	Not Practiced/Applied (NP/A)

RESULTS AND DISCUSSION

Profile of the Teacher-Respondents

The respondents of the survey were junior high school teachers of Cotabato City Division teaching science subjects for the school year 2018-2019. There was a total of 177 teacher respondents teaching the following science subject areas: General Science, Biology, Chemistry, and Physics.

Table 1 shows the profile of the teacher-respondents in terms of sex, age, length of service, highest educational attainment, and teacher's rank.

Table 1. Profile of Respondents (N = 177)

Variable	Categories	Frequency	
Percentage			
Sex	Male	68	38%
	Female	109	62%
	Total	177	100%
Age	Above 50	38	21%
	46 – 50	83	47%
	36 – 45	31	18%
	26 – 35	25	14%
	Below 25	0	0%
	Total	177	100%
Length of Service	36 years and above	0	
	31 – 35 years	3	2%
	26 – 30 years	13	7%
	21 – 25 years	41	23%
	16 – 20 years	63	36%
	11 – 15 years	30	17%
	10 years and below	27	15%
	Total	177	100%
Highest Educational attainment	Doctoral Degree	2	
	With Doctoral Units/on-going	18	
	Master's Degree	78	44%
	With Master's Units/on-going	36	
	Bachelor's Degree	43	24%
	Total	177	100%
Teacher's Rank	Master Teacher II	9	
	Master Teacher I	23	13%
	Teacher III	77	44%
	Teacher II	0	0%
	Teacher I	68	38%
	Total	177	100%

The personal data are obtained from 68 males (38%) and 109 females (62%). The age bracket of 46-50 comprises the highest number of respondents with 47% followed by above 50 with 21%. There is no respondent below 25 years old. For the length of service as a teacher, 36% belong to 16-20 years, and only 2% belong to 31-35 years. Ten years and below of service as a teacher is comprised of 15% of respondents. No respondents have 36 and above length of service. Master's Degree as the highest educational attainment is the most common among the respondents with 44%, followed by Bachelor's Degree (24%), and with Master's units or on-going (20%). Only 1% of the respondents has a Doctoral Degree while 10% have Doctoral units

or on-going. For the teacher's ranking, 44% are Teacher III, 38% are Master Teacher 1, and 5% are Master Teacher II, while there is no Teacher II respondent.

Rating of the Respondents on their Learning and Innovation Skills

In Table 2, twenty-four indicators (24) comprise the Learning and Innovation Skills. Mean, Standard Deviation (SD), and interpretation for each indicator are established to determine the level of proficiency.

Table 2. Rating of the Respondents on their Learning and Innovation Skills (N = 177)

Indicator	Mean	SD	Interpretation
a. Creativity and innovation			
1. I use a wide range of idea-creation techniques such as brainstorming.	3.55		
HP/A 0.59			
2. I create new and worthwhile ideas by working on models and simulations.	3.37		
HP/A 0.60			
3. I elaborate, refine, analyze, and evaluate my own ideas in order to Improve and maximize creative efforts.	3.60		HP/A
0.51			
4. I develop, implement, and communicate new ideas to others effectively.	3.68		
HP/A 0.47			
5. I am open and responsive to new and diverse perspectives.	3.77		HP/A
0.42			
6. I demonstrate originality and inventiveness in work.	3.56		HP/A
0.52			
7. I understand that creativity and innovation is a long-term, cyclical process Of small successes and frequent mistakes.	3.64		HP/A
0.61			
8. I act on creative ideas to make a tangible and useful contribution to the Field in which the innovation will occur.	3.16		LP/A
0.52			
Over-all	3.54	HP/A	0.53
b. Critical Thinking and problem solving			
9. I use various types of reasoning (inductive, deductive, etc) as appropriate To the situation.	3.28		HP/A 0.52
10. I use systems thinking and analyze how parts of a whole interact with Each other to produce overall outcomes in complex systems.	3.37		
HP/A 0.48			
11. I effectively analyze and evaluate evidence, arguments, claims and beliefs	3.28		
HP/A 0.50			
12. I synthesize and make connections between information and arguments.	3.18		
LP/A 0.41			
13. I interpret information and draw conclusions based on the best analysis	3.33		
HP/A 0.53			
14. I reflect critically on learning experiences and processes.	3.74		HP/A
0.44			
15. I solve different kinds of non-familiar problems in both conventional			

And innovative ways.	3.27	HP/A	0.47
16. I identify and ask significant questions that clarify various points of view And lead to better sollutions.	3.65	HP/A	
0.55			
Over-all	3.39	HP/A	0.49
c. Communications and collaboration			
17. I articulate thoughts and ideas effectively using oral, written, and Nonverbal communication skills in a variety of forms and contexts.	3.30	HP/A	
0.46			
18. I listen effectively to decipher meaning, including knowledge, values, Attitudes, and intentions.	3.76	HP/A	
0.43			
19. I use communication for a range of purposes (e.g. to inform, instruct, Motivate, and persuade).	3.80	HP/A	
0.40			
20. I utilize multiple media and technologies, and know how to judge their Effectiveness priority as well assess their impact.	3.67	HP/A	
0.51			
21. I communicate effectively in diverse environments (including multilingual).	3.68		
HP/A 0.50			
22. I collaborate with others and value the individual contributions made by Each team member.	3.73	HP/A	0.49
23. I demonstrate ability to work effectively and respectfully with diverse teams.	3.22		
LP/A 0.47			
24. I exercise flexibility and willingness to be helpful in making necessary compromises To accomplish a common goal.	3.82	HP/A	0.38
Over-all	3.62	HP/A	0.46
Grand	3.52	HP/A	0.49

Legend:

Scale	Range of Mean	Interpretation
4	3.26 – 4.00	Highly Practiced/Applied (HP/A)
3	2.51 – 3.25	Likely Practiced/Applied (LP/A)
2	1.76 – 2.50	Less Practiced/Applied (LEP/A)
1	1.00 – 1.75	Not Practiced/Applied (NP/A)

Learning and Innovation Skills Level of Proficiency

Among the learning and innovation skills, there are three indicators that are likely practiced/applied as shown in Table 2. The indicators are the following: (a8) I act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur, (b12) I synthesize and make connections between information and arguments, and (c23) I demonstrate ability to work effectively and respectfully with diverse teams. The means are 3.16, 3.18 and 3.22, respectively. The indicator with the highest mean is (c24) exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal, with a mean of 3.82. This is followed by (c19) I use communication for a range of purposes (e.g to inform, instruct, motivate and persuade) with a mean of 3.80, and by (a5) I am open and responsive to new and diverse perspectives with a mean of 3.77. Among the three

sub-categories, communications and collaboration has the highest over-all mean of 3.62 while critical thinking and problem solving has the over-all mean of 3.39.

Findings from research studies conducted by the World Economic Forum (2016), Bloomberg (2014), and IBM (2010) highlighted that learning and innovation skills are the most important 21st century skills needed to excel in any jobs. To develop and launch an innovation that can solve a real problem and can provide a meaningful value, it takes creative problem solving, leadership, strategic thinking, and effective communication. The reason why these skills are becoming more and more important in the workforce is because of the changing nature of work and the rapid pace of change in society (Eich, 2018).

Innovation and creativity cannot be taught in classroom, but they can be learned, developed and strengthened through practice. To learn such important skills, individuals are placed in situations that will challenge them to think and act in new and unexpected ways (Goodman, 2019). Dyer et al. (2009), in their study on innovative people, found out that the key discovery skills of innovators were applying were networking, associating, observing, questioning, and experimenting. For the future education, according to Cobo (2012), expanded learning and the development of skills for innovation are critical aspects.

Rating of the Respondents on their Information, Media Technology Skills

Table 3 shows the level of proficiency for the Information, Media and Technology Skills. It comprises of twelve indicators (12) with mean, Standard Deviation (SD) and interpretation for each indicator.

Table 3. Rating of the Respondents on their Information, Media and Technology Skills (N = 177)

Indicator	Mean	Interpretation
SD		
a. Information literacy		
1. I access information efficiently (time) and effectively (sources). HP/A 0.40	3.80	
2. I evaluate information critically and competently. 0.46	3.69	HP/A
3. I use information accurately and creatively for the issue or Problem at hand. 3.72	HP/A	0.50
4. I manage the flow of information from a wide variety of sources. 0.41	3.21	LP/A
5. I apply a fundamental understanding of the ethical/legal issues Surrounding the access and use of information. 3.63	HP/A	
0.48		
Over-all	3.61	HP/A 0.45
b. Media literacy		
6. I understand both how and why media messages are Constructed, and for what purposes 3.66	HP/A	
0.51		
7. I examine how individuals interpret messages differently, and How media can influence beliefs and behaviors. 3.68	HP/A	
0.48		

8. I have a fundamental understanding of the ethical/legal issues Surrounding the access and use of media and information technologies.	3.69			
HP/A 0.51				
9. I understand and utilize the most appropriate media creation tools, Characteristics, and conventions.	3.76	HP/A		
0.43				
10. I understand and effectively utilize the most appropriate expressions And interpretations in diverse, multi-cultural environments.	3.73	HP/A		
0.45				
Over-all	3.70	HP/A		0.48
c. ICT (Information, Communications, and Technology) Literacy				
11. I use technology as a tool to research, organize, evaluate, and Communicate information.	3.54	HP/A		
0.52				
12. I use digital technologies and social networks appropriately to access, Manage, integrate, evaluate, and create information.	3.52	HP/A		
0.54				
Over-all	3.53	HP/A		0.53
Grand	3.62	HP/A	0.49	

Legend:

Scale	Range of Mean	Interpretation
4	3.26 – 4.00	Highly Practiced/Applied (HP/A)
3	2.51 – 3.25	Likely Practiced/Applied (LP/A)
2	1.76 – 2.50	Less Practiced/Applied (LEP/A)
1	1.00 – 1.75	Not Practiced/Applied (NP/A)

Information, Media and Technology Skills Level of Proficiency

In the category of Information, Media and Technology Skills, the indicator a4 (I manage the flow of information from a wide variety of sources) is likely practiced/applied with a mean of 3.21, and getting the lowest mean. The highest mean is 3.80 obtained by Indicator a1 (I access information efficiently (time) and effectively (sources)), followed by b9 (I understand and utilize the most appropriate media creation tools, characteristics, and conventions) with 3.76, and b10 (I understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments) with 3.73. The sub-category media literacy has the highest over-all mean of 3.70, while information literacy receives the lowest over-all mean.

Today, information is provided to us in different forms of media, such as newspapers, TV, the internet, and radio, and with instant access to information anywhere in real-time (Li, 2003). Information flow is defined as the movement of information between people and systems. Efficient and secure information flows are a central factor in the performance of decision-making, processes, and communications.

Among the three aspects of this category, Media literacy, which is the ability to analyze media, and create media products, got the greatest number of indicators with high means. This is a significant finding because, as what Goetze, et al (2005) and Schwarz (2001) indicate, teachers should be literate first in media literacy and must also be able to model media literacy for their

students. It offers new ways of engaging students in learning; and it makes connections among students, between school and life, between educators and others (Schwarz, 2001).

Rating of the Respondents on their Career and Life Skills

The Career and Life Skills proficiency ratings are shown in Table 4. There are thirty-two indicators (32), and Mean, Standard Deviation (SD), and interpretation for each indicator are determined.

Table 4. Rating of the Respondents on their Career and Life Skills (N = 177)

Indicator	Mean	Interpretation
SD		
a. Flexibility and adaptability		
1. I adapt to varied roles, job responsibilities, schedules, and contexts.	3.51	HP/A
0.50		
2. I work effectively in a climate of ambiguity and changing priorities.	3.58	HP/A
0.53		
3. I incorporate group input feedback into the work effectively.	3.47	HP/A
0.59		
4. I deal positively with praise, setbacks, and criticism.	3.43	HP/A
0.53		
5. I understand, negotiate, and balance diverse views and beliefs to reach Workable solutions, particularly in multi-cultural environments.	3.68	
HP/A 0.49		
Over-all	3.54	HP/A 0.50
b. Initiative and self-direction		
6. I set goals with tangible and intangible success criteria.	3.75	HP/A
0.44		
7. I balance tactical (short-term) and strategic (long-term) goals.	3.53	
HP/A 0.53		
8. I utilize time and manage workload efficiently.	3.49	HP/A
0.57		
9. I monitor, define, prioritize, and complete tasks without direct oversight.	3.65	
HP/A 0.49		
10. I am a self-directed learner.	3.51	HP/A
0.50		
11. I go beyond basic mastery of skills and/or curriculum to explore and Expand one's own learning and opportunities to gain expertise.	3.38	HP/A
0.49		
12. I demonstrate initiative to advance skill levels towards a professional level.	3.50	
HP/A 0.50		
13. I reflect critically on past experiences in order to inform future progress.	3.78	
HP/A 0.45		
Over-all	3.57	HP/A 0.50
c. Social and cross-cultural interaction		
14. I know when it is appropriate to listen and when to speak.	3.74	HP/A
0.48		

15. I conduct myself in a respectable, professional manner.	3.69	HP/A		
0.51				
16. I respect cultural differences and work effectively with people from a Range of social and cultural backgrounds.	3.68	HP/A		
0.47				
17. I respond open-mindedly to different ideas and values.	3.71	HP/A		
0.46				
18. I leverage social and cultural differences to create new ideas and Increase both innovation and quality of work.	3.83	HP/A		
0.38				
Over-all	3.73	HP/A		0.46
d. Productivity and accountability				
19. I set and meet goals, even in the face of obstacles and competing pressures.	3.55			
HP/A 0.50				
20. I prioritize, plan, and manage work to achieve the intended result.	3.50	HP/A		
0.50				
21. I work positively and ethically.	3.68	HP/A		0.47
22. I multi-task, manage time and projects effectively.	3.50	HP/A		
0.53				
23. I participate actively, as well as I am reliable and punctual.	3.48	HP/A		
0.52				
24. I present oneself professionally and with proper etiquette.	3.69	HP/A		
0.46				
25. I am accountable for results.	3.46	HP/A		
0.54				
Over-all	3.56	HP/A		0.50
e. Leadership and responsibility				
26. I use interpersonal and problem-solving skills to influence and guide Others toward a goal.	3.68	HP/A		0.47
27. I leverage strengths of others to accomplish a common goal.	3.49	HP/A		
0.50				
28. I inspire others to reach their very best via example and selflessness				3.62
HP/A 0.49				
29. I demonstrate integrity and ethical behavior in using influence and power.				3.67
HP/A 0.49				
30. I act responsibly with the interests of the larger community in mind.				3.59
HP/A 0.53				
31. I help teachers develop their abilities to use various strategies (such as Formative assessments) to reach diverse students and create environments				3.48
HP/A 0.52				
That support differentiated teaching and learning.				
32. I encourage knowledge sharing among communities of practitioners, using Face-to-face, virtual, and blended communications.	3.47	HP/A		
0.50				
Over-all	3.57	HP/A		0.50
Grand	3.62	HP/A		0.49

Legend:

Scale	Range of Mean	Interpretation
4	3.26 – 4.00	Highly Practiced/Applied (HP/A)
3	2.51 – 3.25	Likely Practiced/Applied (LP/A)
2	1.76 – 2.50	Less Practiced/Applied (LEP/A)
1	1.00 – 1.75	Not Practiced/Applied (NP/A)

Career and Life Skills Level of Proficiency

The data in Table 4 reveals that all the indicators under Career and Life Skills are highly/applied as there are no means of 3.25 and below. The highest means are obtained by indicators c20 (I leverage social and cultural differences to create new ideas and increase both innovation and quality of work) with 3.83, followed by b14 (I reflect critically on past experiences in order to inform future progress) with 3.78, and b6 (I set goals with tangible and intangible success criteria) with 3.75. The lowest mean is obtained by indicator b11 (I go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise), with 3.38.

Among the five sub-categories, Social and Cross-cultural interaction has the highest mean of 3.74. On the other hand, the lowest mean is obtained by sub-category Flexibility and adaptability with 3.54.

The Career and Life Skills is a learning strand, particularly among Alternative Learning System (ALS) learners that is being advanced by the Department of Education. It focuses on the attitudes, skills, and knowledge (competencies) necessary for earning a living and promoting a sustainable lifestyle (DepEd, 2017). These skills are non-tangible that deals with the cognitive, social, and emotional competence of an individual. Kivunja (2015) states that the Career and Life Skills have gained higher priority in the 21st century curriculum and workplace because of the dynamics of the need for multitasking, versatility, and speed.

Overall Proficiency of the Science Teachers of 21st Century

Overall, the 21st Century Skills are highly practiced/ applied by the respondents. The highest grand mean is obtained by the Information, Media and Technology Skills, and the lowest grand mean is obtained by the Learning and Innovation Skills. Among the seventy (70) indicators across the three categories, there are four (4) indicators that are likely practiced/applied – three (3) from Learning and Innovation Skills and one (1) from Information, Media and Technology Skills. The rest of the indicators, including all from Career and Life Skills, are highly practiced/ applied.

Rating of School of Administrators on the 21st Century Skills of their Science Teachers

Ten selected school administrators of Cotabato City Division were asked to rate their Science teachers as to what extent they possess such skills of the 21st century. The survey was done using the same instrument used by the teacher-respondent.

Rating of School Administrators on the Learning and Innovation Skills of their Science Teachers

In Table 5, the ratings of school administrators on the Learning and Innovation Skills of their science teachers are shown. Means with interpretation and Standard Deviation (SD) are established.

Table 5. Rating of School Administrators on the Learning and Innovation Skills of their Science Teachers (N = 10)

Indicator	Mean	Interpretation	SD
a. creativity and innovation			
1. I use wide range of idea-creation techniques such as brainstorming.	3.50	HP/A	0.17
2. I create new and worthwhile ideas by working on models and simulations.	3.40		HP/A 0.16
3. I elaborate, refine, analyze, and evaluate my own ideas in order to Improve and maximize creative efforts.	3.80	HP/A	0.13
4. I develop, implement, and communicate new ideas to others effectively.	3.40		HP/A 0.16
5. I am open and responsive to new and diverse perspectives.	3.80	HP/A	0.13
6. I demonstrate originality and inventiveness in work.	3.50	HP/A	0.17
7. I understand that creativity and innovation is a long-term, cyclical Process of small successes and frequent mistakes.	3.70	HP/A	0.15
8. I act on creative ideas to make a tangible and useful contribution to the Field in which the innovation will occur.	3.70	HP/A	0.15
Over-all	3.60	HP/A	0.15
b. Critical thinking and problem solving			
9. I use various types of reasoning (inductive, deductive, etc.) as Appropriate to the situation.	3.70	HP/A	0.15
10. I use systems thinking and analyze how parts of a whole interact with Each other to produce overall outcomes in complex systems.	3.30		HP/A 0.15
11. I effectively analyze and evaluate evidence, arguments, claims and beliefs.	3.50	HP/A	0.17
12. I synthesize and make connections between information and arguments.	3.30		HP/A 0.15
13. I interpret information and draw conclusions based on the best analysis.	3.60		HP/A 0.16
14. I reflect critically on learning experiences and processes.	3.40	HP/A	0.16
15. I solve different kinds of non-familiar problems in both conventional			

And innovative ways.	3.40	HP/A	0.16
16. I identify and ask significant questions that clarify various points of view And lead to better solutions.	3.70	HP/A	
0.15			
Over-all	3.49	HP/A	0.16
c. Communication and collaboration			
17. I articulate thoughts and ideas effectively using oral, written and nonverbal Communication skills in a variety of forms and contexts.	3.60	HP/A	
0.16			
18. I listen effectively to decipher meaning, including knowledge, values, Attitudes, and intentions.	3.70	HP/A	
0.15			
19. I use communication for a range of purposes (e.g. to inform, instruct, Motivate, and persuade).	3.80	HP/A	
0.13			
20. I utilize multiple media and technologies, and know how to judge their Effectiveness a priority as well as assess their impact.	3.40	HP/A	
0.16			
21. I communicate effectively in diverse environments (including multilingual).	3.40		
HP/A 0.16			
22. I collaborate with others and value the individual contributions made by Each team member.	3.80	HP/A	0.13
23. I demonstrate ability to work effectively and respectfully with diverse teams.	3.90		
HP/A 0.10			
24. I exercise flexibility and willingness to be helpful in making necessary Compromises to accomplish a common goal.	3.90	HP/A	
0.10			
Over-all	3.69	HP/A	0.14
Grand	3.59	HP/A	0.15

Legend:

Scale	Range of Mean	Interpretation
4	3.26 – 4.00	Highly Practiced/Applied (HP/A)
3	2.51 – 3.25	Likely Practiced/Applied (LP/A)
2	1.76 – 2.50	Less Practiced/Applied (LEP/A)
1	1.00 – 1.75	Not Practiced/Applied (NP/A)

As to the school administrators' rating of their Science teachers Learning and Innovation Skills, all skills are highly practiced/applied. Indicators (c23) they demonstrate ability to work effectively and respectfully with diverse teams, and (c24) they exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal, has the highest mean. These are both under the sub-category of Communications and collaboration, which also gets the highest over-all mean of 3.69 among sub-categories.

The lowest means are obtained by (c10) they use systems thinking and analyze how parts of a whole interact with each other to produce overall outcomes in complex systems, and (c12) they synthesize and make connections between information and arguments, both with 3.30. Both

are under Critical thinking and problem-solving sub-category, which among the sub-categories got the lowest over-all mean of 3.49.

Rating of School Administrators on the Information, Media and Technology Skills of their Science Teachers

The ratings of school administrators on the information, Media and Technology Skills of their Science teachers are shown in Table 6.

Table 6. Rating of School Administrators on the Information, Media and Technology Skills of their Science Teachers (N = 10)

Indicator	Mean	Interpretation
SD		
a. Information literacy		
1. I access information efficiently (time) and effectively (sources).	3.70	
HP/A 0.15		
2. I evaluate information critically and competently.	3.80	HP/A
0.13		
3. I use information accurately and creatively for the issue or Problem at hand.	3.70	HP/A 0.15
4. I manage the flow of information from a wide variety of sources.	3.70	HP/A
0.15		
5. I apply a fundamental understanding of the ethical/legal Issues surrounding the access and use of information.	3.40	HP/A
0.16		
Over-all	3.66	HP/A 0.15
b. Media literacy		
6. I understand both how and why media messages are Constructed, and for what purposes.	3.90	HP/A
0.10		
7. I examine how individuals interpret messages differently, And how media can influence beliefs and behaviors.	3.70	HP/A
0.15		
8. I have a fundamental understanding of the ethical/legal issues Surrounding the access and use of media and information technologies.	3.80	
HP/A 0.13		
9. I understand and utilize the most appropriate media creation Tools, characteristics, and conventions.	3.70	HP/A
0.15		
10. I understand and effectively utilize the most appropriate expressions And interpretations in diverse, multi-cultural environments.	3.60	
HP/A 0.16		
Over-all	3.74	HP/A 0.14
c. ICT (Information, Communications, and Technology) literacy		
11. I use technology as a tool to research, organize, evaluate And communicate information.	3.70	HP/A 0.15
12. I use digital technologies and social networks appropriately		

To access, manage, integrate, evaluate, and create information.		3.80	HP/A	
0.12				
Over-all		3.75	HP/A	0.14
Grand	3.71	HP/A		0.14

Legend:

Scale	Range of Mean	Interpretation
4	3.26 – 4.00	Highly Practiced/Applied (HP/A)
3	2.51 – 3.25	Likely Practiced/Applied (LP/A)
2	1.76 – 2.50	Less Practiced/Applied (LEP/A)
1	1.00 – 1.75	Not Practiced/Applied (NP/A)

As shown in Table 6, the indicator (a6) they understand both how and why media messages are constructed, and for what purposes has the highest mean of 3.90. The lowest mean of 3.40 is obtained by Indicator (a5) they apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information. The sub-category ICT (Information, Communications, and Technology) literacy has the highest over-all mean of 3.75, among the three sub-categories. The sub-category Information literacy has the lowest over-all mean of 3.66.

Rating of School Administration on the Career and Life Skills of their Science Teachers

Table 7 displays the ratings of school administrators on the Career and Life Skills of their Science Teachers.

Table 7. Rating of School Administration on the Career and Life Skills of their Science Teachers (N = 10)

Indicator	Mean	Interpretation
SD		
a. Flexibility and adaptability		
1. I adapt to varied roles, job responsibilities, schedules, and contexts.	3.80	HP/A
0.13		
2. I work effectively in a climate of ambiguity and changing priorities.	3.80	HP/A
0.13		
3. I incorporate group input feedback into the work effectively.	3.70	HP/A
0.15		
4. I deal positively with praise, setbacks, and criticism.	3.80	HP/A
0.13		
5. I understand, negotiate, and balance diverse views and beliefs to reach Workable solutions, particularly in multi-cultural environments.	3.70	
HP/A		
0.15		
Over-all	3.76	HP/A
		0.14
b. Initiative and self-direction		
6. I set goals with tangible and intangible success criteria.	3.80	HP/A
0.13		
7. I balance tactical (short-term) and strategic (long-term) goals.	3.40	
HP/A		
0.16		

8. I utilize time and manage workload efficiently. 0.15	3.70	HP/A	
9. I monitor, define, prioritize, and complete tasks without direct oversight. HP/A 0.13			3.80
10. I am a self-directed learner. 0.13	3.80	HP/A	
11. I go beyond basic mastery of skills and/or curriculum to explore and Expand one's own learning and opportunities to gain expertise. 0.10	3.90	HP/A	
12. I demonstrate initiative to advance skill levels towards a professional level. HP/A 0.13			3.80
13. I reflect critically on past experiences in order to inform future progress. HP/A 0.15			3.70
Over-all	3.74	HP/A	0.14
c. Social and cross-cultural interaction			
14. I know when it is appropriate to listen and when to speak. 0.13	3.80	HP/A	
15. I conduct myself in a respectable, professional manner. 0.13	3.80	HP/A	
16. I respect cultural differences and work effectively with people from a Range of social and cultural backgrounds. 0.13	3.80	HP/A	
17. I respond open-mindedly to different ideas and values. 0.10	3.90	HP/A	
18. I leverage social and cultural differences to create new ideas and Increase both innovation and quality of work. 0.13	3.80	HP/A	
Over-all	3.82	HP/A	0.12
d. Productivity and accountability			
19. I set and meet goals, even in the face of obstacles and competing pressures. HP/A 0.13			3.80
20. I prioritize, plan, and manage work to achieve the intended result. 0.16	3.60	HP/A	
21. I work positively and ethically.	3.80	HP/A	0.13
22. I multi-task, manage time and projects effectively. 0.15			3.70
23. I participate actively, as well as I am reliable and punctual. 0.15	3.70	HP/A	
24. I present oneself professionally and with proper etiquette. 0.13	3.80	HP/A	
25. I am accountable for results. 0.13	3.70	HP/A	
Over-all	3.71	HP/A	0.14
e. Leadership and responsibility			
26. I use interpersonal and problem-solving skills to influence and guide Others toward a goal.	3.70	HP/A	0.15

27. I leverage strengths of others to accomplish a common goal.	3.60	HP/A	0.16
28. I inspire others to reach their very best via example and selflessness	3.60		HP/A 0.16
29. I demonstrate integrity and ethical behavior in using influence and power.	3.80		HP/A 0.13
30. I act responsibly with the interests of the larger community in mind.	3.80		HP/A 0.13
31. I help teachers develop their abilities to use various strategies (such as Formative assessments) to reach diverse students and create environments	3.70		HP/A 0.15
That support differentiated teaching and learning.			
32. I encourage knowledge sharing among communities of practitioners, using Face-to-face, virtual, and blended communications.	3.70	HP/A	0.15
Over-all	3.75	HP/A	0.15
Grand	3.80	HP/A	0.14

Legend:

Scale	Range of Mean	Interpretation
4	3.26 – 4.00	Highly Practiced/Applied (HP/A)
3	2.51 – 3.25	Likely Practiced/Applied (LP/A)
2	1.76 – 2.50	Less Practiced/Applied (LEP/A)
1	1.00 – 1.75	Not Practiced/Applied (NP/A)

As shown in Table 7 the highest mean of 3.90 is obtained by Indicators (b11) I go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise, and (c17) they respond open-minded to different ideas and values. The lowest mean of 3.40 is obtained by indicator (b7) they balance tactical (short-term) and strategic (long-term) goals. The sub-category, social and cross-cultural interaction has the highest mean of 3.82 among the five sub-categories. On the other hand, the lowest mean is obtained by sub-category Leadership and responsibility with 3.70.

Overall Proficiency of the Science Teachers as Rated by the School Administrators

Overall, the 21st Century Skills as perceived by the school administrators are highly practiced/applied by the science teacher-respondents. The highest grand mean is obtained by the Career and Life Skills with 3.75, and the lowest grand mean is obtained by the Learning and innovation skills with 3.59.

Tests of Differences between Means of the Teachers' Response and the School Administrators' Response

The means of the responses of the teacher-respondents and that of the school administrators are compared for the hypothesis test.

Table 8 shows the t-test result between the mean ratings of the teacher-respondents by the teachers themselves and that of the school administrators on learning and innovation skills.

Table 8. t-Test Results for the Differences in the Mean Ratings on Learning and Innovation Skills

Compared Interpretation	df	Mean	SD	t-ratio	t-Prob.	Interpretation
Teachers' Rating	177	3.52	0.400	0.324	0.570	Not Significant
Admins' Rating	10	3.59	0.486			

P > 0.05, Not Significant at .05 alpha (2-tailed)

As reflected in the table above, the t-test computations show no significant difference between the ratings of the teachers and administrators on Learning and Innovation Skills, [t (177, 10) = .570]. Thus, the null hypothesis that there is no significant difference between the teachers' and administrators' ratings on learning and innovation skills is accepted. This further means that the ratings of teachers of their learning and innovation skills (Mean = 3.52) and the administrators' rating on the teachers' skills (Mean = 3.59) are most likely the same.

Table 9 below shows the t-test result between teachers' and administrators' ratings on Information, Media and Technology Skills.

Table 9. t-Test Results for the Differences in the Mean Ratings on Information, Media and Technology Skills

Compared Interpretation	df	Mean	SD	t-ratio	t-Prob.	Interpretation
Teachers' Rating	177	3.62	0.412	0.279	0.598	Not Significant
Admins' Rating	10	3.71	0.451			

P > 0.05, Not Significant at .05 alpha (2-tailed)

There is no significant difference between the ratings of teachers and the administrators on Information, Media and Technology Skills as displayed in Table 9, [t (177, 10) = .279, p = 598]. Therefore, the null hypothesis that there is no significant difference between the teachers' and the administrators' ratings on Information, Media and Technology Skills is also accepted. Further, the ratings of teachers of their information, Media and Technology Skills (Mean = 3.62) and the administrators' rating on the teachers' skills (Mean = 3.71) are most likely the same. The t-test result between teachers' and administrators' ratings on Career and Life Skills is shown in Table 10.

Table 10. t-Test Results for the Differences in the Mean Ratings on Career and Life Skills

Compared Interpretation	df	Mean	SD	t-ratio	t-Prob.	Interpretation
Teachers' Rating	177	3.59	0.437	1.427	0.234	Not Significant
Admins' Rating	10	3.76	0.503			

P > 0.05, Not Significant at .05 alpha (2-tailed)

The t-test results of the teachers and of the administrators on Career and Life Skills as reflected in the table above show no significant difference [$t(177, 10) = 1.427, p = .234$]. In this premise, the null hypothesis that there is no significant difference between the teachers' and the administrators' ratings on Career and Life Skills is accepted. Therefore, the ratings of teachers of their Career and Life Skills (Mean = 3.59) and the administrators' rating on the teachers' skills (Mean = 3.76) are most likely the same.

SUMMARY AND CONCLUSIONS

Summary of Principal Findings

The principal findings for this study are summarized as follows:

1. The majority of the 177 respondents are females (62%). Most of them (47%) are in the age bracket of 46-50. For the length of service as a teacher, the majority of 36% belong to 16-20 years. The highest educational attainment common among the respondents is a Master's Degree with 44%. For the teachers' ranking, most respondents are Teacher III (44%).
2. The learning and innovation skills has the lowest grand mean for both teachers-respondents and school administrators-respondents. Its sub-category Critical thinking and problem solving has the lowest over-all mean while communication and collaboration has the highest over-all mean.
3. The information, media and technology skills have the highest grand mean for the science teachers-respondents. Its sub-category information literacy has the lowest over-all mean for both teachers-respondents and school administrators-respondents.
4. The career and life skills have the highest grand mean among the school administrators-respondents. Its sub-category social and cross-cultural interaction has the highest over-all mean for both teachers and school administrators' respondents. The lowest mean is obtained by the sub-category flexibility and adaptability for the teachers-respondents.
5. Having the lowest over-all means, the training needs are identified for critical thinking and problem solving of learning and innovation skills; information literacy of information, media and technology skills; and flexibility and adaptability of career and life skills. Proposed training designs are attached in Appendix C.
6. The null hypothesis is accepted as there is no statistically significant difference between the mean ratings of the proficiency of skills of the teachers and the administrators. Both ratings of teachers and the administrators are most likely the same.

Conclusions

This study concludes that the Junior High School Science teachers of Cotabato City Division have highly practiced/ applied 21st Century Skills. The rating of the school administrators supports this. The science teachers are most proficient in the information, media and technology skills that has aspects of information literacy, media literacy, and ICT (Information, Communications and Technology) literacy. They are less proficient in learning and innovation skills with aspects of creativity and innovation, critical thinking and problem solving, and communications and collaborations.

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