

Knowledge and Thinking Strategies of the 21st Century Learners of Eastern Samar State University

Alma P. Kuizon

Associate Professor, Eastern Samar State University- Salcedo Campus

Abstract

This study explored and evaluated the proficiency of knowledge and thinking strategies practices of 21st century learners. The determinants of knowledge proficiency were fundamental, meta, and humanistic, and the practices of thinking strategies were core knowledge skills, cross-disciplinary knowledge skills, ICT skills, creativity and innovation skills, critical thinking and problem solving skills, communication skills, collaboration skills, life and career skills, ethical and emotional skills, and cultural competence skills. A descriptive and main component analysis were utilized to establish the impact and order in the knowledge proficiency and thinking strategies practices of the 21st century learners. A model displaying the principle components analysis was also depicted, indicating that the level of knowledge proficiency was modest. Similarly, the model highlighted that the higher the core knowledge acquisition, the more holistic the 21st century learners. Furthermore, there was sufficient practice of the students' thinking methods, with the more core knowledge skills practiced, the higher the cognitive skills implicate more competent and developing 21st century learners. Furthermore, this research suggests that meta and humanistic knowledge should be strengthened.

Keywords: *knowledge, thinking strategies, 21st century learners*

Introduction

The learners of the twenty-first century logically steer the future of our educational development and challenge the country's economy. The entrance of these revolutionary generations, in particular, has been the primary focus of most studies due to its distinct and non-traditional characteristics, which have transformed practically all methods, methodologies, and strategies in the learning paradigm. One of the most important goals of education is to positively reinforce learners' ability to manage complexities with desired abilities and attributes. Furthermore, in order to survive the twenty-first century, learners must demonstrate superior higher order cognition skills throughout their learning progression.

The advent of industry 4.0 challenges our nation's readiness in the education society. This revolution will diverge the Filipino 21st century learners from the universal arena considering the exponentially demand of highly skilled 21st century workforce. However, to address the influx of industry 4.0 revolution, students need to prepare their optimal skills in the 21st century of Science High School Science Technology Engineering and Mathematics knowledge and thinking strategies to acquire their future gains. Also, mentioned in the article of Educational Leadership "an increasing number of

professionals, politicians, and commerce are unified around the idea that students need 21st century skills to be successful today in their studies and career lives”.

Empowering the Senior High School Science Technology Engineering Mathematics students in the 21st century ensures they can thrive their daily life challenges as well as invest in uplifting the nation’s economy. An active, fun and meaningful learning through Project- Based World (Vander et.al. 2016), where students can access to high quality project based learning that will challenge their fundamental, meta, humanistic knowledge and thinking strategies. Also, introducing and teaching students lifelong skills (Harris, 2020) enhances their awareness necessary in acquiring knowledge and practicing skills significant to their future. Moreover, a competitive 21st century learners practices must exhibit the following: 1) student engagement 2) meaningful learning, and 3) strong dynamic relationship, for better learning development that will positively shape the students’ future to a desirable industry 4.0 workforce contributing to the economy of our country.

Similarly, at Eastern Samar State University, proficiency in knowledge and thinking strategies practices of the 21st century learners of Science High School Science Technology and Mathematics is challenged by the competitive workforce demand of the 21st century learners to be at par in the global industrialization as well the need to empower students to be productive locals of Eastern Samar that will eventually elevate the province economy.

Specifically, this study sought to answer the following questions:

1. What are the level of knowledge and thinking strategies of the 21st century learners:
 - 1.1 Knowledge
 - 1.1.1 Fundamental
 - 1.1.2 Meta
 - 1.1.3 Humanistic
 - 1.2 Thinking Strategies
 - 1.2.1 Core Knowledge Skills
 - 1.2.2 Cross-Disciplinary Knowledge Skills
 - 1.2.3 ICT Skills
 - 1.2.4 Creativity and Innovation Skills
 - 1.2.5 Critical Thinking and Problem Solving Skills
 - 1.2.6 Communication Skills
 - 1.2.7 Collaboration Skills
 - 1.2.8 Life and Career Skills
 - 1.2.9 Ethical and Emotional Skills
 - 1.2.10 Cultural Competence Skills
2. Using Principal Component Analysis, how may the 21st century knowledge be described in terms of three domains?
3. To what extent are the knowledge proficiencies in the 21st century learners?
4. Using Principal Component Analysis, how may the 21st century thinking strategies be described in terms of ten components?
5. To what extent are the thinking strategies practices in the 21st century learners?

2. Research Design and Methods

The study utilized an exploratory data analysis specifically, the Principal Component Analysis to significantly determine the level of knowledge proficiency and thinking strategies practices in the 21st century learning opportunity of students. It involved 86 students of Grade 11 and Grade 12 Science High School Science Technology Engineering and Mathematics track of Eastern Samar State University. The study used a modified adapted survey questionnaire in collecting data. Moreover, the data were then collated, presented, analyzed and interpreted.

3. Research Results and Discussion

Table 1. Level of Knowledge
n=186

Knowledge of the 21st Century	MEAN	INTERPRETATION
FUNDAMENTAL KNOWLEDGE	3.80	Moderately Agree
META KNOWLEDGE	3.60	Moderately Agree
HUMANISTIC KNOWLEDGE	3.72	Moderately Agree
Grand Mean	3.71	Moderately Agree

Legend: 5.00-4.20 strongly agree, 4.19-3.40 moderately agree, 3.39-2.60 neither agree/disagree, 2.59-1.80- moderately disagree, 1.79-1.00, strongly disagree

Table 1 revealed that the level of knowledge proficiency in terms of fundamental knowledge, meta knowledge and humanistic knowledge are all moderate and have more impact shown on their fundamental knowledge proficiency. The Science High School Science Technology Engineering and Mathematics track have initially practiced fundamental knowledge which is an essential pattern in acquiring core knowledge skills, cross-disciplinary skills, and ICT skills. Moreover, (Hirsch, 2014) stresses in his study that fundamental knowledge is the backbone of all sources of new information learned.

Table 2. Level of Thinking Strategies Skills
n=186

Thinking Strategies of the 21st Century	GRAND MEAN	INTERPRETATION
CORE KNOWLEDGE	3.79	MODERATELY AGREE
CROSS DISCIPLINARY KNOWLEDGE	3.80	MODERATELY AGREE
ICT	3.82	MODERATELY AGREE
CREATIVITY & INNOVATION	3.61	MODERATELY AGREE
CRITICAL THINKING & PROBLEM SOLVING	3.64	MODERATELY AGREE
COMMUNICATON	3.41	MODERATELY AGREE
COLLABORATION	3.74	MODERATELY AGREE
LIFE AND CAREER SKILLS	4.28	MODERATELY AGREE
ETHICAL & EMOTIONAL SKILLS	3.14	NEITHER AGREE/DISAGREE
CULTURAL COMPETENCE	3.74	MODERATELY AGREE
OVERALL GRAND MEAN	3.70	MODERATELY AGREE

Cronsbach's Alpha= 0.9523

The table above portrayed that respondents are future oriented: they clearly understand the importance of education in shaping their future. Students skills in navigating complex life and work environments in a globally competitive setting are determinants of their success in learning, wherein

students’ attend religiously their classes to be successful in life and career (Douglas and Morris, 2014). However, students’ ethical and emotional skills practices, reflect student’s issues on laziness and attitude sensitivity. Moreover, to thrive in the 21st century, where change is constant, a learner should properly utilize and practice the optimal skills of each of the ten thinking strategies. These 21st century skills are essentials of the students to succeed in their learning activities, able to thrive in a complex environment and be a pillar of our nations’ development. A need to intensify each of the ten thinking strategies of the respondents to attain and maximize the desirable skills.

Table 3. Knowledge Eigenanalysis of the Correlation Matrix

Eigenvalue	2.3684	0.3709	0.2607
Proportion	0.789	0.124	0.087
Cumulative	0.789	0.913	1.000

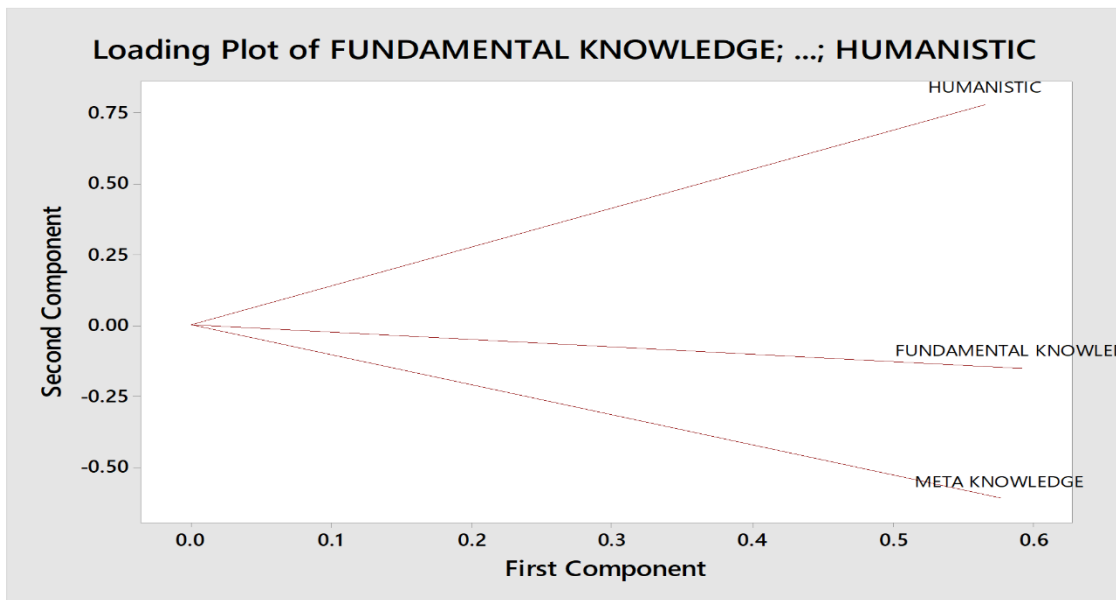


Figure 1. The Knowledge Plot

Principal Component Analysis revealed that knowledge proficiency of the 21st century learners is sufficient. The extent of their proficiency in knowledge is clearly depicted in the model derived as the extent of knowledge index. Also, the model portrayed that fundamental knowledge proficiency has greater impact on the 21st century learners.

Table 4. Thinking Strategies Eigenanalysis of Correlation Matrix

Eigenvalue	5.6223	1.0166	0.8191	0.6191	0.4851	0.4704	0.3611	0.2785	0.1706	0.1572
Proportion	0.562	0.102	0.082	0.062	0.049	0.047	0.036	0.028	0.017	0.016
Cumulative	0.562	0.664	0.746	0.808	0.856	0.903	0.939	0.967	0.984	1

Table 4 revealed that the Principal Component Analysis of the impact of the students’ practices in the 21st century shown above has a total variance of greater than fifty percent; therefore it is sufficient to represent the true eigenvector Principal Component 1 as practices of thinking strategies of the 21st century learners. These thinking strategies are considered core knowledge, cross-disciplinary knowledge, ICT,

critical thinking and problem solving, creativity and innovation, communication, collaboration, life and career, ethical and emotional, and cultural competence skills.

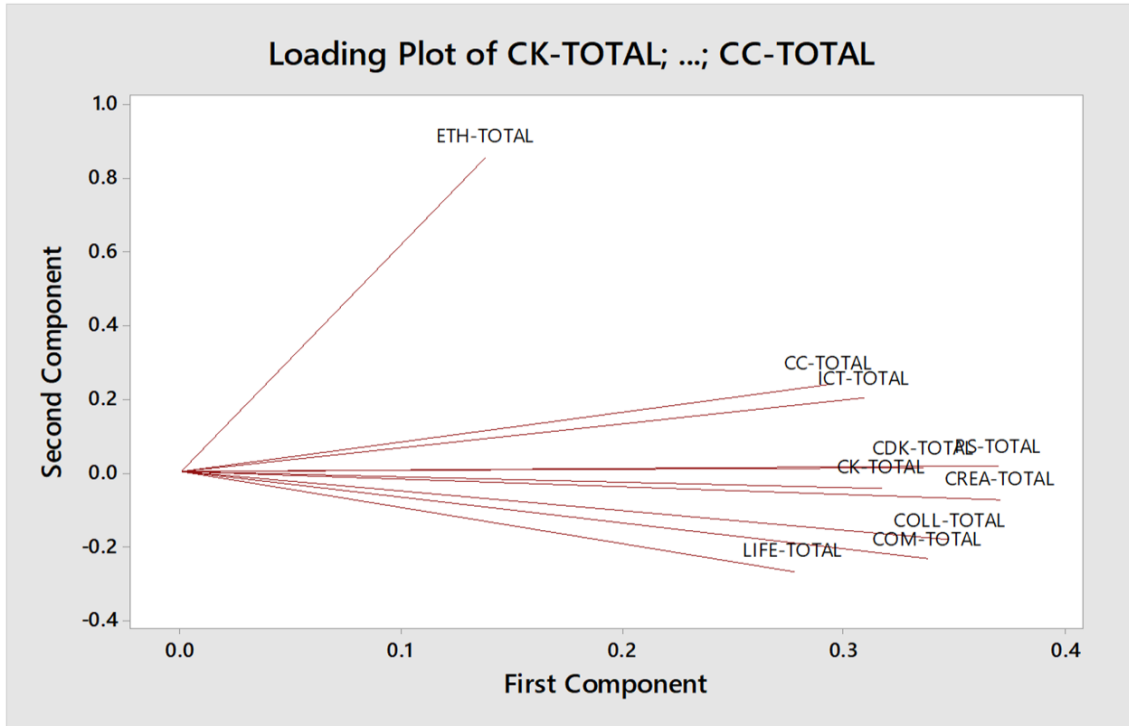


Figure 2. Thinking Strategies Plot

Principal Component Analysis showed that Thinking Strategies practices of the 21st learning century is sufficient. The model of the extent of thinking strategies exposed that core knowledge has better impact on the 21st century learners.

$$21^{st} \text{ Century Thinking Strategies Index} = CK*0.317 + CDK*0.336 + ICT*0.309 + CREA*0.371 + PS*0.370 + COM*0.338 + COLL*0.348 + LIFE*0.277 + ETH*0.138 + CC*0.293$$

4. Conclusion

The 21st century learning, the Science Technology Engineering and Mathematics students acquire knowledge and thinking skills using myriad strategies. The identified factors highly contribute to the development of students’ knowledge and thinking strategies for survival in the real world. However, schools or institutions in the Philippines have to intensify their level of training and teaching practices to improve these skills among Filipinos 21st century learners. To note, in these knowledge category students, predominant appreciation of meta knowledge must be further given attention to boost the 21st century 4C’s skills as meta knowledge. Also, there is a need to reevaluate the emotional and ethical skills of the students to build morally upright and resilient Filipino 21st century learners’. Consequently, further recommendations were made to attain the fullest advantage of the study producing holistic 21st learners of the country.

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