

## The 4c's Century Skills In Teaching And Learning Trigonometry

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### Abstract

It is a global issue on how to improve the quality of Teacher education in terms of teaching and learning process, 4C's twenty first century skills: Critical thinking, Communication, Collaboration, and Creativity are essential for success in today's world. The importance of Teacher's as one of the factors in the instrumentation of learning and measuring the effectiveness of the teacher strategies in the manner to create a meaningful learning and multiple learning opportunities for all students. Learning is a tool for the individual for his lifelong activity. Being equipped, means two things: (1) to have the direction and (2) to have a skills for lifelong learning. Kolb's process of learning and Garner's ways of learning using the twenty first century skills. The aim of the study is find out the effectiveness of the integration of 4c's in teaching trigonometry. The researcher used the quasi-qualitative method and focus –group of method in gathering descriptive information, then evaluated and validated by experts in the field. In synthesizing the result of the data using the SPSS software statistics mean, SE mean, T=value and P-value it shows in the teaching and learning process twenty first century skills has a vital role in preparing the students for their future. However, there are variety of opportunities for the teachers in enhancing their ability in teaching as well the significant to the students capability of their learning competencies in the twenty first century skills..

**Keywords:** Twenty first century skills, schools, students, learning competencies, critical thinking, communication, collaboration, creativity

### 1. Introduction

Twenty first century calls for 21<sup>st</sup> century teaching. While traditional teaching methods have their own merits at some of them have already taken deep roots and are in fact be considered time tested methods, however, with the kinds of learners we have now, sole dependents on these rather traditional methods may no longer be suitable and effective addressing the diverse learning styles of the diverse 21<sup>st</sup> century learners.

Professional development is very important for teachers. It is something that challenges teachers and educators to think critically and communicate effectively that will involves true collaboration and encourages them to be creative and innovative in the teaching profession. Teachers may consider on students outcomes involving the 4c's.

At present, teachers have slowly started integrating in their instruction some innovations in order to include

the various skills expected of 21<sup>st</sup> century learners to master if not possess at least. These skills are critical thinking , communication, collaboration, and creativity also known as the 4c's in the 21<sup>st</sup> century learning and teaching.

In global diversity twenty first century skills added some important core in the education for human competencies as to productive investment, to have a quality result, then adopt several changes in a very competitive society that continuous improvement must be consider for a competitive society. In light of this , students are expected to be able to think critically and independently able to take charge and make sense of his own learning , express himself in a coherent way to ensure the smooth conveyance of information, work with others harmoniously in order to achieve common goals and innovative solutions in varied problems using the things he has learned.

CHED MEMORANDUM No. 75, series of 2017, this implements the Policies and Standards & Guidelines for Bachelor of Secondary Education in recognition of the spirit of outcome –based education . PSG also provides ample time for HEI'S to be creative in the curriculum in line with the assessment of how best to achieve learning outcomes in their pedagogy and their respective missions. Constructivism is employed in the teaching learning trigonometry .The 4C's 21st century skills: Critical Thinking, Collaboration, Communication, and Creativity are appropriate in building the students or learners competencies, that have been identified by the United States based partnership for 21st century skill as one of the most important factor for the twenty first century education. Despite countless efforts of schools to equip teachers with knowledge and pedagogies tailored fit for the 21<sup>st</sup> century learners, there have been reports that a considerable number of students will display a dismissal performance in one or most of these competencies / skills . The researcher observed that learning trigonometry needs attention .Students find it difficult ,hence the researcher decided to determine the effectiveness of the integration of 21<sup>st</sup> century skills in instruction in the hope that this endeavor will be helpful in designing an instructional plan to further develop the students 21st century skills .

## **2.Literature Review**

The Philippines, education has shifted the system completely or paradigm shift to new approaches that is developing our country and our society into a globally empowered students by having the 21<sup>st</sup> century skills in mathematics in the modern world. Emerging the global vision and mission of the k1-12 program with the globally implementations which improving the whole society, students living to the norms and standard of our country wherein teaching is outcome base learning in the real world achievement (Marc,2016).

Teaching and learning process with the integration of the twenty first century kills using the digital creative work helps the students more flexible to any tools of learning which allowing them to conduct a variety of creative activity may resolve to a unique result ( Donovan , 2014).In conceptualizing , evaluating and synthesizing mathematical problems will develop the students higher order thinking skills for a lifelong learning , evaluating complex issues require effective and creative collaboration from others learners ideas in drawing out decisions ( Retnawati et. al,2018).

Twenty first century skills like communication skills is one of the important that students must have the abilities to express thoughts and ideas clearly, to articulate writing and opinions need proper instruction by communication others especially in the workplace and social interaction . Students are every communicative to interact in the school environment manifested a learning ability to collaborate others in making a decisions in life and easy to adjust the individual conflict ( Bellanca,2014). The 4C's 21st century skills: Critical Thinking, Collaboration, Communication, and Creativity with the technology integration in teaching and learning process with the application of the 4C's can help the students build their future or learners competencies ( Pelligreno,2017).

The modern world as a life that will help the students preparing them to life skill as well as in their future professional careers. Effective teacher must be a communicative individual possess the communication skills which is vital in the classroom as part of the teaching process in order to assess the students learning (Greenstein,2012). In the world of classroom the 21st century teaching ,evidently there are schools systems were not yet ready to fully adopt and embrace these very teaching strategies that have been denounce for a century, by then the students are now exposed to digital technology ,so the educational system must embrace the 21<sup>st</sup> century teaching . Intervention programs which may lead the learners more interesting levels of the applications to the acquired skills in achieving the individual goals. The classroom learning is the foundation of students' knowledge towards the affective and cognitive aspects which build up them to reach their achievements (Wright and Lee,2014).

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acceptance self-determination with the proper guidance in the classroom are the positive experiences which the learners understand in achieving their priority and goals ( Rata,2016). Teaching in the twenty first century appears to be a massive change , then a teacher must , therefore , realize that to be successful and effective , he must be willing to change , learn, and adopt or embrace the new system of education . Teaching made the teacher to have an opportunity to performs the many roles and the chance to make the classroom environment as life interesting and meaningful and worthwhile that gives him a feeling of fulfilment and achievement in seeing that the learners develop their own concept and activities for the individual growth of the learners . Integrating ICT in teaching mathematic help to solve and understand mathematical problems it will attribute to a good result in the issues of formulating concept (Genlott & Grönlund, 2016). In teaching the 21st century skills teachers must be equipped in the use of ICT as an instrumentation in mathematics , the result of the Swedish study 2013 only 1/3 favorable to use ICT and 20% are not favorable that is a challenging factor in an effective teaching (Suto,2013).

In the current technological mathematical instrument teachers in teaching they need enough time to be train to as the integration of digital technology in the modern Math. Teachers must be a globally competent in terms of the twenty first century skills that preparing the individual learners to be globally competent which is offer a variety practices empowerment into transformative education. UNESCO frameworks Global Citizenship Education that in teaching twenty first century skills teachers must be globally competent that teaching and learning becomes a transformative education , opportunities for the teacher to be a multi-cultural experiential teaching (Kopish,2017).

Today's 21<sup>st</sup> century learning the 4c's identifies the skills (a) critical

thinking as to critically solve problems analytically using higher thinking order skills, (b) communication students deliver information creatively and effectively, (c) collaboration students relate things and ideas with working others harmoniously, achieving goals in a specific time,(d) creativity which the learners creative enough in coming up their solutions to every problems that they encountered and can design their life with self-directed for their future( Hewlett,2019 ).

Learners globally the 21st century skills (4c's) are essential today's teaching. Critical thinking skills develop the students interpretation of information ,data, accuracy in problem solving and the ability to understand creatively in drawing out solutions , communication in the workforce is vital and essential to be effectively deliver the message , the products and selling services that include feelings, thoughts and attitudes. Collaboration is the engagement activity with the peers in working out solutions ,formulating ideas that inspire the learners to be more participative and competent in their interpersonal motivation of learning towards a task oriented individual that build up a good relationship with others. Creativity develop the students engagement in manipulative learning, designing creative solutions and students may learn to create variety of intuitive ideas ( Jared,2016).

In global diversity teaching and learning process allowing the students to have their own way of conceptualizing the subject, interactive approach in a manner of with a social motivational affective and the teachers also take a consideration to equate the time with a quality instruction to let the students fully understand the whole activity in the classroom and the teacher will become effective in the learning process which added some important core in the education for human competencies as to productive investment( Wishmath,2013).

One of the contributors for the growth of the Country's economy is the Education, it plays an important role in the skilled workforce in a society. The development of the environment enhances the technology application and the innovations of teaching and learning styles, there is a great difference between the old method and the interacting learners in the teaching and learning strategies resulting to a better students performance. Individual self directed in the learning process will help the students develop their critical thinking skills as well their ability in outsourcing their task through technology literacy. Transformative education will assess the teaching methods effective towards the learners (Kermanshachi, 2018).

Teachers must have a self- awareness and has the quality in assessing the students growth with the ability to associate and collaborate with peers, learners, and possessing the skills of management relationship with a holistic character in building a better relationship to students for their social awareness , influencing the students to a wholesome character in interacting his environment. Emotional intelligence must be consider in hiring a new teachers (Brase,2016). To have a quality schools the policy makers must set a standards in educations, partnership of twenty first century skills and the core basic knowledge will have an outcome of a better schools including the improvement of life and the success in career skills. Teachers should consider the appropriate materials in the application of 4c's in teaching and learning process

allowing to have a wide range of students performance (Loveless,2013).

### 3.Methodology

The study aimed to determine the effectiveness of the 4C's integration in teaching -learning trigonometry among first year education student. Specifically, it sought to answer the respondents performance pre- and post testing to both control and experimental groups. Further, it aimed to identify significant difference between the Pre-and Post test.

1. Pre-Post Test student performance in Trigonometry in both control and experimental groups along the following:

- 1.1 Critical Thinking
- 1.2 Communication
- 1.3 Collaboration
- 1.4 Creativity
2. Significant difference between the pre--post test .
3. Mean gain difference between the control group and the experimental group.

The research design of the study was a quasi- experimental design that gathered information and opportunity in understanding the importance of 4C's in 21<sup>st</sup> century in Mathematics of Trigonometry towards the teaching and learning process .The study was conducted to Eastern Visayas State University located at Eastern part of Leyte at the Municipality of Ormoc with a total populations of 4, 240 students and 1240 freshmen education students w ith almost 70 students who are BSED Math1.The researcher wrote a letter to the Campus Director of Eastern Visayas State University – Ormoc City Campus in Leyte that part of my study.

**To find out the significance of the 4C's in 21st century skills in today's education like mathematics in the Trigonometry and its teaching and learning process in the classroom with the pre-post-test performance. The significant and the main-gain difference between the control and experimental group of their pre-post test result. The implementation of 4C's in teaching and learning mathematics in the plane trigonometry, the teachers' instructional competence based on students' feedback. The respondents of this study are the BSED Math 1 students of Eastern Visayas State University Ormoc City Campus Campus which is located at Barangay Don Felipe Iarrazabal Street Ormoc City. BSED Math -1 who were enrolled in mathematics in Trigonometry, Second Semester of SY 2017- 2018 . There are 35 number of BSED-Math 1 students for control group and 39 number of BSED Math1 students for experimental group. . The researcher gathered data from the students in trigonometry. Tabulate all the data gathered for proper interpretation using the SPSS software.**

**Table 1. Pre-Post Student Performance in Trigonometry of Control Group**

Learning Competencies	PRE-TEST					POST-TEST				
	N	SD	Mean	Description	Rank	N	SD	Mean	Description	Rank
Solve problem Involving angles and Their measurement	34	4.077	7.1134	Average	2	34	2.96	8.294	Average	1
Apply trigonometric Principles in real life	34	4.331	7.389	Average	1	34	3.80	8.2206	Average	2
Perform calculation and Solve applied	34	4.275	5.194	Below Average	3	34	2.59	4.533	Below Average	3

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problems In trigonometry										
Identify functions and Relations, giving some Real life situations	34	3.308	4.472	Below Average	4	34	2.51	3.059	Below Average	<b>4</b>
<b>Grand Total</b>		3.998	6.042				2.97	6.027		

Table 1 presents the pre-post test performance of the students in Trigonometry of their learning competencies of the control group.

**Table 2.** Pre-Post Student Performance in Trigonometry of Experimental

Learning Competencies	PRE-TEST					POST-TEST				
	N	SD	MEAN	Description	Rank	N	SD	MEAN	Description	Rank
Solve problems Involving angles And measurements	36	3.010	8.176	AVERAGE	1	36	2.110	10.056	AVERAGE	4
Apply trigonometric Principles in real life	36	3.993	8.147	AVERAGE	2	36	3.905	20.806	ABOVE AVERAGE	4
Perform calculation And solve problem Applied problem in trigonometry	36	2.452	4.471	BELOW AVERAGE	3	36	5.926	24.528	ABOVE AVERAGE	4
Identify functions and Relations, giving some real life relationship	36	2.611	2.611	BELOW AVERAGE	4	36	4.545	15.556	ABOVE AVERAGE	4
<b>Grand Total</b>		<b>3.017</b>	<b>5.851</b>				<b>4.097</b>	<b>7.737</b>		

∞  $\alpha = 0.05$  level of significance

Table 2 presents the pre-post test of students in trigonometry of their leaning competencies of experimental group.

**Table 3.** Significant Difference Between The Pre-Post test of Control Group

LEARNING COMPETENCIES	PRE-TEST					POST-TEST				
	MEAN	SD	TVALUE	PVALUE	DESCRIPTION	MEAN	SD	TVALUE	PVALUE	DESC.
Solve problems Involving angles And measurements	7.194	4.07	-0.27	.079	NOT SIGNIFICANT	8.294	2.96	-0.27	.07901	NOT SIGNIFICANT
Apply trigonometric Principles in real life	7.389	4.31	0.27	.943	NOT SIGNIFICANT	8.026	3.80	4.331	.943	NOT SIGNIFICANT
Perform calculation And solve problem Applied problem in trigonometry	5.194	4.25	0.19	0.52	NOT SIGNIFICANT	4.353	2.59	4.275	0.520	NOT SIGNIFICANT
Identify functions and Relations, giving some real life relationship	4.472	3.38	0.06	0.095	NOT SIGNIFICANT	3.059	2.51	3.308	0.095	NOT SIGNIFICANT
<b>Grand Total</b>		6.062	3.308	0.0833	0.4095			5.933	2.51	3.882

$\alpha = 0.05$  level of significance

Table 3 shows that there is no significant difference between the pre-post test of the students performance among their learning competencies in the control group.

**Table 4.** Significant Difference Between the Pre-Post Test of Experimental Group

LEARNING COMPETENCIES	PRE-TEST					POST-TEST				
	MEAN	SD	TVALUE	PVALUE	DESCRIPTION	MEAN	SD	TVALUE	PVALUE	DESCRIPTION
Solve problems involving angles and measurements	8.176	3.010	3.83	.001	NOT SIGNIFICANT	10.056	2.110	3.83	0.001	NOT SIGNIFICANT
Apply trigonometric principles in real life	8.147	3.993	14.86		NOT SIGNIFICANT	20.806	3.905	14.86	0.651	NOT SIGNIFICANT

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Perform calculation and solve problem applied problem in trigonometry	4.471	2.452	16.3	0.000	NOT SIGNIFICANT	24.528	5.926	16.3	0.000	NOT SIGNIFICANT
Identify functions and relations, giving some real life relationship	3.029	2.611	12.51	0.000	NOT SIGNIFICANT	15.556	4.545	12.51	0.000	NOT SIGNIFICANT
<b>Grand Total</b>	5.956	3.017	11.9	0.000		88.72	4.122	11.9	0.000	

$\alpha=0.05$  level of acceptance

Table 4 shows that there is a significant difference between the pre-post test of the students performance level of the experimental group in trigonometry.

**Table 5.** Mean –Gain Difference Between the Control and the Experimental Groups

Learning Competencies	Pre-Test			Post Test		Description
	MEAN	SD	SE MEAN	T VALUE	P VALUE	
Solve problem involving angles and their measurements	-3.057	5.693	0.962	3.18	0.003	
Apply Trigonometric principles to real life	-13.49	7.39	1.25	10.75	0.000	Significant
Perform calculation and solve applied problems in trigonometry	-19.11	7.84	1.33	14.42	0.000	
Identify functions and giving some real life relationship	-11.06	5.96	1.01	10.97	0.000	
<b>Grand Total</b>	-11.679	33.604	1.138	9.83	0.00.	

Significant at  $\alpha=0.05$

Table shows that there is a significant mean gain difference between the control and the experimental groups of their level of competencies.

## 5. Discussion

### 1. Pre-Post Student Performance in Trigonometry of Control Group

The students in the control group their pre-post Test performance are the same in all the 21<sup>st</sup> century skills (4c's). This implies that The students needs the application of 4c's in teaching trigonometry to improve their performance . Whereas the experimental group their pre-post test performance of the students was greatly improved by using the 21<sup>st</sup> century skills (4C's). The challenges in teaching and learning in 21<sup>st</sup> century skills in relations between the 4c's the learners writing , reading and communication has a significant contribution of the development of every individuals learning process and drawing out mathematical solutions (Rata,2016). To be globally competent the 4c's is needed in preparing the individual learners to have a variety practices that empowered them into a transformative education (Kopish,2017).

### 2. Pre-Post Test Performance in trigonometry of Experimental Group

There was a significant difference between the pre-post test of the students performance in trigonometry that the control group p-values is greater than the  $\alpha=0.05$  level of acceptance while the experimental group p values is less than or within the  $\alpha = 0.05$  level of acceptance .The learning competencies category from average to above average, therefore the integration of 4c's in the teaching and learning in trigonometry is effective The development of 21<sup>st</sup> century competencies would facilitate the evaluation of the learners performance realizing the significant element in the teaching approaches to support the learning environment challenges (Mishra,2017)).

### 3. Significance Difference Between The Pre-Post Test of Control Group

The performance level shows a grand total of p-values =0.4095 which is greater than the  $a=0.05$  level of significance , Therefore the learning competencies must be developed. The knowledge as to students critical thinking, communication , collaboration and creativity are equally important in the holistic process of teaching trigonometry. In the teaching and learning process allowing the students to have their own way of conceptualizing the subject, interactive approach in a manner of with a social motivational affective and the teachers also take a consideration to equate the time with a quality instruction to let the students fully understand the whole activity in the classroom and the teacher will become effective in the learning process ( Renatwati,et.,al,2018).

### 4. Significance Difference Between The Pre-Post Test of Experimental Group

The performance level of the experimental group in their learning competencies the total p values is 0.000 is less than or within the  $\alpha = 0.05$  level of acceptance .It shows that there is a significant difference between the pre-post test of the students performance in trigonometry. Therefore, After the integration of 4c's in teaching trigonometry their abilities were developed and their performance also improved very well . The students must explore the challenges in life and the work environments in a competitive society that students need to determine the skills and the social responsibility as productive individual and responsible person. A total package of new educational approach to the new millennium society ( Donovan et., al ,2014).

### 5. Mean –Gain Difference Between the Control and the Experimental Groups

There was a significant mean gain difference between the Control and Experimental group obtained a SE mean of 0.962 with a Sd of 5.693. Then the computed T value was 3.18 with a p value of 0.003 hence it is less than the  $a=0.05$  level of significant. Conventional or traditional is not adoptable in today's learners. To embrace the 4c's in life develops the students learning in trigonometry and to be adequately prepared in their future, students build up their ability to have more concerned of their well being in self management to be a successful individual and well motivated to increase performance. The integration of 4c's develop the learning competencies of the students and improved their performance and also makes them a self-directed individual transforming into a transformative students (Kivunya,2015). To embrace the 4c's in life develops the students learning in trigonometry and to be adequately prepared in their future, students build up their ability to have more concerned of their well being in self management to be a successful individual and well motivated to increase performance( Hewlett,2015). The integration of 4c's develop the learning competencies of the students and improved their performance and also makes them a self-directed individual transforming into a transformative students (Prensky,2018). The creativity of the students is a vital outlet to them where they are inspires to see who they are and what they can do and to realize what they can accomplish. In Collaboration the students must possess the ability to collaborate seamlessly in both physical and virtual spaces, with real

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and partners globally. The students in terms of communication must be able to communicate not just text or speech, but in multiple multi-media formats (Pellegrino, 2017).

### 6. Conclusion:

Twenty first century skills is characterize with amazing development and skills such as critical thinking , communication , collaboration , creativity . these are important skills in teaching trigonometry. Thus , fundamental outcome of the integration are not only focus on learning content knowledge but emerging students to develop innovative mathematical solutions, critically think through trigonometric problems and the ability to collaborate and communicate each other in teams. The 21<sup>st</sup> century skills is the effective instructional measures as to improve the students performance.

In light of the findings of this study , the researcher recommends the following

1. Twenty first century skills (4C's) must be introduce to the different department of EVSU-OCC and teachers should undergo training workshop and proper orientation in integrating 4c's in teaching and learning process of trigonometry .

2. Teachers use adequate tools and material and teachers must have the standard assessment evaluation of the students performance and building up good relationship with the students.

3. EVSU –OCC Campus Director and Dean's of different colleges must implement and support the plan of action in teaching and learning trigonometry with the application of 4c's to improve the student's performance evaluation and increase the passing rate for Licensure Examination for teachers(LET).

4. Further study about the 21<sup>st</sup> century skills maybe conducted . The following are proposed titles.

4.1 Assessment of student learning in the 21<sup>st</sup> century skills

4.2 Teaching Math in the Modern World integrating 4C'S

Encourage collaboration as means to improve students performance. This includes monitoring per coaching, and group activities as efforts to increase retention and learning enrichment

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