



21st Century Skills of Students in a Technical Vocational Education and Training Institution in the Philippines

Joseph Christian P. Oliquino

Camarines Sur Institute of Fisheries and Marine Sciences, TESDA V
Sta. Rosa Del Norte, Pasacao, Camarines Sur, Philippines

*Corresponding e-mail: josephchristianoliquino@yahoo.com

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Abstract: 21st Century Skills of Students in a Technical Vocational Education and Training Institution in the Philippines. Objectives: This study aims to assess the 21st Century Skills of Students in a Technical Vocational Education and Training (TVET) Institution in the Philippines. **Methods:** The descriptive method was used to describe the characteristics and the competency level of 21st century skills of sixty-eight TVET students enrolled in the first semester school year 2019-2020 at Camarines Sur Institute of Fisheries and Marine Sciences, Philippines. A comparative method was used to analyze the similarities and differences of skills. The percentage, ranking, average weighted mean, and one-way ANOVA were used for statistical analysis in determining the interpretation based on the 4-point Likert's rating scale used. **Findings:** The study reveals that the overall level of competency of 21st century skills of TVET Students is 3.081 interpreted as moderately competent which implies that the students can apply their skills in simple situations. **Conclusion:** TVET Students in Philippines possess the 21st century skills.

Keywords: 21st Century Skills, TVET Students, descriptive and comparative analysis.

Abstrak: Keterampilan Abad 21 Siswa di Institusi Pendidikan dan Pelatihan Kejuruan Teknik di Filipina. Tujuan: Penelitian ini bertujuan untuk menilai Keterampilan Abad 21 siswa Institusi Pendidikan dan Pelatihan Kejuruan Teknik di Filipina. **Metode:** Metode deskriptif digunakan untuk menggambarkan karakteristik dan tingkat kompetensi dari enam puluh siswa TVET semester pertama tahun 2019-2020 yang terdaftar di Institut Perikanan dan Ilmu Kelautan Camarines Sur, Filipina. Metode komparatif digunakan untuk menganalisis persamaan dan perbedaan keterampilan siswa. Persentase, pemeringkatan, nilai rata-rata, dan ANOVA satu jalur digunakan untuk analisis statistik dalam menginterpretasi data berdasarkan skala Likert yang digunakan. **Temuan:** Studi ini mengungkapkan bahwa tingkat kompetensi siswa TVET secara keseluruhan adalah 3.081 yang bermakna cukup kompeten dan mampu menerapkan keterampilan mereka dalam situasi sederhana. **Kesimpulan:** Siswa TVET di Filipina memiliki keterampilan abad ke-21.

Kata kunci: Keterampilan Abad 21, siswa Teknik Vokasi, analisis deskriptif dan komparatif.

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■ INTRODUCTION

January 2015 during the World Economic Forum, German Chancellor Angela Merkel, discussed Industry 4.0 to describe the computerization of manufacturing regarded as the fourth industrial revolution. She said that the phenomenon will change the way we deal with the fusion of the online world and the world of industrial production where technology and real-time data will be used to increase productivity and reduce cost. According to Schwab (2016), the critical changes will be amplified by emerging technology breakthroughs in fields such as artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3-D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing. As a result, the anticipation of job creation is rooted in the fact that most in-demand occupations today did not exist ten or even five years ago, and the momentum of this change is yet to accelerate, TESDA (2016). 65% of the children entering primary schools today will end up working in completely new jobs that are not existing yet as estimated by *The Future Industrial Revolution: what it means, how to respond* (2016). Social skills such as persuasion, emotional intelligence and teaching others- will be more in demand than specific technical skills such as programming or equipment operation and control. Essentially, technical skills have to be coupled by strong social and collaboration skills, *The Future of Jobs* (2016).

The British Council released the 21st Century Skills for Global Citizens they call it *Deep Learning Skills*. It composed of: Global Citizenship, Character, Communication, Creativity and imagination, Real-World Problem Solving, Critical Thinking and Use of ICT for Learning. *The Human Capital Outlook: ASEAN* (2016), emphasizes that aside from social and creative skills the Fourth Industrial Revolution also requires strong vocational skills which are often

regarded as poor alternatives about traditional academic routes.

The Fourth Industrial Revolution also known as Industry 4.0, challenge the Philippine educational system to be at par to the global standard. Technical Education and Skills Development Authority (TESDA) is a government agency mandated to manage and supervise the Technical Education and Skills Development programs in the Philippines aims to produce a globally competitive workforce (RA 9292). To address this, TESDA promulgates and implements several projects, programs and policies to ensure the quality of the TVET in the country such as development of Training Regulations (TRs), alignment of the training program to the Philippine TVET Qualification Framework (PTQF), implementation of competency-based training, regulating the TVET programs thru the Unified TVET Program Registration and Accreditation System (UTPRAS), recognizing TVET programs that exceed to the minimum requirements and giving incentives to the institutions identified as Center of Technical Excellence (CenTexes), Distinctive Area of Competence (DAC) and System of TVET Accreditation and Recognition (STAR) program (TESDA, 2018).

To adapt and excel in this revolution, 21st century skills are necessary. TESDA identified nine 21st century skills, these are the collaboration and teamwork, communication, learning and innovation, critical thinking and problem solving, environmental literacy, information technology, life-long learning, and career development, occupational health and safety, and entrepreneurship (TESDA, 2017).

TESDA Technology Institutions (TTIs) as a state-run TVET provider must develop programs to cater to the development and enhancement of the 21st century skills possessed by the students while they are in the training period and school supervision. Camarines Sur Institute

of Fisheries and Marine Sciences (CASIFMAS) as one of the TTIs in the Bicol region located at municipality of Pasacao, Camarines Sur continuously complying to the TESDA imperatives in order to provide quality TVET programs to the constituent and to the nearby municipalities and to help them to become productive and employable locally and internationally. CASIFMAS as a training institution, it is necessary to evaluate the level of competence of the students to develop a program intervention to help the students in developing and enhancing their 21st-century skills.

This study aims to assess the 21st Century of Students in One Technical Vocational Education and Training (TVET) Institution in the Philippines. Specifically, the objectives of the study are to describe the profile of the students, to determine the level of competency of the 21st century skills possessed by students, and determine the significant difference of the 21st century skills in terms of course, gender and age.

■ METHOD

The study employed the descriptive, evaluative, comparative and correlational methods of research. The descriptive method was used to describe the characteristics and the competency level of 21st century skills of the students. The similarities and differences of 21st century skills of the students in the Electronic Products Assembly and Servicing (EPAS) NC II and Computer System Servicing (CSS) NC II, a comparative method was used. The correlational method was applied to determine the relationship between the 21st century skills of the students and the identified predictors.

The survey questionnaires were distributed to 68 students, 34 students from EPAS NC II students and 34 students from CSS NC II enrolled at CASIFMAS in the first semester, the school year 2019-2020. The survey questionnaire used was based on the 21st century skills identified by TESDA.

Statistical Treatment Used

The percentage, ranking, and average weighted mean, one-way ANOVA, correlation, and multiple regression analysis were used for data and statistical analysis in determining the interpretation based on the 4-point Likert's rating scale used.

Table 1: Rating Scale and Verbal Interpretation

Scale	Range-Value	Verbal Interpretation
1	1.000 - 1.750	Incompetent
2	1.751 - 2.500	Less Incompetent
3	2.501 - 3.250	Moderately Competent
4	3.251 - 4.000	Very Competent

The researcher uses incompetent, less competent, moderately competent and very competent interpretation based on the rubrics for the level of competency of 21st Century skills possessed by the students.

■ RESULT AND DISCUSSION

Profile of the Students

The respondents were composed of 31% of male students while the female students were 69%. 13 male and 21 female from EPAS NC II; and 8 males and 26 females were from CSS NC II. The majority of the respondents were female. The total respondents were 68 students. The data is shown in table 2.

Table 2. Respondents' Profile: Gender vs Course

Course	Frequency (Gender)		Total
	Male	Female	
EPAS NC II	13	21	34
CSS NC II	8	26	34
Total	21	47	68

Table 3 shows the cross-tabulation of the age and the course of the students. The ages of the students were a group into four namely: 16-20 yrs. old, 21-25 yrs. old, 26-30 yrs. old, 31 yrs. old and above. The age distribution of EPAS NC II students were 27 students under the age

of 16-20 yrs. old, 6 students under the age of 21-25 yrs. old, and 1 student in the age of 26-30 yrs. old. In CSS NC II, 25 students were 16-20 yrs. old, 3 students under 21-25 yrs. old, 5 students 26-30 yrs. old, and the least numbered students is 31 yrs. old and above only has 1 student. 76% of the respondents fell under the ages of 16-20 yrs. old, 13% for ages 21-25 yrs. Old, 9% were under 26-30 yrs. Old and 2% were 31 yrs. Old and above.

Table 3. Respondents' Characteristics: Age vs Course

COURSE	Frequency(Age)				Mean
	A	B	C	D	
EPAS NC II	27	6	1	0	34
CSS NC II	25	3	5	1	34
TOTAL	52	9	6	1	68

A: 16-20 years old; B: 21-25 years old;
C: 26-30 years old; D: 31 years and above

Table 4 shows the cross-tabulation between the course and the ages of the students. The majority of the students' are between 16 and 20 yrs. old were female while male students dominate a group of 21-25 yrs. old. The female group registered most of the older respondents' ages from 26 yrs. old and above

Table 4. Respondents' Profile: Age vs Gender

GENDER	Frequency(Age)				Mean
	A	B	C	D	
MALE	13	6	2	0	21
FEMALE	39	3	4	1	47
TOTAL	52	9	6	1	68

A: 16-20 years old; B: 21-25 years old;
C: 26-30 years old; D: 31 years and above

The 21st century skills of EPAS NC II students have an over-all weighted rating mean of 3.064 which is interpreted as moderately competent. Female and male EPAS NC II students have moderately competent 21st century

skills with the over-all weighted mean of 3.015 and 3.094 respectively. It also observed that both male and female older students have a higher level of 21st century skills as compare to younger male and female students, as shown in table 5.

Table 5. 21st Century Skills of EPAS NC II Students: Age vs Gender

Age	Gender		Total WM	VI
	Male	Female		
A	2.759	3.066	2.986	MC
B	3.271	3.644	3.333	MC
C	3.533	-	3.533	MC
D	-	-	-	-
Over-All WM	3.015	3.094	3.064	MC

A: 16-20 years old; B: 21-25 years old;
C: 26-30 years old; D: 31 years and above
MC: Moderately Competent

As shown in Table 6, the 21st century skills of CSS NC II students have an over-all rating mean of 3.098 which is interpreted as moderately competent. It also shows that female CSS students have a higher competency level of 21st century skills with the over-all rating mean of 3.257 as compared to the male students which have 2.579. Both older female and male students have a higher level of 21st century skills as compare to younger CSS NC II students. Both male and female CSS NC II students' 21st century skills are moderately competent

Table 6. 21st Century Skills of CSS NC II Students: Age vs Gender

Age	Mean (Gender)		Total WM	VI
	Male	Female		
A	2.587	3.222	3.069	MC
B	2.510	3.075	2.887	MC
C	2.600	3.378	3.222	MC
D	-	3.820	3.820	-
Over-All WM	2.579	3.257	3.098	MC

A: 16-20 years old; B: 21-25 years old;
C: 26-30 years old; D: 31 years and above
MC: Moderately Competent

Table 7 shows the summary of 21st Century Skills of Students: Age vs Gender. It shows that the younger EPAS NC and CSS students have a lower competency level of 21st century skills as compare to older students with a higher competency level of 21st century skills.

Table 7. Summary of 21st Century Skills of the Students: Age vs Gender

Age	Mean (Gender)		Total WM	VI
	Male	Female		
A	2.679	3.142	3.026	MC
B	3.144	3.265	3.184	MC
C	3.067	3.378	3.274	MC
D	-	3.820	3.820	MC
Over-All WM	2.849	3.184	3.081	MC

A: 16-20 years old; B: 21-25 years old;
C: 26-30 years old; D: 31 years and above
MC: Moderately Competent

21st Century Skills of EPAS NC II and CSS NC II Students

The level of competency of the 21st century skills of EPAS NC II and CSS NC II students in CASIFMAS during the first semester, the school year 2019-2020 is shown in Table 8.

Table 8. Level of Competency of the 21st Century Skills of EPAS NC II and CSS NC II students

21 st Century Skills	Mean		Total MW	Rank	VI
	EPAS NC II	CSS NC II			
OHS	3.088 ⁴	3.212 ¹	3.150	1	MC
LLCD	3.100 ³	3.194 ²	3.147	2	MC
Com	3.159 ¹	3.106 ⁶	3.132	3	MC
IT	3.106 ²	3.159 ³	3.132	4	MC
Entrep	3.053 ⁶	3.129 ⁵	3.091	5	MC
CTPS	2.965 ⁹	3.147 ⁴	3.056	6	MC
CT	3.059 ⁵	2.994 ⁷	3.027	7	MC
LI	3.050 ⁷	2.991 ⁸	3.021	8	MC
EL	2.994 ⁸	2.941 ⁹	2.968	9	MC
Over-All WM	3.064	3.098	3.081	-	MC

OHS: Occupational Health and Safety;
LLCD: Life-long Learning and Career

Development; Com-Communication; IT: Information Technology; Entrep-Entrepreneurship; CTPS: Critical Thinking and Problem Solving; CT: Collaboration and Teamwork; LI: Learning and Innovation; EL: Environment Literacy; N: Population WM: Weighted Mean; VI: Verbal Interpretation; MC: Moderately Competent; 1-9: Ranking

In EPAS NC II, among the skills identified by TESDA, the Communication Skills got the highest rating mean of 3.159 which means that the EPAS NC II students are “moderately competent” in communication. Followed by Information Technology Skills (3.106), Life-long Learning and Career Development (3.100), Occupational Health and Safety (3.088), Collaboration and Teamwork (3.059), Entrepreneurship (3.053), Learning and Innovation (3.050), EL-Environment Literacy (2.994), and the Critical Thinking and Problem Solving (2.965) got the lowest rating. All the 21st century skills of EPAS NC Students were all under a moderately competent level which means students can apply the skills in simple situations.

In CSS NC II, the skills of students in Occupational Health and Safety is moderately competent with the rating to mean of 3.212, while Life-long Learning and Career Development is second-highest rating mean of 3.194 followed by Information Technology with the rating mean of 3.159, Critical Thinking and Problem Solving 3.147, Entrepreneurship 3.129; Communication 3.106; Collaboration and Teamwork 2.994, Learning and Innovation 2.991; and the lowest in rank is the Environment Literacy with the rating mean of 2.941. The same with the EPAS NC II student, all of the 21st century skills of the students are moderately competent that implies they can apply the skills in simple situations.

Based on the total weighted mean of the 21st century skills of the students in EPAS NC

II and CSS N II, the Occupational Health and Safety rank first in terms of the level of competency with the total rating mean of 3.150 and interpreted as moderately competent. It implies that the students were moderately competent in follow basic, practicing, and evaluating occupational safety and health procedures, leading in the implementation of OHS program, procedures and policies/guidelines and establishing, managing and sustaining OHS program relevant to the workplace.

The second is the Life-long Learning and Career Development with a total rating mean of 3.147. It indicates that the students have a moderate level of awareness in developing career and life decisions based, can work in a diverse environment, and moderately competent in developing action plans toward local and global peace and sustainability concerns and shape and sustain strategic thinking and attitudes toward a common good. The third is communication skills with the total rating mean of 3.132 which means that the students were moderately competent in communication. This means that the students can apply communication skills in simple situations such as to receive and respond, participate, lead, manage and sustain communication in the workplace.

The fourth skill is Information Technology, the total rated mean is 3.132 and interpreted as moderately competent. This only implies that the EPAS NC II students can apply simple IT skills in workplaces such as access and present information, use information creatively and critically, manage and evaluate usage of information. Entrepreneurship got the 3.091 total rating mean and rank fifth, which means that the students the students can support entrepreneurial mindset in the workplace, contribute to resolving issues and concerns as stakeholder in the company/business pertaining

to usual problems being faced, develop knowledge and skills in running a small business and establish an entrepreneurial spirit, and sustain and evaluate entrepreneurial skills in running a small business as entrepreneur and/or managing a particular company as a manager or supervisor.

The sixth in ranked is Critical Thinking and Problem-Solving but still with the moderate competency level with the 3.056 total ratings mean. It only shows that the students can solve/address routine and general problems, apply critical thinking and problem-solving techniques in the workplace, develop higher-order thinking processes and apply techniques in the workplace, and evaluate higher-order thinking skills and adjust problem-solving patterns.

Collaboration and Teamwork rank seventh with the total rating mean of 3.027, interpreted as moderately competent. Both EPAS NC II and CSS NC II students can work with others and in teams, lead small teams, develop teams, and manage and sustain high performing teams. Learning and Innovation rank eight in the moderately competent level with a total mean of 3.021. It signifies that the students at moderate competency level can support innovation in the workplace, contribute to workplace innovation, discuss problems in the use of innovation in a constructive way, manage innovation and continuous improvement, and lead and present ideas and practical suggestion to appropriate people on how improvements could be made.

The last is Environment Literacy, even though rank least with the total mean of 2.967 it is still interpreted as moderately competent. This implies that both groups of students at moderate competency level can orient oneself to environmentally sustainable work standards, exercise sustainable development in the workplace, evaluate current sustainable development exercises in the workplace,

develop and/or enhance environmentally sustainable work programs in the workplace, and manage and evaluate workplace policies and procedures relevant to the workplace.

In general, the overall rating of 21st Century Skills of TVET students is 3.081 and interpreted as moderately competent with means that the students can apply the 21st century skills in simple situations.

Table 9. Level of Competency of the 21st Century Skills of Male and Female TVET Students.

21 st Century Skills	Mean		Total MW	Rank	VI
	Male	Female			
OHS	2.857 ⁵	3.281 ^{2.5}	3.150	1	MC
LLCD	2.952 ^{1.5}	3.234 ⁴	3.147	2	MC
Com	2.791 ⁷	3.285 ¹	3.132	3	MC
IT	2.800 ⁶	3.281 ^{2.5}	3.132	4	MC
Entrep	2.895 ³	3.179 ⁶	3.091	5	MC
CTPS	2.743 ⁹	3.196 ⁵	3.056	6	MC
CT	2.876 ⁴	3.094 ⁷	3.027	7	MC
LI	2.952 ^{1.5}	3.051 ⁹	3.021	8	MC
EL	2.771 ⁸	3.055 ⁸	2.968	9	MC
N	21	47	68		
Over- All WM	2.849	3.184	3.081	-	MC

OHS: Occupational Health and Safety; LLCD: Life-long Learning and Career Development; Com-Communication; IT: Information Technology; Entrep-Entrepreneurship; CTPS: Critical Thinking and Problem Solving; CT: Collaboration and Teamwork; LI: Learning and Innovation; EL: Environment Literacy; N: Population WM: Weighted Mean; VI: Verbal Interpretation; 1-9: Ranking

As shown in table 9, the level of competency of the 21st century skills of male and female students. It shows that female students have a higher level of 21st century skills as compared to male students.

The 21st century skill of TVET female students that ranked first is the communication

skill with the rating mean of 3.385, followed by information technology and occupational health and safety both with rating mean of 3.281. The fourth rank was life-long learning and career development skill with the rating mean of 3.234, the fifth and sixth rank was the critical thinking and problem-solving skill and Entrepreneurship with the mean rating of 3.196 and 3.179 respectively. While collaboration and teamwork with the rating mean of 3.094 and environment literacy have a rating mean of 3.055 got the seventh and the eighth-ranked. Learning and Innovation skill is in the lowest rank with the rating mean of 3.051.

Table 9 shows that TVET male students rating in the life-long learning and career development skills, and learning and innovation skills is both 2.952 interpreted as moderately competent. In the third and fourth-ranked got by entrepreneurship skill, and collaboration and teamwork skills with the rating mean of 2.895 and 2.876 respectively. The fifth and sixth-ranked were the occupational health and safety skill of the students is with a rating mean of 2.857 and the information technology skill is 2.800. The communication skill rating mean is 2.791 ranked as seventh while environment literacy rating means is 2.77 and the lowest skill rating means is the critical thinking and problem solving with the rating mean of 2.743. Both male and female TVET students have a moderately competent 21st century skills.

Significant Difference in the 21st Century Skills between EPAS NC II and CSS Students

Table 10. Test of Significant Difference in the 21st Century Skills between EPAS NC II and CSS NC II Students

	t	df	Sig. (2 tailed)	Decision on Ho @ 0.05
Between Groups	-.296	66	.768	Accept

As revealed in table 9 the summary of the independent sample “t” indicates that the competency level of 21st Century Skills between EPAS NC II and CSS NC II Students, $t(66) = -2.27$. Since sig. value is greater than 0.05, therefore accept H_0 and reject H_a . The Competency Level of 21st Century Skills of the students has no significant difference between EPAS NC II and CSS NC II Students. With table 8, both EPAS NC II and CSS NC II students possessed moderate competency 21st century skills with the over-all rating mean of 3.064 and 3.098 respectively with the total weighted mean of 3.081 interpreted as moderately competent.

Table 11. Test of Significant Difference in the 21st Century Skills between Male and Female Students

	t	df	Sig. (2 tailed)	Decision on H_0 @ 0.05
Between Groups	-2.860	66	.006	Reject

Table 11 shows the summary of the independent sample “t” indicate that the competency level of 21st Century Skills between Male and Female TVET Students, $t(66) = -2.86$. Since sig. value is less than 0.05, therefore reject H_0 and accept H_a . The Competency Level of 21st Century Skills of the Students has a significant difference between Male and Female Students.

Concerning table 7, Female students have a higher level of competency of 21st century skills with a rating mean of 3.184 as compare to male students which are 2.849.

Table 12. Test of Significant Difference in the 21st Century Skills among Age Level of the Student: 16-20 years old, 21-25 years old, 26-30 years old, and 31 years and above

	Mean Square	F	Sig. (2 tailed)	Decision on H_0 @ 0.05
Between Groups	.341	1.584	.202	Accept

Table 12 shows the summary of the one-way ANOVA that indicates that the competency level of 21st century skills among the age level of the students $F(3) = 1.584$. Since sig. value is higher than 0.05, therefore accept H_0 and reject H_a . The competency level of 21st century skills of the students has no significant difference among age levels.

CONCLUSION

The 21st century skills are very important in the fourth industrial revolution, thus the skills development is vital. It is in the mandate of the educational institution to develop programs that will cater to the enhancement of the students’ skills. The study aims to determine the level of competency of the 21st century skills of TVET students. Based on the findings of the study, it is concluded that the 21st Century Skills of the TVET Students in CASIFMAS is moderate competent. It implies that the students can apply their skills in simple situations. Therefore, it is recommended to strengthen the training delivery of TVET programs in TESDA-CASIFMAS to the development of the 21st century skills of the students.

The nominal duration training program or short term course limits the cultural institution to conduct extra-curricular activities that will support the skills development of the students. Thus, developing new training programs is imperative to develop the students’ 21st in occupational health and safety, life-long learning and career development; communication, information technology, entrepreneurship, critical thinking and problem solving, collaboration and teamwork, learning and innovation, and environmental literacy skills. It is recommended that the TVET institutions should strengthen the offering of TVET programs by developing diploma programs or PQF level 5, participate in extra-curricular activities, and strengthen industry partnership for industry immersions, on-

the-job training or dual-training programs, short term upgrade training facilities, tools, and equipment.

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