21ˢᵗ Century Skills in Higher Education: Teaching and Learning at Ifugao State University, Philippines

Nancy Ann P. Gonzales
Ifugao State University, Philippines
ifsuvpacad@gmail.com

Abstract

The study ascertained the profile of students and faculty members and the level of their critical thinking, collaboration, communication, creativity and innovation, self-direction, global connections, local connections skills, and use of technology as a tool for learning. It also determined the significant difference among the 21ˢᵗ century skills and the dimensions, profile and the respondents. It also determined if a significant relationship exists between the levels of the 21ˢᵗ century skills among students, faculty members, and administrators. Survey through a questionnaire was used to gather data. Stratified sampling technique was applied in determining the 539 students, 125 faculty members, and 35 administrator respondents in the study. Frequency count and percentage were employed to find out the profile of students, faculty members and administrators. Mean rating was used to determine their level of 21ˢᵗ century skills. Results revealed that most of the student respondents are females, enrolled in the education, information technology and agricultural technology programs. Majority of the faculty members and administrators are females, in their middle adulthood stage and taught for more than six years. Results further indicated that the students, faculty members and administrators had a very good level of 21ˢᵗ century skills. Significant differences were noted between the 21ˢᵗ century skills of students by courses/programs and campuses. Significant differences were also recognized among faculty members between their 21ˢᵗ century skills and age. There is no significant relationship between the level of 21ˢᵗ century skills of students, faculty members, and administrators. The findings imply that there is a need to adopt more programs and activities in order to improve the 21ˢᵗ century skills among the students and faculty members. This can be done by upgrading the information technology systems of the University. Strengthening and reactivating global and local connections is also deemed necessary. These can be realized by increasing student and faculty mobility, use of blended learning approach in both the graduate and undergraduate levels, international partnerships, and reaching out to the local communities through projects among others.

Keywords: Communication, Critical Thinking, Creativity And Innovation, Technology

INTRODUCTION

A remarkable change in manufacturing and information knowledge services has taken place in the past years with technology. It has greatly contributed to the success of communicating effectively, sharing and using information in solving problems, adaptability, creativity, innovativeness and global competence. It is a competency that students need to adopt and upgrade themselves with in order to meet the demands of today. It has likewise challenged schools to be more transformative to be able to enable students to develop analytical thinking, problem solving skills, partnership, and innovativeness. All these will prepare them to be successful at work and life (PPRC, 2010) which demand 21ˢᵗ century skills.

Voogt and Roblin (2010), defines *21ˢᵗ century skills* as lifelong learning competencies needed in the struggle for personal life. As claimed by Apple (2008) these skills are fundamental in the lives of students because as stated by Darling-Hammond (2007) these skills place reservations on how to

balance technology, health and financial resources. Students are challenged to rationalize, plan, clarify, organize, reflect, and make sound judgement (Noddings, 2008). Moreover, twenty first century learners should manifest self-direction, collaboration with other people and technology (McCoog, 2008).

The rapid change in the economy and education influenced the development of the *21ˢᵗ century skills* (Rutkowski, et al., 2011). These digital skills are technical, information, communication, collaboration, creativity, critical thinking and problem-solving (Van Laar et al., 2017). The same skills were previously identified by Paige (2009) in addition to proficiency in analytical thinking and synergism.

Critical thinking skills refer to students being able to analyze complex problems, investigate questions for which there are no clear-cut responses, assess different ideas or information, and arrive at correct conclusions. Collaboration skills refer to the ability of students to work as a team, work effectively and respectfully in teams to accomplish a common goal and assume shared responsibility for completing a task. Communication skills enable students to organize their thoughts, data and findings and share these effectively through a variety of media, as well as orally and in writing; creativity and innovation skills refer to students being able to generate and refine solutions to complex problems or tasks based on synthesis, analysis and then combining or presenting what they learned in new and original ways; self-direction skills refer to students being able to take responsibility by identifying topics to pursue and processes for their own learning, and being able to review their works and respond to feedback; global connection skills refer to students being able to understand global, geo-political issues including awareness of geography, culture, language, history, and literature from other countries; local connection skills refer to students being able to apply what they learned to local contexts and community issues. The use of technology in education refers to students being able to create, innovate and develop products through computers (Ravitz,2014).

As aptly posited by Moyer (2016) and Rotherham and Willingham (2009), these skills are important for the success of curricular programs, student life, careers, work environment, and throughout the academic life of the students. The same was suggested by Jerald (2009) who believes that knowledge, skills, actual application and competencies are helpful to students. Individuals who have these skills are good in solving problems, collaborating, communicating, acquiring new skills and information, and in adjusting in today's world (Gewertz, 2008). Complex or difficult situations require problem-solving skills (Keane et al., 2016). It involves analytical thinking as it requires the application of skills, in order for the student to be able to provide solutions in the given challenges (Sheikh & Siti, 2016) because it is important for students to have the ability to assess their own weaknesses and to develop strategies for improvement (Costes-Onishi & Caleon, 2016). Taking intellectual risks is also necessary with the changes brought about by the 21ˢᵗ century skills (Allmond, 2016).

In the workplace, workplace skills are important and should be applied in order for organizations to succeed (Soule and Warrick, 2015). Graduates should, therefore, possess the necessary skills before landing in a job (Hodge and Lear, 2011; Soule and Warrick, 2015) because many scholars (e.g. Casner-Lotto, and Barington, 2006; Duerden et al., 2014; Farrington et al., 2012; Hodge and Lear, 2011) observed that college graduates do not satisfy the needed *21ˢᵗ century skills*. College students need to be trained more on writing skills as well as professional skills such as uses of e-mail, self-expression, and avoidance of slang (Stevens, 2011).

A gap was noted between what students learn at school and what is needed in the jobs (Duerden et al., 2014). The skills of newly hired employees are somewhat not sufficient in the performance of their functions (Stevens, 2011). It proves that one may teach students how to think, but without giving them the necessary background and knowledge, they will not be able to analyze the content properly (Willingham, 2007).

Literature review revealed that there are gaps in the *21ˢᵗ century skills* of learners. It is therefore important to also determine the *21ˢᵗ century skills* and learners in our own university, thus this study. The purposes of the study are to: (1) determine the profile of the students in terms of sex, course, year, campus, and the profile of the faculty members and administrators specifically their sex, age, position/designation, length of service, campus; (2) identify the level of *21ˢᵗ century skills* of students, faculty members and administrators across campuses according to the following dimensions: critical thinking skills, collaboration skills, communication skills, creativity and innovation skills,

self-direction skills, global connections, local connections, and use of computers in education; (3) determine if there is a significant difference on the *21st century skills* of the students, faculty members and administrators by dimension, profile, and respondents; and, (4) find out if there is a significant relationship of the levels of *21st century skills* among the students, faculty members and administrators.

METHODOLOGY

The research was conducted at Ifugao State University. It is a public higher education institution in the Philippines created in 1920, mandated to do instruction, research, extension and income generation. It has six campuses namely: Aguinaldo, Hapao, Lagawe, Lamut (Main), Potia, and Tinoc Campuses. The data were gathered using the survey method. Stratified sampling technique was employed to collect information from the students, faculty members and administrators. There were 539 students from the following courses: Associate in Computer Technology, Bachelor of Science in Accountancy, Bachelor of Science in Criminology, Bachelor of Secondary Education, Bachelor of Elementary Education, Bachelor of Science and Home Technology, Bachelor of Science in Entrepreneurship, Bachelor of Science in Information Technology, Bachelor of Science in Psychology, Bachelor of Science in Tourism, Bachelor of Technical Teacher Education, Diploma in Agriculture Technology and Bachelor in Agricultural Technology. There were 125 faculty member respondents with positions Instructor I, Instructor II, Instructor III, Assistant Professor I, Assistant Professor II, Assistant Professor III, Assistant Professor I; and 35 Administrators.

The 70 item-questionnaire on *21st learning skills* by Ravitz (2014) was used in gathering the needed data. Numbers 1-9 are items for critical thinking skills, numbers 10-18 for collaboration skills, numbers 19-26 for communication skills, numbers 27-34 for creativity and innovation skills, numbers 35-44 for self-direction skills, numbers 45-53 for global connection, numbers 54-61 for local connections, and numbers 62-70 for the use of computers in education. The data collected were collated and subjected to statistical analysis. A five-point rating scale was utilized to determine the level of 21st century skills of students, faculty members, and administrators across campuses. The analysis of variance (ANOVA) was utilized to determine if there is a significant difference between the 21st century skills of students, faculty members, and administrators according to the profile, variables and respondents. The Pearson's chi-square was applied to determine if there is a significant relationship between the levels of 21st century skills of the students, faculty members, and administrators.

RESULTS AND DISCUSSION

Profile of Students

Table 1 displays that there were 539 student respondents. Most or 73. 84% of them are females. One hundred seventy-seven or 33.02% are Bachelor of Secondary Education and Bachelor of Elementary Education students; 13.17%. are Bachelor of Science in Information Technology students; and the minority or 3.15%. are Bachelor of Technical Teacher Education students. Majority or 58.44% are third years and 18.37% are fourth years. There were few respondents in the first and second years probably because of the K to 12 curriculum of the basic education programs which resulted to an enrolment gap in the higher education for two years due to the additional two years for senior high school.

It can also be seen in the table that out of 539 respondents, 216 or 40.07% were enrolled at Lamut Campus which has the highest population among all campuses. The campus has a land area of 518,592 square meters. On the other hand, ninety or 16.70% were enrolled at Potia Campus. This campus has a total of 1,781 enrollees and with the largest land area of 3,402,895 square meters.

Table 1. Profile of Student Respondents

Profile Variable	Compared groups	Frequency	Percent
Sex	Male	141	26.16
	Female	398	73.84
	Total	**539**	**100.00**
Course/Program enrolled	Associate in Computer Technology	26	4.82
	Bachelor of Science in Accountancy	20	3.71
	Bachelor of Science in Criminology	36	7.23
	Bachelor of Secondary Education/Elementary	177	32.83
	Bachelor of Science and Home Technology	19	3.52
	Bachelor of Science in Entrepreneurship	25	4.63
	Bachelor of Science in Information Technology	71	13.17
	Bachelor of Science in Psychology	32	5.93
	Bachelor of Science in Tourism	48	8.90
	Bachelor of Technical Teacher Education	17	3.15
	Diploma in Agriculture Technology-Bachelor in Agriculture Technology	65	12.05
	Total	**539**	**100.00**
Year Level	First Year	78	14.47
	Second Year	47	8.72
	Third Year	315	58.44
	Fourth Year	99	18.37
	Total	**539**	**100.00**
Campus	Aguinaldo	58	10.76
	Hapao	25	4.64
	Lagawe	89	16.51
	Lamut/Main	216	40.07
	Potia	90	16.70
	Tinoc	61	11.32
	Total	**539**	**100.00**

Profile of Faculty Members and Administrators

The profile of the faculty members and administrators is shown in Table 2. The faculty respondents were composed of Instructor I, Instructor II, Instructor III, Assistant Professor I, Assistant Professor II, Assistant Professor III, and Assistant Professor IV. Majority of the faculty members and administrators are females at 63.75%, who generally belong to the age bracket of 35-60 years old; followed by 54 or 33.75% whose age bracket is from 25-34 years old. The least number of four or 2.52% are 61 years old and above. Fifty-six or 35% of the 160 respondents rendered service in the university for more than six years and 48 or 30% of the respondents served the University for two years or less. There were only 22 or 13.75% of them who taught for four to six years. Out of the 160 respondents, 70 or 44% work at Lamut campus, 35 or 22% at Potia Campus and seven or 4% are at Tinoc campus. This means that majority of the respondents are faculty members, female, in their middle adulthood, who taught for many years and are based at the Lamut campus.

Table 2. Profile of Faculty Members and Administrators

Profile Variable	Compared Groups	Frequency	Percent
Sex	Male	58	36.25
	Female	102	63.75
	Total	**160**	**100**
Age	20 – 24	16	10.00
	25 – 34	54	33.75
	35 – 60	86	53.75
	61 and above	4	2.50
	Total	**160**	**100.00**
	Faculty members	125	78.12
	Administrators	35	21.88
Position	**Total**	**160**	**100.00**
Length of Service	2 years and below	48	30.00
	2 -4 years	34	21.25
	4 - 6 years	22	13.75
	6 years and above	56	35.00
	Total	**160**	**100.00**
Campus	Aguinaldo	9	6
	Hapao	8	5
	Lagawe	31	19
	Lamut/Main	70	44
	Potia	35	22
	Tinoc	7	4
	Total	**160**	**100**

Level of 21st Century Skills of Students, Faculty Members, and Administrators

With reference to Table 3, the mean values for faculty members (3.92), for administrators (4.02) and for students (3.82) indicate that their level of 21st century skills is very good. Also, the overall mean of 3.92 shows that faculty members and students have a very good degree of 21st century skills. This denotes that the students, faculty members and administrators are very good in critical thinking like being able to analyze all sorts of problems, investigate and evaluate different points of view and draw appropriate conclusions. They are also very good in collaborating or working together effectively and accomplish goals and objectives and communicating where they are able to organize thoughts, ideas and share effectively through a variety of media. They are also skilled or very good in creating and innovating where they are able to derive solutions to problems at different degrees. They can combine and present what was learned in new and original ways. They are likewise very good in self-directing where they are being able to take responsibility and review their work and respond to feedback. Their skills to connect globally and locally where they are able to understand geo-political issues, cultural history, language and literature of other countries and apply what was learned to local contexts and use computers in the process are also notable for as Johnson (2009) stressed, 21st century skills are not mere computer knowledge but also involves rational thinking, problem solving, communication and teamwork.

The results inform us that the respondents profess 21st century skills at a higher level. It is the opposite of some related studies which found out that that there is lack of preparation among first-time employees (Duerden et al., 2014; Farrington et al., 2012, Hodge and Lear, 2011; Soule and Warrick, 2015) specifically the lack of preparedness among college student graduates on the ability to demonstrate the necessary competencies termed as 21st century skills in order to be successful in the work environment (Duerden et al., 2014; Farrington et al., 2012; Hodge and Lear, 2011).

Table 3. Level of 21st Century Skills of Students, Faculty Members and Administrators

Dimensions	Faculty Members		Administrators		Students		Overall mean	Level
	Mean	Level	Mean	Level	Mean	Level		
1. Critical Thinking	3.99	Very Good	4.11	Very Good	3.81	Very Good	3.97	Very Good
2. Collaboration	4.06	Very Good	4.18	Very Good	3.88	Very Good	4.04	Very Good
3.Communication	4.00	Very Good	4.05	Very Good	3.87	Very Good	3.97	Very Good
4. Creativity and innovation	3.95	Very Good	3.96	Very Good	3.82	Very Good	3.91	Very Good
5. Self-direction	3.94	Very Good	4.03	Very Good	3.78	Very Good	3.92	Very Good
6. Global connections	3.70	Very Good	3.85	Very Good	3.78	Very Good	3.78	Very Good
7. Local connections	3.80	Very Good	3.96	Very Good	3.78	Very Good	3.85	Very Good
8. Use of computers in education	3.92	Very Good	4.05	Very Good	3.86	Very Good	3.94	Very Good
Overall mean	**3.92**	**Very Good**	**4.02**	**Very Good**	**3.82**	**Very Good**	**3.92**	**Very Good**

Table 4 shows the test of significant differences in *21st century skills* of students across dimensions. Using ANOVA, it reveals that there are significant differences in the means (F-value=2.122, p<0.05). Post-hoc analysis of the differences revealed that critical thinking, (M=3.81), collaboration skills (M=3.88), communication skills (M=3.87), use of computers in education (M=3.86), creativity and innovation skills (M=3.82) and critical thinking skills (M=3.81) are significantly higher than self-direction skills (M=3.78), global connections (M=3.78) and local connections (M=3.78). However, there are no significant differences in means among collaboration skills, communication skills, use of computers in education, creativity and innovation skills, and critical thinking skills.

Table 4. Results of Analysis of Variance on the Difference in 21st Century Skills of Students

21st Century Skills	Mean	F-value	p-value	Remarks
1. Critical thinking skills	3.81			
2. Collaboration skills	3.88			
3. Communication skills	3.87			
4. Creativity and innovation skills	3.82			
5. Self-direction skills	3.78	2.122	0.038	S
6. Global connections	3.78			
7. Local connections	3.78			
8. Use of computers in education	3.86			

Legend: S = significant

Table 5 shows the test of significant differences in 21st century skills of faculty members across dimensions. Using ANOVA, it reflects that there was a significant difference in means (F-value=6.079, p<0.05). Post-hoc analysis of the differences revealed that collaboration skills (M=4.12), critical thinking skills (M=4.05), communication skills (M=4.02), self-direction skills (M=3.98), use of computers in education (M=3.98) and creativity and innovation skills (M=3.95) are significantly higher than local connections (M=3.88) and global connections (M=3.77). However,

there are no significant differences in means among collaboration skills, critical thinking skills, communication skills, self-direction skills, use of computers in education and creativity and innovation skills. Likewise, significant difference in means does not exist between global and local connections.

Indeed, education in the 21stcentury highlights globalization and internationalization. Any advancement of technology presents theoretical constructs and realistic insights in the development and enhancement of knowledge, skills, and attitudes among students and teachers (Abao, Dayagbil, & Boholano, 2015).

Table 5. Results of Analysis of Variance on the Difference in 21st Century Skills of Faculty Members

21st Century Skills	Mean	F-value	p-value	Remarks
1. Critical thinking skills	4.05			
2. Collaboration skills	4.12			
3. Communication skills	4.02			
4. Creativity and innovation skills	3.95	6.079	0.001	S
5. Self-direction skills	3.98			
6. Global connections	3.77			
7. Local connections	3.88			
8. Use of computers in education	3.98			

Table 6 presented the results of the significant differences in the level of skills of students when grouped according to course (F=7.150, p<0.05) and campus (F=4.071, p<0.05). Post-hoc analysis revealed that BS Tourism (M=3.286), BTTE (M=3.549) and BS Psychology (M=3.564) students have significantly lower level of skills than other students in the other courses. However, there are no significant differences on the level of skills among the aforementioned courses.

With regards to campus, it was found that the level of skills of students at IFSU-Hapao (M=3.607), IFSU-Tinoc (M=3.664) and IFSU-Lamut (M=3.784) is significantly lower than the other IFSU campuses. However, there is no significant difference between the level of skills among the foresaid IFSU-campuses.

Table 6. Results of Analysis of Variance on the Difference In 21st Century Skills of Students by Profile

Profile Variables	F-value	p-value	Remarks
1. Sex	0.001	0.978	NS
2. Course	7.150	0.001	S
3. Year Level	1.895	0.129	NS
4. Campus	4.071	0.001	S

Legend: NS = Not significant, S = Significant

Results show that there is a significant difference between the level of skills of the faculty members when grouped according to age (F=2.908, p<0.05) as shown in Table 7. Post-hoc analysis revealed that 35 – 60 age group (M=4.038) has a significantly higher level of skills than the 25 – 34 age group (M=3.818), but not significantly higher than the other age groups.

Table 7. Results of Analysis of Variance on the Difference In 21st Century Skills of Faculty Members by Profile

Profile	F-value	p-value	Remarks
1. Sex	0.485	0.487	NS
2. Age	2.908	0.036	S

3. Position	2.137	0.083	NS
4. Length of Service	2.299	0.080	NS
5. Campus	1.927	0.093	NS

There is significant difference in the level of *21st century skills* among the three types of respondents (F=3.512, p<0.05) as revealed in Table 8. Post-hoc analysis shows that students' level of 21st century skills (M=3.822) is significantly lower than ADCO members (4.023). However, there is no significant difference in the level of skills between students and faculty members (M=3.919).

Table 8. Results of Analysis of Variance on the Difference in 21st Century Skills of Students, Faculty Members, and Administrators

Respondents	Mean	F-value	p-value	Remarks
1. Faculty Members	3.919			
2. Administrators	4.023	3.512	0.030	S
3. Students	3.822			

Test of relationship on the level of *21st century skills* among students, faculty members, and administrators using Pearson's chi-square revealed that there is no significant relationship on their level of skills (chi-square = 5.299, p>0.05) as illustrated in Table 9. This indicates that the *21st century skills* of the students do not influence the level of skills of faculty members and administrators and vice versa.

Table 9. Cross Tabulation on the Relationship of Level of 21st Century Skills among the Students, Faculty Members, and Administrators

Type of Respondent	Frequency	Level			
		Fair	Good	Very Good	Excellent
1. Students	Frequency	13	126	342	58
	% of Total	1.9%	18.0%	48.9%	8.3%
2. Administrators	Frequency	0	6	24	5
	% of Total	0.0%	.9%	3.4%	.7%
3. Faculty Members	Frequency	1	25	89	10
	% of Total	.1%	3.6%	12.7%	1.4%
Total	**Frequency**	**14**	**157**	**455**	**73**
	% of Total	**2.0%**	**22.5%**	**65.1%**	**10.4%**

Pearson's Chi-square value = 5.299 at p-value > 0.05 (Not Significant)

CONCLUSIONS

Most of the student respondents are third- and fourth-year females enrolled in Bachelor of Secondary Education/Bachelor of Elementary Education, Bachelor of Science in Information Technology and Diploma in Agricultural Technology at the Main and Lagawe campuses. There are few students enrolled as freshmen and sophomores. Majority of the faculty members, and administrator respondents are females in their middle adulthood, taught for more than six years in the university and are based at the Main, Potia and Lagawe campuses. In addition, the students, faculty members, and administrators have very good level of the *21st century skills*. They are very good at critical thinking skills, collaboration skills, communication skills, creativity and innovation skills, self-direction skills, global connections skills, local connections skills, and use of technology in education.

Thus, there is a significant difference on the level of *21st century skills* of students. They have

better skills on collaboration, communication, using computers in education, creativity and innovation than global connection and local connection skills. For faculty members, the highest *21st century skills* were on collaboration, critical thinking, communication, self-direction, use of technology in education, creativity and innovation than local and global connections. Bachelor of Science in Tourism, Bachelor of Technical Teacher Education and Bachelor of Science in Psychology students have lower *21st century skills* than those enrolled in the other courses. The students at Hapao, Tinoc and Lamut Campuses have lower *21st century skills* than students from Lagawe, Aguinaldo and Potia campuses. Faculty members who belong to 35-60 years old age group having the highest *21st century skills* than those in the 25-34 age group. As to the skills, these respondents have lower skills than ADCO member. While the test of relationship showed that the skills of students, faculty members, and administrators are not affected by the different groups of respondents.

RECOMMENDATIONS

It is therefore recommended that, (1) The number of first year enrollees be increased. This can be done through regular advertisements, campaign, and dissemination of information in print, electronics and physical visits of employees to the community. The maximum use of information technology in advertising the programs of the university is very helpful since majority of the youth today are abreast with the latest trends on ICT; (2) More programs, projects and activities (PPAs) should be adopted to increase the *21st century skills* of both the students and faculty members to an excellent level. Improving the technology infrastructure of the university is one strategy. It will greatly increase learners and faculty interactions knowing the kind of students that we have in today's learning environment; and, (3) More emphasis should be focused on how to increase global and local connections because these are the limitations of students and faculty members. Strengthening of international relation activities, use of blended learning approach in both the graduate and undergraduate programs will increase global influences, faculty and student's mobility will help improve globalization. Local connections can also be enhanced by revitalizing extension and training activities in the communities and invigorating on local government unit partnerships.

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