

University Undergraduates' ratings of 21st century transferable competences necessary for their career development

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Abstract: The study investigated undergraduates' ratings of 21st century transferable competences necessary for their career development as well as their current proficiency level in the competences. Three hundred and forty-six final year students (2014/2015 session) drawn in clusters from Science, Technology, Engineering and Mathematics (STEM) and Business/Management inclined disciplines in Michael Okpara University of Agriculture Umudike and Abia State University Uturu were used for the study. The study adopted a descriptive survey design. The Undergraduates' 21st Century Transferable Competences Scale (U21S) consisting of 18 Likert-type items was used for data collection. Four research questions and two hypotheses guided the survey. Mean and Standard deviation were used to answer the research questions while t-test was used to test the hypotheses. Results of the study showed that University undergraduates unanimously agree that they require 21st century competencies for their initial employment and that their proficiency level in several transferable competences necessary for their career development is deficient. The result also showed that significant differences did not exist between undergraduates of STEM-inclined and Business/Management-inclined disciplines in their ratings of 21st century competences required for their initial employment as well as between male and female undergraduates. Based on the findings of the study, it is recommended that universities update their curriculum to include activities that will ensure their graduates are properly equipped with competences needed for their career development.

Keywords - Career development, transferable competences, Undergraduates, 21st Century

I. Introduction

Large-scale factors operating at the macro level – such as industrialization, modernization, colonization, westernization and globalisation – have shaped and formed human orientations to work (Arulmani, Bakshi, Leong and Watts, 2014). Globalisation and modernisation are creating an increasingly diverse and interconnected world (Organization for Economic Cooperation and Development – OECD, 2005). Hinged on globalization, recent developments in society and economy require educational systems to equip young people with new skills and competencies which will allow them to participate, benefit from and contribute actively to the new knowledge-based economy.

To function optimally, individuals need to master changing technologies and to make sense of large amounts of available information (OECD, 2005). Exponential growth of knowledge as occasioned by information communication and technology (ICT) has transformed the way we live and work, such that most routine jobs of yesterday are being replaced by technology and in their place, job categories that require knowledge management, abstract reasoning, and personal services seem to be growing (Ananiadou and Claro 2009; National Research Council, 2011). This drift creates a progressively more competitive job market.

Young people, especially university graduates are saddled with the challenge of making career choices that will culminate in their career development. Career, according to Arlumani, Bakshi, Leong and Watts, is a personal engagement with the world of work characterized by the exercise of volition and the identification of personal suitability, requiring preparation and specialization for on-going life-long development. Career development on the other hand, is the life-long process of managing learning, work, leisure, and transitions at all ages and stages of life in order to move towards a personally determined and evolving preferred future (Career Development Association of Australia 2014; Wikipedia 2014).

It is frequently said that people graduating from colleges and universities often lack the skills needed in the present day world of work (Hodge and Lear, 2011). In the opinion of the Association for Career and Technical Education-ACTE (2015), much more than rigorous levels of academic proficiency, especially in math and literacy, which is essential for any post high school endeavour, are required for one to be truly considered ready for a career. For ACTE, to be career-ready, individuals need to be proficient in three major skill areas: (i) core academic skills and the ability to apply those skills to concrete situations in order to function in the workplace and in routine daily activities; (ii) employability skills (such as critical thinking and responsibility) that are essential in any career area and; (iii) technical job-specific skills related to a specific career pathway.

However, the Organization for Economic Cooperation and Development assert that the skills and competencies needed for success in 21st century workplaces can only be learned in schools. Echoing this assertion, Hodge and Lear affirm that a post-secondary education culminating in a degree increases the number of job options and the amount of earnings available to those entering the job market. For the Hidden Curriculum (2014), education is the key to developing the necessary skills to compete for improved employment opportunities and higher wages. Business and political leaders are increasingly asking schools to develop skills such as problem solving, critical thinking, communication, collaboration, and self-management (National Research Council, 2012). These skills and competencies which are transferable from one job to another are often referred to as “21st century skills” to show their relationship to emerging models of economic and social development of the 21st century.

21st Century Skills refer to a broad set of knowledge, skills, work habits, and character traits believed—by educators, school reformers, college professors, employers, and others—to be critically important to success in today’s world, particularly in collegiate programs and contemporary careers and workplaces (Hidden curriculum, 2014). The Partnership for 21st Century learning (2015) lists three types: (a) Learning Skills (Critical Thinking, Creative Thinking, Collaborating, and Communicating); (b) Literacy Skills (Information Literacy, Media Literacy, Technology Literacy); (c) Life Skills (Flexibility, Initiative, Social Skills, Productivity, Leadership).

In contrast to a view of “21st century skills” as general skills that can be applied to a range of different tasks in various academic, civic, workplace, or family contexts, the Committee on Defining Deeper Learning and 21st Century Skills of the National Research Council, view 21st century skills as dimensions of expertise that are specific to—and intertwined with—knowledge within a particular domain of content and performance. Thus, the committee uses the term “competencies,” rather than “skills” to describe those set of key skills—such as critical thinking, problem solving, collaboration, effective communication, motivation, persistence, learning to learn, creativity, innovation, and ethics—that are important to success in education, work, and other areas of adult responsibility and later success. In their opinion, these skills may also be developed within favourable formal or informal learning environments.

The committee views 21st century skills as knowledge that can be transferred or applied in new situations. Transferable knowledge includes content knowledge in a domain and knowledge of how, why, and when to apply this knowledge to answer questions and solve problems. The committees’ adoption of the term “21st century competencies” to embody transferable knowledge and skills aligns with the terminology used by the Organization for Economic Cooperation and Development (OECD) to identify key competencies required for life and work in the current era. According to the OECD (2005),

“A competency is more than just knowledge and skills. It involves the ability to meet complex demands, by drawing on and mobilizing psychosocial resources (including skills and attitudes) in a particular context. For example, the ability to communicate effectively is a competency that may draw on an individual’s knowledge of language, practical IT skills and attitudes towards those with whom he or she is communicating” (OECD, 2005, page 4).

The Committee on Defining Deeper Learning and 21st Century Skills of the National Research Council assigned the various 21st century skills to three clusters of competencies. These broad domains of competence are—cognitive, intrapersonal, and interpersonal. The cognitive domain involves reasoning and memory; the intrapersonal domain involves the capacity to manage one’s behaviour and emotions to achieve one’s goals (including learning goals); and the interpersonal domain involves expressing ideas, as well as interpreting and responding to messages from others.

Policy-makers, education organizations and private foundations reiterate that individuals, especially young people, need an assortment of competencies to enter true career pathways that offer family-sustaining wages, opportunities for advancement and ability to face the intricate challenges of today’s changing workplace. There is also a consensus that these competencies can be and are learned in schools. If this be the case, the question then is, are undergraduates currently acquiring these transferable competences necessary for their career development from Nigeria’s tertiary educational system? What are undergraduates’ ratings of 21st century transferable competences necessary for their career development? What are University Undergraduates’ ratings of their proficiency level in 21st century transferable competences necessary for their career development?

The purpose of the study was to profile the 21st century transferable competences undergraduate students in Abia State Nigeria perceive as important for their career development and to determine the extent to which they perceive their current level of proficiency in these competences.

Research Questions

1. What 21st century transferable competences do university undergraduates perceive as essential for their employment after graduation?
2. What are University Undergraduates' ratings of their proficiency level in 21st century transferable competences necessary for their career development?
3. Do differences exist between the rating of undergraduates in STEM-inclined disciplines and undergraduates in Business and Management inclined disciplines on the 21st century transferable competences needed for initial post-graduation employment?
4. Do differences exist between the rating of male and female undergraduates' rating of 21st century transferable competences needed for initial post-graduation employment?

Research Hypotheses

1. There are no significant differences between the rating of undergraduates in STEM-inclined disciplines and undergraduates in Business and Management inclined disciplines on the 21st century transferable competences needed for their initial post-graduation employment.
2. There are no significant differences between the rating of male and female undergraduates on the 21st century transferable competences needed for initial post-graduation employment.

II. Methods

The study adopted a descriptive survey design to investigate undergraduate's rating of 21st century transferable competences necessary for their career development. The population of the study consisted of 3519 (400-500 level) final year (2014/2015 session) students enrolled in Science, Technology, Engineering and Mathematics (STEM) and Business/Management sciences inclined disciplines in Michael Okpara University of Agriculture, Umudike (MOUUAU) and Abia State University, Uturu (ABSU) both in Abia State, Nigeria. The sample for the study consisted of 346 (three hundred and forty-six) final year students of MOUUAU and ABSU selected in clusters. The sample size was determined using Krejcie & Morgan's (1970) table for determining sample size from a known population. The data collecting instrument was the Undergraduates' 21st century transferable competences Scale (U21S). The instrument was adapted from a combination of 21st century student outcomes listed by the Partnership for 21st century learning (2015) and clusters of 21st century competences catalogued by the National Research Council (2012). The instrument had a Cronbach's Alpha reliability coefficient of .876. The instrument consisted of 3 sections and forty items. Section A collected students' demographic details; sections B and C which consisted of 18 four-point Likert-type items each, required students to state to what extents they agreed with the statements on the data collection instrument.

III. Results

Research Question 1: What 21st century transferable competences do university undergraduates perceive as essential for their employment after graduation?

Table 1: Competences Undergraduates' perceive as essential for their employment after graduation.

	Mean (n=346)	Standard deviation	Remarks
1 Cognitive Competence Domain - Ability to:			
a Effectively analyze and evaluate evidence, arguments, claims and beliefs	3.36	1.94	significant
b Analyse how parts of a whole interact with each other to produce overall outcomes in complex systems	3.00	1.82	significant
c Solve different kinds of non-familiar problems in both conventional and innovative ways	2.70	1.88	significant
d Access information efficiently (time) and effectively (sources)	3.13	1.83	significant
e Use technology as a tool to research, organize, evaluate and communicate information	3.68	2.21	significant
f Use information accurately and creatively for the issue or problem at hand	3.22	1.87	significant
g Articulate thoughts and ideas effectively using oral, written and non-verbal communication skills in a variety of forms and contexts	3.12	1.83	significant
Pooled Mean	3.17	Important Domain	
2 Intrapersonal Competence Domain - Ability to:			
a Adapt to varied roles, job responsibilities, schedules and contexts	3.15	1.84	significant
b Understand, negotiate and balance diverse views and beliefs to reach workable solutions especially in multicultural environments.	2.87	1.84	significant
c Respect cultural differences and work effectively with people from a range of social and cultural backgrounds	3.14	1.84	significant
d Set goals with tangible and intangible success criteria	2.88	1.83	significant
e Monitor, define, prioritize and complete tasks without direct supervision or oversight	2.83	1.85	significant
f Reflect critically on past experiences in order to inform future progress	3.18	1.85	significant
Pooled Mean	3.00	Important Domain	

3 Interpersonal Competence Domain - Ability to:				
a	Use inter-personal and problem solving skills to influence and guide others towards a goal	3.41	1.96	significant
b	Demonstrate integrity and ethical behaviour in using influence and power	2.97	1.82	significant
c	Analyze issues and interests at stake and to identify areas of agreement and disagreement	2.87	1.84	significant
d	Work effectively and respectfully with diverse teams	3.31	1.91	significant
e	Prioritize, plan and manage work to achieve intended results.	3.27	1.89	significant
f	Understand and effectively utilize the most appropriate expression and interpretations in diverse multicultural environments	2.87	1.84	significant
Pooled Mean		3.11	1.84	Important Domain

Table 1 shows that all the items had mean scores above 2.50. This indicates that the undergraduates recognize the importance of 21st century transferable competences for their employment after graduation.

Research Question 2: What are University Undergraduates' ratings of their proficiency level in 21st century transferable competences necessary for their career development?

Table 2: Undergraduates' rating of their current proficiency level in 21st century transferable competencies

21st century transferable competences		Mean (n=346)	Standard deviation	Remarks
1 Cognitive Competence Domain: - Ability to:				
a	Effectively analyze and evaluate evidence, arguments, claims and beliefs	2.48	2.05	Not proficient
b	Analyse how parts of a whole interact with each other to produce overall outcomes in complex systems	2.01	2.56	Not Proficient
c	Solve different kinds of non-familiar problems in both conventional and innovative ways	2.62	1.94	proficient
d	Access information efficiently (time) and effectively (sources)	2.83	1.84	proficient
	Use technology as a tool to research, organize, evaluate and communicate information	2.85	1.84	proficient
e	Use information accurately and creatively for the issue or problem at hand	2.81	1.85	proficient
f	Articulate thoughts and ideas effectively using oral, written and non-verbal communication skills in a variety of forms and contexts	2.03	2.54	Not proficient
Pooled Mean		2.52		significant
2 Intrapersonal Competence Domain - Ability to:				
a	Adapt to varied roles, job responsibilities, schedules and contexts	2.63	1.94	proficient
b	Understand, negotiate and balance diverse views and beliefs to reach workable solutions especially in multicultural environments.	2.20	2.32	Not proficient
c	Respect cultural differences and work effectively with people from a range of social and cultural backgrounds	3.06	1.82	proficient
d	Set goals with tangible and intangible success criteria	2.17	2.36	Not proficient
e	Monitor, define, prioritize and complete tasks without direct supervision or oversight	2.43	2.09	Not proficient
f	Reflect critically on past experiences in order to inform future progress	2.73	1.89	proficient
Pooled Mean		2.54		Significant
3 Interpersonal Competence Domain - Ability to:				
a	Use inter-personal and problem solving skills to influence and guide others towards a goal	3.10	1.83	proficient
b	Demonstrate integrity and ethical behaviour in using influence and power	2.68	1.91	proficient
c	Analyse issues and interests at stake and to identify areas of agreement and disagreement	2.76	1.87	proficient
d	Work effectively and respectfully with diverse teams	2.88	1.83	proficient
e	Prioritize, plan and manage work to achieve intended results.	1.99	2.58	Not proficient
f	Understand and effectively utilize the most appropriate expression and interpretations in diverse multicultural environments	2.70	1.90	proficient
Pooled Mean		2.68		Significant

Table 2 shows the mean scores of undergraduates' perception of their current competency level. All the items did not score above the weighted mean of 2.50. This indicates that the students perceive themselves as having inadequate proficiency in some 21st century competences necessary for career development.

Research Question 3: Do differences exist between the rating of undergraduates in STEM-inclined disciplines and undergraduates in Business and Management inclined disciplines on the 21st century transferable competences needed for initial post-graduation employment?

Table 3: Differences in STEM inclined and Business Management inclined discipline undergraduates' rating of 21st century transferable competences needed for their initial post-graduation employment

21st century transferable competences		STEM inclined		Business & Mgt	
		Disciplines (n=156)		Disciplines (n=190)	
		Mean	Std Dev	Mean	Std Dev
1	Cognitive Competence Domain - Ability to:				
a	Effectively analyze and evaluate evidence, arguments, claims and beliefs	3.31	1.91	3.42	1.98
b	Analyse how parts of a whole interact with each other to produce overall outcomes in complex systems	3.10	1.83	2.89	1.83
c	Solve different kinds of non-familiar problems in both conventional and innovative ways	2.54	2.00	2.96	1.82
d	Access information efficiently (time) and effectively (sources)	3.10	1.83	3.09	1.83
e	Use technology as a tool to research, organize, evaluate and communicate information	3.64	2.17	3.73	2.26
f	Use information accurately and creatively for the issue or problem at hand	3.04	1.82	3.45	2.00
g	Articulate thoughts and ideas effectively using oral, written and non-verbal communication skills in a variety of forms and contexts	2.95	1.82	3.33	1.92
2	Intrapersonal Competence Domain - Ability to:				
a	Adapt to varied roles, job responsibilities, schedules and contexts	3.03	1.82	3.29	1.90
b	Understand, negotiate and balance diverse views and beliefs to reach workable solutions especially in multicultural environments.	2.72	1.89	3.04	1.82
c	Respect cultural differences and work effectively with people from a range of social and cultural backgrounds	3.14	1.84	3.13	1.85
d	Set goals with tangible and intangible success criteria	2.94	1.82	2.80	1.86
e	Monitor, define, prioritize and complete tasks without direct supervision or oversight	2.81	1.85	2.85	1.84
f	Reflect critically on past experiences in order to inform future progress	3.13	1.84	3.25	1.88
3	Interpersonal Competence Domain - Ability to:				
a	Use inter-personal and problem solving skills to influence and guide others towards a goal	3.43	1.99	3.35	1.93
b	Demonstrate integrity and ethical behaviour in using influence and power	2.82	1.85	3.13	1.84
c	Analyse issues and interests at stake and to identify areas of agreement and disagreement	2.95	1.82	2.77	1.87
d	Work effectively and respectfully with diverse teams	3.15	1.84	3.51	2.05
e	Prioritize, plan and manage work to achieve intended results.	3.30	1.90	3.23	1.87
f	Understand and effectively utilize the most appropriate expression and interpretations in diverse multicultural environments	2.85	1.84	2.88	1.83

Table 3 shows that all the items scored above the weighted mean of 2.50. This indicates that the undergraduates in STEM-inclined and Business /Management inclined disciplines perceive that 21st century transferable competences are important for their initial employment after graduation.

Research Question 4: Do differences exist between male and female undergraduates' rating of 21st century transferable competences needed for initial post-graduation employment?

Table 4: Differences in male and female undergraduates' rating of 21st century transferable competences needed for their initial post-graduation employment

21st century transferable competences		Female (n=159)		Male (n=187)	
		Mean	Std Dev	Mean	Std Dev
1	Cognitive Competence Domain - Ability to:				
a	Effectively analyze and evaluate evidence, arguments, claims and beliefs	3.46	2.01	3.27	1.89
b	Analyse how parts of a whole interact with each other to produce overall outcomes in complex systems	3.03	1.82	2.98	1.82
c	Solve different kinds of non-familiar problems in both conventional and innovative ways	2.54	2.00	2.89	1.83
d	Access information efficiently (time) and effectively (sources)	3.19	1.86	3.01	1.82
e	Use technology as a tool to research, organize, evaluate and communicate information	3.81	2.35	3.57	2.10
f	Use information accurately and creatively for the issue or problem at hand	3.41	1.97	3.05	1.82
g	Articulate thoughts and ideas effectively using oral, written and non-verbal communication skills in a variety of forms and contexts	3.00	1.82	3.23	1.87
	Pooled Mean	3.20		3.14	
2	Intrapersonal Competence Domain - Ability to:				
a	Adapt to varied roles, job responsibilities, schedules and contexts	3.37	1.95	2.95	1.82
b	Understand, negotiate and balance diverse views and beliefs to reach workable solutions especially in multicultural environments.	2.77	1.87	2.95	1.83
c	Respect cultural differences and work effectively with people from a range of social and cultural backgrounds	3.07	1.83	3.19	1.86
d	Set goals with tangible and intangible success criteria	2.82	1.85	2.93	1.82
e	Monitor, define, prioritize and complete tasks without direct supervision or oversight	2.80	1.86	2.86	1.84

f	Reflect critically on past experiences in order to inform future progress	3.04	1.82	3.30	1.90
	Pooled Mean	2.97		3.03	
3	Interpersonal Competence Domain- Ability to:				
a	Use inter-personal and problem solving skills to influence and guide others towards a goal	3.30	1.90	3.47	2.02
b	Demonstrate integrity and ethical behaviour in using influence and power	2.92	1.83	3.00	1.82
c	Analyse issues and interests at stake and to identify areas of agreement and disagreement	2.69	1.90	3.02	1.82
d	Work effectively and respectfully with diverse teams	3.34	1.93	3.29	1.90
e	Prioritize, plan and manage work to achieve intended results.	3.18	1.85	3.35	1.93
f	Understand and effectively utilize the most appropriate expression and interpretations in diverse multicultural environments	2.83	1.85	2.90	1.83
	Pooled Mean	3.04		3.17	

Table 4 presents male and female undergraduates' rating of 21st century transferable competences needed for their initial post-graduation employment.

Hypothesis 1: There are no significant differences between the ratings of undergraduates in STEM-inclined disciplines and undergraduates in Business and Management inclined disciplines on the 21st century transferable competences needed for their initial post-graduation employment.

DISCIPLINE	n	Grand mean	df	t-cal	t-critical	Remark
STEM-inclined	156	57.95	344	0.029	1.96	Not significant
Business/Management inclined	190	60.10				

At the 0.05 level of significance and 344 degree of freedom, the calculated t-test value of 0.029 is less than the critical t-test value of 1.96. Thus, the null hypothesis that there are no significant differences between the rating of undergraduates in STEM-inclined disciplines and undergraduates in Business and Management inclined disciplines on the 21st century transferable competences needed for their initial post-graduation employment is upheld.

Hypothesis 2: There are no significant differences between the rating of male and female undergraduates on the 21st century transferable competences needed for initial post-graduation employment.

GENDER	n	Grand mean	df	t-cal	t-critical	Remark
Female	159	58.57	344	0.519	1.96	Not significant
Male	187	59.21				

At the 0.05 level of significance and 344 degree of freedom, the calculated t-test value of 0.519 is less than the critical t-test value of 1.96. Thus, the null hypothesis that there are no significant differences between male and female undergraduates rating of the 21st century transferable competences needed for initial post-graduation employment is upheld.

IV. Discussion And Findings

The rapid advancement of science and technology in the knowledge-based economy of the 21st century places unprecedented demand for diverse competences on individuals for them to contribute as well as benefit from their careers. The National Research Council (2011, 2012), asserts that students of today must be prepared to take hold of life's demands and thrive in tomorrow's world. This is necessitated by the proliferation of job categories requiring skills and competences such as knowledge management, critical thinking, complex decision making, effective communication, collaboration, self-management, personal services, problem solving, ethical and abstract reasoning. These skills are seen as valuable and cannot be automated. The findings of this study indicate that University undergraduates unanimously agree that they require the 21st century competencies outlined in this study for their initial employment after graduation. This finding also aligns with Martin-DeLeon's (2010) observation that the demand for skills in communication, collaboration and team building, as well as in creative thinking has increased significantly in the 21st century.

The responsibility of turning out graduates with the right competences needed to excel in their chosen careers falls within the purview of universities. However, Okonjo-Iweala (2012), opines that several Nigerian universities are producing graduates that lack the right skills needed to perform tasks required in their chosen fields and this makes it difficult for them to be gainfully employed. The results of the study indicate that by undergraduates' perception, their proficiency level in several transferable competences necessary for their career development is deficient. Such cognitive competency deficiencies include ability to effectively: analyze and evaluate evidence, arguments, claims and beliefs (mean 2.48); analyze how parts of a whole interact with each

other to produce overall outcomes in complex systems (mean 2.01); articulate thoughts and ideas effectively using oral, written and non-verbal communication skills in a variety of forms and contexts. The undergraduates also reported deficits in intrapersonal competences such as ability to: understand, negotiate and balance diverse views and beliefs to reach workable solutions especially in multicultural environments (mean 2.20); set goals with tangible and intangible success criteria (mean 2.17); and monitor, define, prioritize and complete tasks without direct supervision or oversight (mean 2.43). In addition, they reported very low proficiency in the ability to prioritize, plan and manage work to achieve intended results (mean 1.99). These results show that undergraduates perceive themselves as being proficient in most 21st century transferable competences. Thus to large extents, these results counter Okonjo-Iweala's (2012) assertions that Nigerian graduates lack the right skills needed to perform tasks required in their chosen fields. It also challenges Hodge and Lear's (2011) report that people graduating from colleges and universities often lack the skills needed in the present day world of work.

There were no significant differences between the ratings of undergraduates in STEM-inclined disciplines and undergraduates in Business and Management inclined disciplines on the 21st century transferable competences needed for their initial post-graduation employment and career development. Although there are several reports of gender differences in educational outcomes, the findings of this study does not indicate any difference in male and female undergraduates' ratings of 21st century transferable competences needed for their initial post-graduation employment and career development.

V. Conclusion

From the analysis of data, it was pertinent to conclude that university undergraduates are conversant with the 21st century transferable competences they are expected to have for their initial post graduation employment. The undergraduates are also aware of their levels of proficiency in these competences. The undergraduates acknowledge that they are not proficient in some of the competences required for their initial employment and subsequent career development.

The assertions that the skills and competencies needed for success in 21st century workplaces can be and are learned in schools makes it imperative for universities to update their curriculum to include activities that will ensure their graduates are properly equipped with competences needed for their career development.

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