Responsiveness Index for the Development of the 21st Century Competencies

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Abstract

The main objective of this study was to develop a responsiveness index to assess the development of the 21st century competencies in the higher education institutions in Philippine school systems. Specifically, it intended to identify the major dimensions of the responsiveness index and its key indicators, determine the optimal weight for each dimension and key indicators, determine the variables and its influence to the major dimensions, and validate the responsiveness index derived through a pilot sample.

It was conducted in the Province of Bukidnon and its neighboring provinces of Misamis Oriental, Agusan del Sur, Davao City, and Lanao del Sur in school year 2014-2015. The Delphi approach and other statistical tools were utilized to gather and analyze the data. Findings showed the four major dimensions of the 21st century skills. These are ways of thinking, ways of working, tools for working, and skills for living with respective key indicators. Optimal weights were also determined per dimension and its respective key indicators. It was also found that variables like age, gender, educational attainment, employment status, and employment agency influence the four dimensions. The responsiveness index was validated by 1000 student respondents coming from different parts of the educational sector both public and private as well as different stakeholders and different professions using systematic random sampling.

The developed responsiveness index is a systematic way to assess 21st century competencies and can be useful to teachers, school leaders, and educational policy makers in the teaching and development of 21st century abilities and competencies.

Keywords: *Responsiveness index, 21st century abilities and competencies, ways of thinking, ways of working, tools for working*

Introduction

The 21st-century competencies are sets of a wide variety of abilities and broader competencies, creativity, adaptability and global awareness that are achieved and developed by students in order to succeed in the information age (Partnership 21, 2006). It ushers in new challenges for Philippine schools and educators as they confront essential changes in global knowledge and technology. These competencies are seen as critical components of college and

career readiness. School systems are facing intense pressure on how to assess the skills and competencies that their graduates possess.

How responsive are the Philippines schools in developing these competencies as they face the increasing pressure to produce graduates with complex range of competencies? What specific learning skills do students need to experience and how do teachers provide these learning experiences to develop these skills? Furthermore, how can these be manifested or assessed in terms of their level of responsiveness in the development of these 21st century competencies?

In a previous Asia Society Report, it is evident that the state of assessing the development of the 21st century competencies in educational institutions is inadequate. It has focused more on how new social practices evolve due to increased use of new digital technologies, especially among young people (Saavedra & Opfer, 2012). This means that these practices need to be reconstructed into key skills, not defined from systems level, but from the everyday lives of people in societies.

Hence, the four major dimensions of the 21st Century Skills (Wagner, 2009), namely, ways of thinking, ways of working, tools for working, and skills for living must be given more emphasis and its specific skill components must be identified. Other important factors like age, gender, educational attainment, employment status and employment agency where the respondents are employed will also be considered as these still hold responsible in the success of the development of these skills. These variables were utilized during the validation of the questionnaire.

The present study considered the four major dimensions of the 21st century competencies by Wagner in 2008 as the basis of the study. These are ways of thinking, ways of working, tools for working, and skills for living. Through the Delphi approach, specific key indicators under each dimension were identified. These key indicators were classroom learning activities that develop 21st century competencies. Optimal weights were also determined for each dimension and its respective key indicators. The responsiveness index was validated by 1000 student respondents coming from different parts of the educational sector, both public and private as well as different stakeholders and different professions using a systematic random sampling.

Thus, an index of these components will be developed to measure the responsiveness of educational institutions in the development of these competencies among their students. The development of responsiveness index is necessary to provide relevant measures that educators may wish to consider using. It offers guidance to help them compare and implement as an assessment system. However, the present study asserts to develop a responsiveness index on the four dimensions, namely: ways of thinking, ways of working, tools for working, and skills for living. There are key indicators for each dimension. These are classroom learning activities that would aid in the development of the 21st-century competencies

Review of Literature

Assessment in the development of the 21st century skills is an emergent concern in the present educational state that has brought significant issues among educators, curriculum developers and policy makers (P21, 2006). Research on how responsive the educational systems in the Philippines and abroad are shows various developments regarding this matter, and how these issues have been addressed to promote the teaching and learning assessment of these skills at different situations.

A review was conducted to identify the skills, resources and assessment approaches that have been adopted from other countries were found to be insufficient. Several works have been developed and presented about 21st Century skills but nothing had identified the most relevant skills and how are these skills be most appropriately be assessed (Saavedra and

Opfer (2012). The 21st-century skills as part of learning, collaborate with others and connect through technology for a knowledge-based economy and environment (SCANS (1992). While the 4Cs of Lesgold (2009) summarizes all these skills like critical thinking skills, creative thinking skills, communicating skills and collaborating skills and with Wagner's (2009), he defined four dimensions defined inconsistently, which can lead to confusion and divergent interpretations .

Although the Framework for 21st Century Learning advocates (Partnership for 21st Century Skills (P21) (2006) and the Iowa 21st Century Skill Framework (2007) concretely identified these specific skills as sets of wide variety of abilities and broader competencies such as creativity, adaptability and global awareness that are achieved and developed by students in order to succeed in the information age. Sets of criterion that manifested these abilities and competencies were developed and proposed different instruments on how the skills are assessed.

A comprehensive index for assessing responsiveness in the development of these 21st century competencies is indispensable. However, there is no such measuring tool developed to assess the responsiveness of an institution or an organization particularly in an educational system in the development of the 21st century skills among students as mentioned by Tuley (2012). This is confirmed by the Assessment and Teaching of 21st Century Skills project (ATC21S, 2010), which asserts that experiences like problem solving among students need to inform educators in the way they design assessment tasks and define key skills. Thus, these practices need to be reconstructed into key skills.

The abovementioned literature and studies have to bear to the present study. It considers the four dimensions of 21st-century competencies, namely; Ways of Thinking, Ways of Working, Tools for Working, and Skills for Living .These competencies were the basis for developing this responsive index. In this index, various classroom learning experiences were identified as classroom activities that develop such competencies. Besides, it provides an idea on which activities are present or not in a classroom setting. This index may assist other institutions in identifying which of the key indicators are provided by the institution for their graduates. New standards for what students should learn and do must be clearly observed and assessed. This assessment tool may be designed like a responsiveness index.

Conceptual Framework

It should be noted that the '21st century skills' concept encompasses a wide-ranging and unstructured body of knowledge and skills that is not easy to define and that has not been officially codified or categorized. Added to this is the adoption of different models that will not serve to illustrate the concepts and assessment of these skills. These concepts served as the anchorage of the present study strengthened by Wagner's (2009) and Assessment and Teaching of 21st Century Skills project (ATC21S, 2010) which state that new standards for what students should learn among the different specific skills must be specifically identified, be clearly observed, and assessed. Thus, new conceptions of assessment must be designed like a responsiveness index.

Responsiveness index is an assessment tool essential to measure the level of performance in response to the development of the 21st century abilities and competencies. Different methodologies will be developed and validated in the strengthening of the development of 21st century skills among students. This is a challenge where schools must transform in ways that will enable students to acquire these skills to be successful in work and life. A clear definition of responsiveness has to be made, and from it comprehensive indicators may evolve (De Silva & Valentine, 2000).). Also methods for generating indices of responsiveness are desirable. These generated indices serve as a measuring tool and provide awareness among

educational institutions' performance in the development of these skills (Tuley, 2012).

Likewise, Wagner (2009) described also these skills into four dimensions of the 21st century skills as ways of thinking, ways of working, tools for working, and skills for living, still there will be more emphasis in identifying the specific skill components per dimension. Thus, an index of these components was developed to measure the responsiveness of the development of these skills.

Hence, responsiveness has been proposed to evaluate and monitor the performance of the educational system. The responsiveness of the educational system refers to the ability of educational institutions to meet the legitimate expectations of stakeholders both internal and external. The responsiveness index have to be developed from the list of 21st century skills based on the analysis of the 12 relevant frameworks drawn from a number of countries (ATC21S, 2010). This will measure and monitor how well each school performs in response to what are required relative to the development of the 21st century abilities and competencies. Specifically, responsiveness can be assessed by the presence or absence of such learning activities. Figure 1 shows the schematic diagram of the study. The skills are organized into four dimensions, namely, ways of thinking, ways of working, tools for working, and skills for living where each dimension has its key indicators identified.

The ways of thinking consists of creativity, critical thinking, problem-solving, and decision-making. Creative thinking involves looking at things differently, testing, experimenting, engaging in reflection, looking for many possible answers rather than one, and challenging existing thought patterns. Another way of thinking is critical thinking as it allows the students to acquire the means of assessing and upgrading their abilities to judge well. Problem solving includes skills such as ordering, comparing, contrasting, evaluating and selecting.

It provides a logical framework for problem-solving (Bradsford, 1999). This further helps to select the best alternative from those available by narrowing down the range of possibilities. On the other hand, decision-making is the process of choosing what to do by considering

Responsiveness Index in the Development of the 21st Century Abilities and Competencies

Dimensions	*Key Indicators*
Ways of Thinking	*a. Creativity* *b. Critical Thinking* *c. Problem Solving* *d. Decision Making*
Ways of Working:	*a. Communication* *b. Collaboration*
Tools for Working:	*a. Information and Communication Technology* *b. Information Literacy*
Skills for Living	*a. Leadership Skills* *b. Personal Productivity* *c. People Skills* *d. Self-Direction*

Figure 1. Schematic diagram showing the variables of the study.

the possible consequences of different choices (Costa et al., 2009).

Ways of working include communication and collaboration. To communicate clearly is to articulate thoughts and ideas effectively using oral, written, and nonverbal communication skills in a variety of forms and contexts. Collaborating with others is the ability to work effectively and respectfully with diverse teams. It encompasses not only the mastery of technical skills and techniques, but also the understanding to apply these skills purposefully, safely and responsibly in learning, everyday life and employment.

On the other hand, *tools for working* include information and communications technology (ICT) and information literacy. A measure of success today is how well one can evaluate, manage, and communicate all forms of information within a technological environment. According to Wagner (2008), 21st century students need 'knowing how to learn' skills that enable them to acquire new knowledge and skills, connect new information to existing knowledge, analyze, develop habits of learning, and work with others to use information. Information literacy is defined as a set of abilities requiring individuals to "recognize when information is needed and locate, evaluate, and use effectively the needed information (Partnership for 21st Century Skills, 2006).

Skills for living in the world, according to Trilling (2009) and Gerald, (2009) includes citizenship, life and career, and personal and social responsibility. Today's life and work environments require far more than thinking skills and content knowledge. The ability to navigate the complex life and work environments in the globally competitive information age requires students to pay rigorous attention to develop adequate life and career skills. SCANS (1992) confirmed that these skills focus on flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, and leadership and responsibility.

Table 1.
Profile of the Participants of the Study

Variables	Aspects			Remarks
Age	39 – 41 years old	(70)	7%	Age bracket of the majority of the respondents was from 27 to 29 years
	36 – 38 years old	(110)	11%	
	33 – 35 years old	(140)	14%	
	30 – 32 years old	(200)	20%	
	27 - 29 years old	(270)	27%	
	18 – 26 years old	(210)	21%	
Gender	(410) 41% of the respondents were males and (590) females			There were more female respondents
Educational attainment	Education	(400)	40%	There were more teacher respondents.
	Business Administration	(260)	26%	
	Arts and Sciences	(210)	21%	
	Communication and Industrial Technology	(190)	19%	
Employment Status	(510) 51% of the respondents were permanent; (330) 33%, casual; (140) 14%, contractual or job order; and (20) 2%, self employed.			Most of the respondents had permanent status in their job
Employment Agency	(530) 53% were DepEd Employees; (420) 42% were in other Gov't. agencies; and (50) 5%, in private offices.			Most of the respondents were employed in the Government agencies specifically in the Department of Education

Objectives of the Study

The main objective of this study was to develop an index of responsiveness to assess the development of the 21st century abilities and competencies.

Specifically, it intended to:

1. identify the major dimensions of the responsiveness index and its key indicators,
2. determine the optimal weight for each dimension and key indicators,
3. determine the variables and its influence to the major dimensions, and
4. validate the responsiveness index derived through a pilot sample.

Research Design and Method

The development of the responsiveness index of the 21st Century competencies was designed to be descriptive and normative. It determined the dimensions of responsiveness index of the 21st-century competencies. These key indicators are classroom learning activities that develop 21st-century competencies. It was conducted in the Province of Bukidnon and its neighboring provinces of Misamis Oriental, Agusan del Sur, Davao City and Lanao del Sur last School Year 2014-2015. These provinces are in Region X where most of the graduates were working. There were 1000 participants of the study which composed of 3 different groups of students and professionals who were students and graduates of Bukidnon State University from 2002 to 2013. There were more or less 345 participants who represented each group, namely; students, employees, and employers. They were identified through systematic random sampling. Table 1 shows the profile of the participants.

The researchers utilized the Delphi approach in determining the four dimensions, namely, ways of thinking, ways of working, tools for working, and skills for living, and its specific skills per key indicator. This was done through brainstorming with a jury of experts which included the vice president of the academic affairs of BukSU, the dean of the College of Teacher Education, the schools division superintendent of Bukidnon, a 21st century skills specialist/advocate, and two retired professors of a private institution. This panel of experts was chosen because of their knowledge and involvement in 21st century skills. The active participation and knowledge of the experts provided significant data about the opportunities as experienced by students in all key indicators. They provided theoretical bases and learning experiences with regards to the development of the abilities and competencies and other related issues.

The Delphi approach was utilized in identifying these key indicators to develop a full range of alternatives, explore, and expose underlying assumptions as well as correlate judgments on the formulation of the responsiveness index (Altschuld, 2003). The researchers acted as the facilitators during the brainstorming and were guided by an unstructured interview guide that focused on the various classroom learning experiences employed to develop the 21st-century competencies. The brainstorming was conducted for two days. All the results of discussions on the dimensions and the key indicators for each dimension were recorded. The researchers provided the experts with those results. The experts also made revisions before coming up with the final input of the index.

The output of the discussions is the questionnaire. A questionnaire was developed with sets of key indicators that manifested the skills being developed which also measures the performance of schools regarding how responsive they were in the development of 21st century competencies. All the items included in the index were reviewed by the panel of experts for validation before these were finally reproduced.

Multiple regression analysis was used to

determine if the variables, namely, age, gender, educational attainment, employment status, and employment agency influenced the four dimensions. The constructed responsiveness index was validated by a group of experts from various organizations who were actively involved in the 21st century skills issues and concerns. The instrument was tested among the three (3) groups of try-out respondents which included students, employees, and employers. The number of try-out respondents for each group was done through systematic random sampling. The respondents of the study were identified based on the four dimensions.

Results and Discussion

Table 2 shows the four major dimensions of the responsiveness index and their key indicators. These are the ways of thinking, ways of working, tools for working, and skills for living. The key indicators for each dimension include creativity, critical thinking, problem solving, and decision making for the first dimension. The second dimension consists of communication and collaboration, while the third dimension includes information communication technology or ICT and information technology. The last dimension consists of leadership skills, personal productivity, people skills, and self-direction.

Further, the table reveals the respective optimal weights of the four major dimensions and their key indicators. Results indicate that among the four dimensions, skills for living have the highest optimal weight and ways of thinking having the least. However, in terms of the key indicators, information and communications technology (ICT) has the highest optimal weight while information literacy has the lowest optimal weight.

It can be noted that each dimension is

Table 2.
Four Dimensions, Their Key Indicators and Equivalent Optimal Weights

Dimensions	Optimal Weight	Key Indicators	Optimal Weight
Ways of Thinking	31.51%	Creativity	6.57%
		Critical Thinking	7.39%
		Problem Solving	8.32%
		Decision-Making	9.23%
Ways of Working	15.88%	Communication	7.96%
		Collaboration	7.92%
Tools for Working	17.15%	Information and Communications Technology (ICT)	*10.88%
		Information Literacy	6.27%
Skills for Living	*35.35%	Leadership Skills	8.43%
		Personal Productivity	8.97%
		People Skills	*9.39%
		Self-Direction	8.57%

composed of key indicators at the same time consists of different skills that build up the items in the responsiveness index. The optimal weights for each dimension and key indicator manifest the standard weight of importance as required which evolves an inclusive meaning that builds up the responsiveness index. As shown in the table, *skills for living,* among the four dimensions gets the highest weight while the *ways of working* gets the least. This means that the skills under this key indicator must be given or receive more emphasis/importance compared to others in terms of the development of the skills because it has four important and challenging indicators needed in life. On the other hand, among all the key indicators, ICT gets the highest optimal weight as it deals with the global knowledge and technology while the rest have closely similar weight.

The table further shows that the identified optimal weight of each dimension (i.e., skills for living is 35.35% etc.) manifests the required weight or standard weight in getting the weight per dimension. This means that among the four dimensions this one must be given more emphasis or priority by the institutions. The three dimensions may also have their share of weight in the development of the 21st century abilities and competencies.

Table 3 shows the significant influence of the variables identified relevant in the development of the 21st century abilities and competencies, namely, age, gender, educational attainment, employment status, and employment agency. It can be gleaned from the regression analysis of data that the six variables significantly influence the four dimensions and to their key indicators. It was revealed that age was a variable that indicated that an individual was equipped with the required skills. Only gender did not influence the dimension ways of thinking. The idea of equal opportunities for both male and female to acquire the necessary skills maybe the reason for this result.

It can be gleaned from the regression analysis of data that age significantly influences responsiveness in the development of the 21st Century abilities and competencies in the four dimensions. Age is a variable that influences the development of the skills in ways of thinking, skills of working, tools for working and skills for living. It can be inferred that age is an influential factor or observed determinant as for how one is responsive to be equipped with the different skills. For example in school, it can be inferred that most of the students admitted to school have a younger age. Basically, those who are expected to enroll in college range between 15-21 years old. These were students who just graduated from high school and went on to college. There are only a few students admitted to school whose age is above 21. They either take up the second course or were enrolled at a later age.

The younger ones are observed to be equipped with the 21st competencies.

Table 3.
Variables of the Study and Its Influence to the Four Dimensions

Dimensions	Age	Gender	Educational Attainment	Employment Status	Employment Agencies
Ways of Thinking	5.62*	1.32	2.38*	2.35*	4.19*
Ways of Working	3.17*	2.34*	2.37*	3.47*	2.32 *
Tools for Working	1.67*	1.31*	1.45*	2.06*	1.60*
Skills for Living	6.31*	1.47 *	1.88*	2.15*	2.15*

Significant at 0.05 level

Apparently, they acquired the different skills required of them during their college years because during these years, teachers start to employ classroom learning activities that would develop 21st century competencies. This age bracket is where most of the employers look for in hiring employees due to their abilities, capabilities, and willingness to work compared to older age bracket from 35 and above. Workers of this age bracket are found to be creative, critical thinkers, good in problem-solving, and wise in decision-making.

The issue of decision-making becomes increasingly important during this stage because, according to Gerald (1999), they are developing greater independence and encountering more choices free from adults. The choices they make may considerably affect not only their own lives but of others as well. Accordingly, Pink (2006) stated that some of these choices may include which career to pursue, whether or not to have sex, whether or not to use alcohol, cigarettes, or other drugs, or whether or not to engage in violent or risky behaviors. Concern about these "risk behaviors" has led to the development of prevention and intervention programs. These programs strive to help them better protect themselves with effective decision-making skills (Bransford, 1999).

Further, this age group is found to be capable of harnessing technology to perform learning skills such as communicating effectively with presentation software (Pink, 2006). They are engaged in any form of electronic technology and are observed to have skills of being flexible and ready to adapt, initiating social and cross-cultural skills, being a good leader and responsible in work assignments. They can communicate clearly and work effectively and respectfully with diverse personalities in their workplace.

Gerald (2009) posited that today's life and work environments require workers that are young and far more than critical thinkers and knowledgeable in every aspect. Age of the students, graduates or employees is the most crucial factor in navigating the complex life and work environments in the globally competitive information age. Respondents' age is an important variable that needs rigorous attention in developing adequate life and career skills.

Gender is another variable and an indicator in the development of the 21st century abilities and competencies. As shown in the table, it is found out that it does not influence ways of thinking dimension. However, it shows significant influence in the other three dimensions, namely, ways of working, tools for working, and skills for living. Apparently, the three dimensions are characterized according to gender. With the information and technology, males seemed to be more skillful in performing presentation using software or juggling personal responsibilities with a personal digital assistant. Moreover, the females are more engaged and responsible in their work compared to males.

It further shows that gender is an indicator that may be connected with general opinion now in the Philippines is that both genders have equal opportunities and right to work. Gone is the social paradigm that female has to stay at home and take care of the children. In fact, more women now advance their knowledge and skills by enrolling in postgraduate studies to update themselves despite the general opinion.

The *educational attainment* of the respondents is another variable that shows significant influence to the four dimensions. It indicates that the abilities and competencies in the four dimensions are developed in the courses they took during their college years and have been enhanced when they get employed. Specific example to this is students who took up Information Technology are known to be skillful in terms of performing office application skills like Microsoft Word and Spreadsheet or another database when compiling documents. Most likely they are employed right away after graduation to workplaces best suited to their abilities and capabilities. This idea is also true to

Education graduates who were exposed to these skills during their college years much more when they were exposed to practice teaching in their last year in college.

The college where they taught may have professional development and had teachers who used educational approaches that inherently encouraged or facilitated the acquisition of cross-disciplinary skills. They applied educational strategies such as authentic learning and demonstrations of learning which tend to be cross-disciplinary in nature, and students—in the process of completing a research project. Examples of these are using a variety of applied skills, multiple technologies, and new ways of analyzing and processing information, while also taking initiative, thinking creatively, planning out the process, and working collaboratively in teams with other students (Markham, (2003). Thus, teachers nowadays are seen having internet skills, utilize ICT tools, computer network, and other electronic media effectively and even use computer-based package in assessing and evaluating students' performance.

The graduates are most likely developed if not fully but partly the abilities and competencies of the 21st century. Teachers in those years are more planned and premeditated about teaching cross-disciplinary skills in subject-area courses. Like in many other courses, students are required to learn research methods and conduct their own researches. These can also be applied in other disciplines where students articulate technical scientific concepts in written and graphic forms and present research results to a panel of experts. They can also use sophisticated technologies, software programs, and apply multimedia as an extension of an assigned project. In other words, when the 21st century learners graduate from college, they certainly have acquired some if not most of the skills.

Another variable considered influential in the development of the 21st abilities and competencies is the *employment status* of the respondents. It is imperative that students when they finish their course or right after graduation, they will seek employment. Once they are hired, they must think of the security and tenure of their work. As practiced, qualified applicants equipped with the knowledge, skills, and competencies required for the job are hired by any company or agency with a provisional status for two years before they will be given permanent status. Most often, hired workers are those students who satisfied graduation requirements in the office where they were assigned during their internship, apprenticeship, volunteer experiences or on-the-job training experiences. In this case, students might acquire a variety of practical, job-related skills, and work habits, while also completing academic coursework and meeting the same learning standards (Trilling et al., 2009). Thus, students who developed the 21st century skills during college days are positively associated with future success in their job.

The last variable that shows significant influence in the four dimensions is the *employment agency* where the respondents are employed. 21st century skilled graduates are mostly employed in the government agencies. It can be observed that only a government employee is provided with job security and other forms of benefits in terms of work status even if the worker is not yet permanent. Typically, when one thinks of work benefit opportunities in terms of employment what comes in one's mind is that the government agency is more established compared to private or non-government agencies.

Conclusion

The constructed responsiveness index for the development of the 21st Century competencies underwent a thorough process of identification and validation of the 4 dimensions, its key indicators, its optimal weights, other variables and its influence to the dimensions. This was done through a Delphi approach with a panel of experts and was tried out to 1000 participants. Therefore, this is an appropriate

and relevant manifestation to be utilized as a tool in assessing a school's responsiveness to the development of the 21st Century competencies and even for other purpose or investigation.

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