Teacher Perception on the 21st Century Skills Determinants

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Abstract

Visualizing the determinants of 21st century skills perceived by teachers was examined in this inquest. The aim was to classify and reveal underlying concerns confirming to those skills. It was also of interest elucidating the most influential factor and its attributes relatable to those skills in a more identifiable perspective. The inquiry was conducted under quantitative approach using Structural Equation Model; five variables were involved. The 21st century skills was the dependent variable. Conversely, ways of thinking, ways of working and tools for working were the independent variables; skills for living was an intervening variable. Instruments in the form of questionnaires were developed to assemble replies from 1,100 eligible respondents utilizing a Simple Random Sampling technique; 142 out of 250 questionnaires distributed were finally completed. Ten hypotheses were scrutinized and conclusively six of them validated by the analysis. It was finally obtained that the most noteworthy drive determined the 21st century skills was the ways of thinking. Additionally, the most vital attributes convincingly correspond to this factor were creativity and problem solving skills.

Keywords: The 21st century skills, ways of thinking, ways of working, tools for working, skills for living, structural equation model.

Background

The education of teachers in the future should ponder on the learning, development and education of children, youth and adults. Teacher education programmes are denoted by high-level academic and professional quality. Research affiliation and professional approaches must work together to prop up the education of highly qualified preschool, primary and tertiary teachers (Union of Education Norway, 2008). This is strictly essential as to respond the fact that globalization, economy necessity and low civic engagement compound the urgency for students to develop the skills and knowledge they need for success (Saavedra & Opfer, 2012). The interconnectedness of global economy, ecosystem and political networks required students learn to communicate, collaborate and problem solve with people worldwide. Moreover, employers demand fewer people with basic skills sets and more people with complex thinking and communication skills.

Correspondingly, Beers (2012) contends that the 21st century dawned as the commencement of the digital age, a time of unprecedented growth in technology and its subsequent information explosion. Never before have the tools for information access and management made such an impact on the way we live, work, and interact. New technologies and tools multiply daily and the new technologies of today are outdated almost as they reach the market. Besides, everyone will think of any single product or service should always be better, faster, cheaper and newer (Gasperzs, 2011). This background then leads us to the questions of "what are the 21st century skills" look like? The 21st century learning should not be controversial. It is simply an effort to define modern learning using modern tools (Chen, 2010). This query is gravely essential to be brought down in relations to preparing both teachers and students entering the weird and wonderful circumstances. It is then relevant to inquest what would be the determinats of the 21st century skills needed as indicated by teachers in Indonesia framework.

Related Literature and the Model

Numerous studies and reports have emerged over the past decade that seek to identify the life, career and learning skills that define the skills needed for success in the 21st century globe. Despite the fact that there are some differences on how the skills are categorized or interpreted, there are also many commonalities. The current and future health of America's 21st century economy, on the word of Metiri Group (2011), depends directly on how broadly and deeply Americans reach a new level of

literacy, includes strong academic skills, thinking, reasoning, teamwork skills and proficiency in using various technologies. It further elaborates the skills into four areas, that is: digital age literacy (today's basic), inventive thinking (intellectual capital), interactive communication (social and personal skills) and quality (state-of-the-art results). Moreover, the Partnerships for 21st Century Skills (2013) listed three types of them and they were categorized into: learning, literacy and life skills.

In a more identifiable manner, Beers (2012) categorized the 21st century skills into eight perspectives, they are creativity and innovation, critical thinking and problem solving, communcation, collaboration, information management, effective used of technology, career and life skills, and cultural awarness. This classification is relevant to the fact that the highest ranked skills for students entering the workforce were not facts and basic skills – they were applied skills that enable workers to use the knowledge and basic skills they have obtained.

Similarly, Saavedra & Opfer (2012) introduced seven categories of the 21st century skills, they are: critical thinking and problem solving, collaboration and leadership, agility and adaptability, initiative and entrepreneurialism, effective oral and written communiaction, accessing and analysing information, and curiosity and imagination. In relations to the development of the model for the sake of this inquest, it was specifically chosen the 21st century skills as launched by AT21CS (The Assessment and Teaching of 21st Century Skills) by putting all aspect explained previously into the category with four main outlooks. AT21CS then placed creativity, critical thinking, problem solving, decision making and learnig into the so-called the ways of thinking. Communication and collaboration were then labeled as the ways of working. Information and communication technology and information literacy were classified as the tools for working. Citizenship, life and career, and personal and social responsibility were grouped as the skills for living in this universe.

Having considered all skills previously discussed, it is then proposed the model for this researh consisted of five variables in association with searching for the determinants of the 21st century skills. Inline with what was intoduced by AT21CS, the 21st century skills became the dependent variables. Coversely, the ways of thinking, the ways of working and the tools for working were independent variables; the skills for living was an intervening variable.

Conceptually, the 21st century skills, as the dependent variable, consisted of four dimensions, they were visionary, flexibility, leadership and risk taking. Operationally, this implied that defined skills for success in the 21st century should be those students that experiencing learning processes and enabling them to have a clear vision, high flexibility, strong leadership and rational risk taker.

Likewise, the ways of thinking, as the first independent variable, conceptually consisted of four dimensions, they were creativity, critical thinking, problem solving and decision making. Operationally, this implied that defined skills for success in the 21st century with respect to the ways of thinking was those students who experiencing learning processes that facilitating them to have a prominent ceativity, smart critical thinking, excellent problem solving and coherent decision making.

Similarly, the ways of working, as the second independent variable, conceptually consisted of three dimensions, they were communication, collaboration and learning. Operationally, this implied that defined skills for success in the 21st century as regards to the ways of working was those students who experiencing learning processes that assisting them to have assured communication, mutual beneficial collaboration and lifelong learning habit.

Correspondingly, the tools for working, as the third independent variable, conceptually consisted of three dimensions, they were literacy in media, information and technology. Operationally, this implied that defined skills for success in the 21st century relating to the tools for working was those students who experiencing learning processes that assisting them to be familiar with and so friendly to any kind of advancement in media, information and technology issues.

Lastly, the skills for living in this universe as the intervening variable, conceptually consisted of three dimensions, they were life and career, citizenship, and personal and social responsibility. Operationally, this implied that defined skills for success in the 21st century with regard to the skills for living was those students experiencing learning processes that supporting them to be aware of and acquainted with features on life and career, citizenship, and personal and social responsibility trends.

Diagramatically, the elaboration of those related literatures with respect to the construction of the model clarified previously can be better comprehended by looking at the following figure.
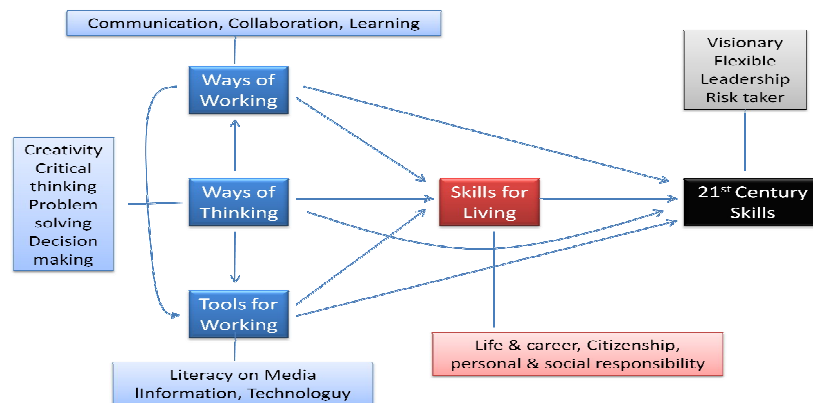

Figure 1: The Model of the Research

Methodology and the Hypothesis

This research was conducted at Universitas Terbuka milieu, the Indonesia Open University. The population was teachers who also students at Universitas Terbuka and graduated in and up to the first semester of 2014. Respondents were teachers from all over Indonesia who attended graduation ceremony in the first period of 2014 academic year. This research furthermore utilized a quantitative approach, with the help of structural equation model, or SEM (Jogijanto, 2011). To congregate data from the respondents, survey approach was conducted by developing instruments in the form of questionnaires in the first place and then should be completed by all respondents (Singarimbun & Effendi, 1989). The questionnaires were developed by incorporating the five variables involved and each variable was subdivided and totaled to 17 dimensions, 34 attributes and 68 statements.

In the sampling process, Firdaus & Affendi (2008) suggested that the minimum number of respondents under the SEM approach ranged from 5 to 15 for each dimension. This implied that based on this rule of thumb then the number of respondents should be ranged from 85 up to 255. The minimum number of respondents as the samples for this study by design was agreed upon 120 teachers. To obtain that minimum target, 250 questionnaires were provided, distributed to and collected from the eligible teachers (graduates) as the respondents of the research.

There were five sets of questionnaires developed. The first one measured the 21st century skills under four dimensions and eight attributes with 16 statements. The other four questionnaires measured the ways of thinking under four dimensions and eight attributes with 16 statements; the ways of working was under three dimensions and six attributes with 12 statements; the tools for working was under three dimensions and six attributes with 12 statements; and the skills for living was under three dimensions and six attributes with 12 statements (Tjiptono & Fandi, 2011). In order to be counted, all statements had to be answered thoroughly by each respondent. Table 1 below summarized them.

No	Variables	Dimensions	Number of …		Notes
1	The 21st century skills (Y)	1. Visionairy 2. Flexibility 3. Leadership 4. Risk taking	Attributes Statements - Before tryout - After tryout	8 19 16	Dependent Variable
2	The ways of thinking (X₁)	1. Creativity 2. Critical thinking 3. Problem solving 4. Decision making	Attributes Statements - Before tryout - After tryout	8 20 16	Independent Variable 1
3	The ways of working (X₂)	1. Communication 2. Collaboration 3. Learning	Attributes Statements - Before tryout - After tryout	6 15 12	Independent Variable 2
4	The tools for working (X₃)	1. Media literacy 2. Information literacy 3. Technology literacy	Attributes Statements - Before tryout - After tryout	6 14 12	Independent Variable 3
5	The skills for living (X₄)	1. Life and career 2. Citizenship 3. Personal and social responsibilty	Attributes Statements - Before tryout - After tryout	6 14 12	Intervening Variable

Tabel 1: Variables, Dimensions, Attributes and Statements Involved

The SEM approach was then used to statistically draw the conclusions and illustrate the results descriptively as well as inferentially (Hair et al, 1995 & Wijayanto, 2008). Additionally, after the try out and before being analyzed under the SEM method, tests on data normality, linearity and multicolinearity were performed; and they were in fact all complied with.

Having described those terms both in the conceptual and operational phase, ten hypotheses were then constructed and analyzed by using a quantitative method under SEM. The ten hypotheses were formulated as follows.

H_1 : The 21st century skills are influenced by the ways of thinking
H_2 : The 21st century skills are influenced by the ways of working
H_3 : The 21st century skills are influenced by the tools for working
H_4 : The 21st century skills are influenced by the skills for living
H_5 : The skills for living are influenced by the ways of thinking
H_6 : The skills for living are influenced by the ways of working
H_7 : The skills for living are influenced by the tools for working
H_8 : The ways of working are influenced by the ways of thinking
H_9 : The tools for working are influenced by the ways of thinking
H_{10} : The tools for working are influenced by the ways of working.

Findings and Discussions

Before discussing the findings, it is useful to illustrate the characteristics of selected teachers as respondents. This will provide a better context for the findings as can be seen in the following table.

No	Description	Notes
1	Students' domicile	22 out of 37 Regional Offices (All over Indonesia)
2	Population Minimum samples	1,100 graduates 85 graduates
3	Questionnaires - Provided, distributed - Returned, processed	 250 sets 142 sets
4	Age *(Y: Year)*	18 - 25 = 11 % 26 - 30 = 34 % 31 - 35 = 29 % 36++ = 26 %
5	Study at UT for *(Y: Year)*	4Y = 2 % 5Y = 38 % 6Y = 39 % 7Y = 18 % 8Y or more = 3 %
6	Grade Point Average (GPA)	2.00 - 2.49 = 6 % 2.50 - 2.99 = 62 % 3.00 - 3.49 = 31 % 3.50 - 4.00 = 1 %
7	Gender	Female = 72 % Male = 28 %
8	Teacher in	Early childhood = 21 % Primary School = 73 % High School = 6 %

Table 2: Respondents' Characteristics, Population, Samples & Questionnaires

The results of the SEM analysis are described in the following details, including figures and table.
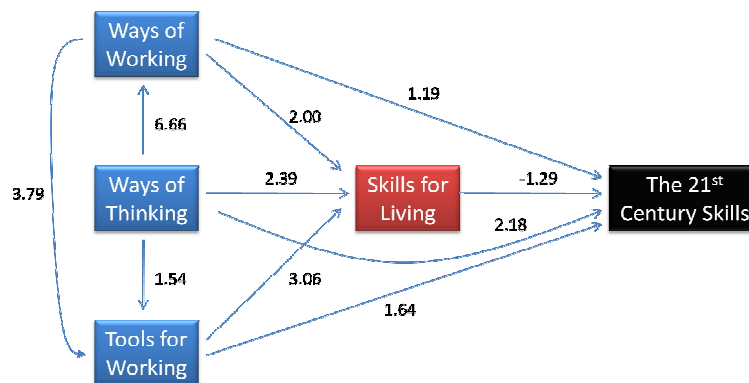

Figure 2: The Output of t-Value of the Model

The first result related to the ten hypotheses of the study. Figure 2 demonstrated that six of the ten hypotheses were validated by the analysis. This implied that three main hypotheses, namely the ways of working (1.19), the tools for working (1.64) and the skills for living (-1.29) toward the 21st century skills were not substantiated, since the values of those three hypotheses were less than ±1.96, as it was theoretically required. Another variable that was also not validated by the analysys was the ways of working towards the tools for working (1.54). The remaining assumptions, especially one of the main variables, were validated by the analysis, i.e., the 21st century skills was influenced by the ways of thinking (2.18) positively and directly. In addition, the skills for living were also influenced by the ways of thinking (2.39), the ways of working (2.00), the tools for working (3.06); and the ways of working were influenced by the ways of thinking (6.66) and the tools for working were influenced by the ways of working 3.79).

Having obtained the results from testing the hypotheses, the next step was to examine values of the loading factor, i.e., the power level of their relations. This result determined the influence of the independent variables on the dependent variable; including on the moderating variable. Figure 3 below looks at the loading factor of the model used in the inquest.
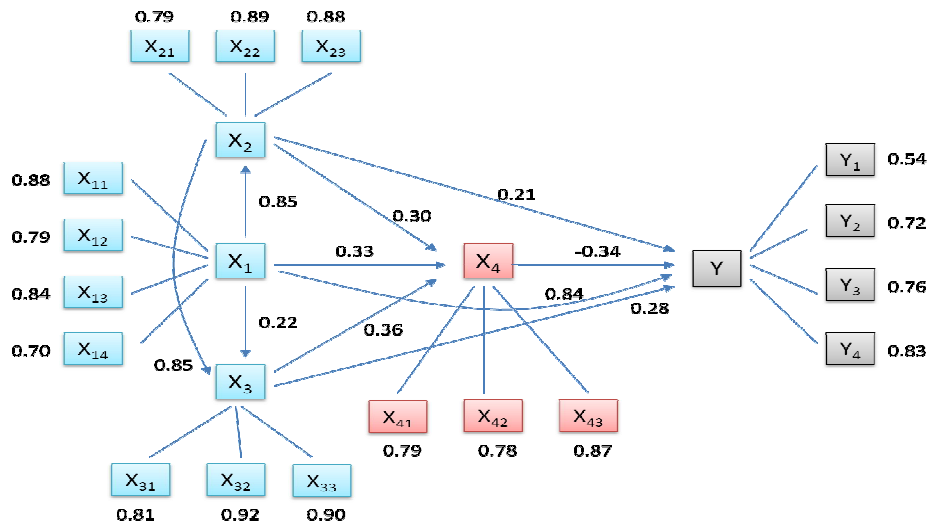
Figure 3: Loading Factor of the Model

Figure 3 confirmed on the five cores of the study. The first piece of evidence was that one of the main variables involved affecting the 21st century skills, namely the ways of thinking ($X_1 = 0.84$). The second point is that the most important aspect influencing the 21st century skills was in fact the ways of thinking (X_1). The third point is that the prevalent attributes of the ways of working aspect were creativity ($X_{11} = 0.88$) and followed by problem solving ($X_{13} = 0.84$).

The fourth point that can be drawn from Figure 3 related to the two prevalent attributes representing the 21st century skills (Y) according to Indonesian teachers were risk taking ($Y_4 = 0.83$) and leadership ($Y_3 = 0.76$). Apart from that, it is nonetheless worth to note that Indonesian teachers had a propensity to put collaboration ($X_{22} = 0.89$), learning ($X_{23} = 0.88$) and communication ($X_{21} = 0.79$) respectively within the variable of the ways of working (X_2). Indonesian teachers also be liable to place information literacy ($X_{32} = 0.92$), technology literacy ($X_{33} = 0.90$) and media literacy ($X_{31} = 0.81$) respectively within the variable of the tools for working (X_3). Moreover, Indonesian teachers be predisposed to grade personal and social responsibility ($X_{43} = 0.87$), life and career ($X_{41} = 0.79$) and citizenship ($X_{31} = 0.79$) respectively within the variable of the skills for living in the world (X_4).

The fifth point that is amazingly intresting to be further studied on the result that the 21st century skills (Y) were not significantly infleunced by the other three main variables, such as the ways of working ($X_2 = 0.21$), the tools for working ($X_3 = 0.28$) and the skills for living ($X_4 = -0.34$); even for the skills for living the result is in negative sign.

Goodness of Fit	Cut-off Value	Results	Notes
Significance probability (P-value)	0,05	0.09543	Good Fit
Root Mean Square Residual (RMR)	0,05 or 0,1	0.036	Good Fit
Root Mean Square Error of Application (RMSEA)	0,08	0.036	Good Fit
Goodness of Fit (GFI)	0,90	0.91	Good Fit
Adjusted Goodness of Fit (AGFI)	0,90	0.96	Good Fit
Comparative Fit Index (CFI)	0,90	0.98	Good Fit

Norm Fit Index (NFI)	$\geq 0,95$	0.93	Good Fit

Table 3: The Goodness Fit of the Model

Despite four of the hypotheses were not validated by the analysis, the goodness-of-fit of the model used was appropriate to evaluate the hypotheses. The output of the analysis proved the goodness of fit between the model and all its dimensions and requirements used in the study are actually all considered in the categories of Good Fit. This implied that the model was valid in the sense that the model was developed in accordance with and based on the relevant theory. The dimensions, attributes, values and requirements based on the result from SEM can be seen in Tabel 3.

Essential Remarks

This study has created a quantitative model of the 21st century skills of a comprehensive analysis from teacher perspectives. No one sees more clearly than teachers on how the technologies we use in our daily lives influence how the students become skilled at. Students have changed, teachers have changed, learning itself has changed; and learning tools have evolved accordingly (Stevens, 2012). The model used in the investigation was validated with the help of the SEM method that analyzed data from a survey of 142 graduates of Universitas Terbuka that they factually were all teachers, when they were attending graduation ceremony of 2014 first semester conducted at the Central Office.

This study also ultimately ascertained that the ways of thinking was the foremost determinant to the 21st century skills. This finding was analogous with Edutopia (2014) by saying that it is not adequate to master academics alone, students also need to get hold of a set of skills that will last for a lifetime. To be able to solve problems in our complex and fast-changing world, students must become nimble, creative thinkers who can work well with others. In additions, the findings convincingly indicated that considerable parts on the ways of thinking were creativity and problem solving features respectively in relations to the 21st century skills needed in the sense of risk taking and leadership perspective as the major features to be the star in the era of the 21st century.

How to answer the question of equiping students to be approvingly creative and smart in problem solving states were becoming teachers' huge responsibility. It aimed at assuring effective teaching and learning processes in the classroom so that the students survive in the 21st century as they were well-equipped with risk taking ability and effective leadership outlooks. It was resulted by better curriculum, better teaching and better tests as well (Rotherham & Willingham, 2009). At this point, it is crucial for the Nation to accommodate these outcomes and to develop relevant support mechanisms to assist teachers to fulfill their mandate from now on. This was relevant both according to Wesling (2010) and Berry (2010) by saying that the 21st century learning embodies an approach to teaching that marries content to skill and that students master content while producing, synthesizing, and evaluating information from a wide variety of subjects and sources with an understanding of and respect for diverse cultures.

If we had faith in the 21st century skills are the secret to solving a global economic challenges and to engaging effectively in that spheres, we consequently must act on the belief that using those skills to patch up our education systems is possible as well. This implies that it is critically eminent to continually assess changes in teachers needs and desires in order to make both students and teachers are all on the same boat in entering this weird and wonderful globe with higher confident. If this result is true for Indonesian context, it might also be relevant to any other teachers in any other countries.

Acknowledgement

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