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Designing and Validation of Curriculum Model of Medium Period Technological Competence

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Abstract

Purpose: Increasing improvement in the field of computer sciences, appearance and development of information networks, especially internet, facilities and new ways are provided for the programmers and executives of training plans. The purpose of present research is planning and validation of curriculum model of medium period technological competence.

Methodology: This research has mixed strategy. To answer these questions, the research was done in four phases. The first phase was done with qualitative approach and other phases with quantitative approach. Handling this research in the first phase, interview, search and investigation was used for data collection. After doing interviews with 12 persons of elites and using the articles of related researches, obtaining data were collected and the questionnaire including 76 questions in 6 main effective indices on curriculum model of medium period technological competence was planned. In the next step of this questionnaire, it was distributed among some elites of managers and assistants of electronic training schools to determine efficiency amount of each noted factors in the questionnaire on curriculum of medium period technological competence and based on their idea using confirmed element analysis method was designed for medium period technological competence.

Finding: Obtained findings indicated that 6 indices with 15 components make the status of network substructure with two access components to network and network quality, relation tool and collaboration with two components of concurrent and in-concurrent relationships, non-technical competences and technical skills with three components of knowledge, skill and attitude, strategies of simplicity training with three components of patterning and cooperation, management and supervision, training strategies for increasing trust with three components of trust, honesty and appreciation and management with two components of time management and support for curriculum model of medium period technological competence.

In addition, confirmed element analysis of obtaining components indicated that there is acceptable curriculum model of medium period technological competence with data. The most element load was related to management (0.964) and the least one related to network substructure (0.579).

Conclusion: Due to obtaining findings, we can conclude that based on the idea of experts, hardware factors such as substructure of communication networks and internet and technical skills along with software and human factors such as management play the role in designing curriculum of medium period technological competence.

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1. Introduction

With the introduction of new technologies in the individual and social fields, education has not been spared from this phenomenon, and perhaps a slow revolution is taking shape that marks the basis of traditional education and brings with it new learning opportunities It has. One of the achievements of new technologies in education is to strengthen the spirit of search and fulfillment of inquiry, use of multimedia tools and means and consequently to become more enjoyable, more effective and more practical education, realization of lifelong learning, ie education without Limitation of time and place and access to multiple sources (Ebadi, 2004).

Web-based learning, created following the advent of the Internet into the world of education, provides a wealth of information through a variety of interactions that create an exploratory environment for learners, as well as opportunities for learners to explore. And find and learn according to their needs. This type of training, on the other hand, allows them to study the content of the course through the subsidy network at any time and place (Chen, 2005). In fact, e-learning provides a new and powerful tool for schools, institutions and universities, with which they can achieve their goals and create dynamic and new learning-teaching environments, in addition to answering issues such as Increasing demand for higher education, the use of large manpower for administrative and other matters, the huge cost of education, the need for learners' desire for offline access to content, their time and space constraints, and the problems of forced and timely attendance. Classrooms, etc. (Newman, 2003).

Virtual learning environment has many possibilities and personalization tools that can be combined with the information society education curriculum in different ways. Using the multimedia facilities of this technology, it is possible to produce quality content and make it available to learners in different parts of the country through the possibility of any place and at any time, and thus the weakness and lack of some qualified and specialized teachers in some areas. In addition, by facilitating the extent and manner of access to information, the virtual environment acquaints users with the skills of analyzing, critique and using information correctly. Features such as computer and internet skills, self-learning skills, spontaneity, problem-solving and critical thinking, time management skills, interest in learning, self-guidance skills, group communication ability, self-assessment, questioning power, discussion skills, responsibility, use skills Online learning resources and the use of learning strategies are considered as characteristics of virtual learners.

Academic achievement is public or private acquired knowledge or skills in subjects that are usually measured by tests and cues or both that professors impose on students. Structural and social organization of the educational environment is effective on self-efficacy and efficiency and ultimately on student performance (Agha Mirzaei and Salehi Omran, 2012). E-learners to succeed in these courses with skills such as; Requires computer skills, skills in using Internet tools and software, problem solving skills, critical thinking skills, study skills and learning strategies, questioning skills, metacognitive skills, self-navigation skills and simultaneous and asynchronous communication skills. Considering the expansion of e-learning courses in the Iranian higher education system, it is important to study the extent to which e-students have these skills and their relationship with various educational factors.

On the other hand, countries like Iran, which strive to achieve comprehensive self-sufficiency, not only need to acquire information technology, but must also move from the stage of technology consumption to production. The condition for the realization of this strategic policy is the supply and training of experienced and specialized human resources and this heavy task is the responsibility of the educational systems, especially education, in the first stage. On the other hand, virtual education in Iran is a fledgling industry in the field of distance learning technology, but it is necessary that educational centers and institutions, especially universities, using a model appropriate to the educational and cultural structure of the country, in the field of virtual learning environments they are the basis of international standards (Asemi, 2006).

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The aim of this study is to design and validate the appropriate and useful high school technological competency curriculum model in this field in order to take a small step towards the productivity of high school schools from the virtual world. Given the shortage of skilled manpower, the country's climate and numerous emergencies in the country, the main issue of this study is to determine the extent to which it is possible to launch virtual education in secondary schools and whether teachers and students are ready to benefit. Taking advantage of e-learning facilities is sufficient and also what are the opinions of principals and students' attitudes about e-learning. Finally, based on the results, appropriate solutions will be provided in this field.

2. Methodology

This research has an integrated strategy. That is, to answer the questions, the research was conducted in four phases. The first phase was conducted with a qualitative approach and the other phases were conducted with a quantitative approach. In the qualitative method, the "data-based" approach was used and in the quantitative method, "factor analysis" was used. Since different phases are considered in the present study, the type of research (based on the mentioned classifications) is different in each phase. In summary, the type of research in different phases of research is described in the table below;

Table1. Type of research in different phases of research

Classification basis	Phase 1 Identify the factors affecting the validation of the technological competency curriculum model and explain the model	Phase 2 Determine the variables of the model variables	Phase 3 Model test	Phase 4 Investigating the internal relationships of model dimensions
Purpose of the research	Exploratory_explanatory	Descriptive	Descriptive	Descriptive
Research result	Developmental	Developmental-applied	Developmental-applied	Developmental-applied
Research data	Qualitatively	quantitative	quantitative	quantitative

In the first phase of this research, interviews and research were used to collect data. In order to construct a preliminary questionnaire to design a high school technology competency curriculum model, it was necessary to identify all the factors affecting the high school technology competency curriculum. Influential on the curriculum used the technological competence of high school. In this regard, the researcher has conducted all the interviews. Adoption of this procedure enabled the researcher to use the information obtained from previous interviews in subsequent interviews. Be rich in interview data and the purpose of the interviews, which is to understand and explain the complexity of the phenomenon of e-learning. After conducting interviews with 12 elites and using related research articles, the data were collected and a questionnaire containing 76 questions in 6 main indicators affecting the model of high school technological competency model was designed.

In the next stage, this questionnaire was distributed among a number of elites who are also the principals and deputies of e-learning schools to the extent of the impact of each of the factors mentioned in the above questionnaire on the high school technology competency curriculum based on Likert's five options. 1. Specify very low, 2, low, 3, medium, 4, high and 5 very high) and based on their opinion, a model for the high school technological competency curriculum should be designed using the confirmatory factor analysis method.

For qualitative analysis of the data-derived method and for quantitative analysis of the exploratory factor analysis method, first- and second-order confirmatory factor analysis, one-group comparison,

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comparison of the mean of two independent societies, mean rank, etc. (with Using SPSS software, and AMOS) and Dimtel technique were used.

3. Findings

Among the 150 members of the sample, 80.67% (121) were male and 19.33% female, 50% (75) respondents 46 to 55, 31.33% (47) more than 55 and 18.67% 36 to 45 years old. Most of the respondents, ie 52.67% (79 people) had a master's degree and 29.33% (44 people) had a doctorate and the rest had a bachelor's degree.

Six main indicators were obtained from the results based on the opinions and views of the interview with the group of experts. Accordingly, these six indicators include the status of network infrastructure (communication and Internet), communication and interaction tools, non-technical competencies and technical skills, facilitation training strategies, training strategies to increase trust and management, each of which includes a number of The subcomponent and each subcomponent include the questions by which the component is measured. Factor analysis of the high school technological competency measurement model is presented in Figure 1 and the model fit indicators are presented in Table 2.

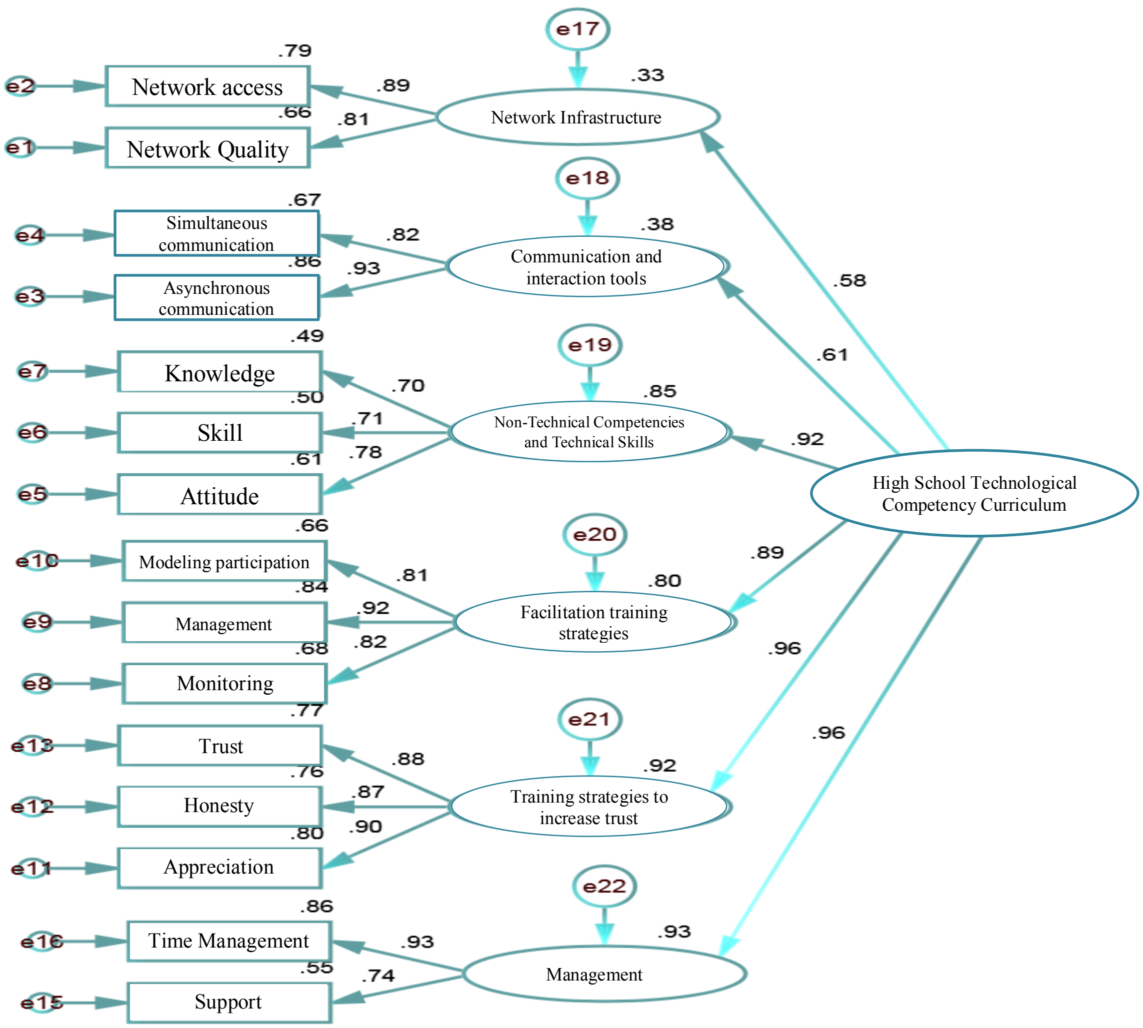

Figure1. Factor analysis of the high school technological competency measurement model

As can be seen in the diagram above, all factor loads are higher than 0.5 and are significant. The highest factor load is related to management (0.964) and the lowest factor load is related to network infrastructure (0.579). . Indicators of educational strategies to increase trust, non-technical competencies and technical

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skills, facilitators training guides and interaction and communication tools in the second to fifth priorities, respectively, have had an impact on the measurement model of high school technological competency curriculum.

Table2. Criteria for fitting the model of measuring the technological competency curriculum of high school

Comparative Fit Index (CFI)	Normalized Fit Index (NFI)	Mean square root of approximation error (RMSEA)	Standard root mean square root (GFI)	χ^2 / df
0.945	0.907	0.092	0.879	2.295
Optimal value: $\chi^2 / df \leq 3; NFI, TLI, CFI, GFI \geq 0/80; RMSEA \leq 0/1$				

As can be seen in the table above, the chi-square square is estimated at a degree of freedom of 2.295, which is less than 3 and indicates a reasonable and appropriate fit of the model. Also, the CFI and NFI coefficients have been more than 0.9, indicating that the model is appropriate. The RMSEA is less than 1. and are at their proper level. The GFI index is more than 0.8 and is acceptable. Therefore, the quality of the designed model is confirmed and the information of the designed model can be used with confidence. The goodness indicators of the high school technology competency model of the curriculum all indicate a good and acceptable fit of the model.

In order to measure the internal validity of the obtained conceptual and process model, after the initial design of the models, the designed models were sent to the experts and their opinions were applied to the models with the consent of the researcher. Then, 7 questions were designed in relation to different dimensions of the model. In Table 3, the results obtained from this questionnaire for internal validation of the conceptual model and the process answered by experts is reported as average and standard deviation.

Table3. Questions about the internal validation of the conceptual and process model

Pattern	Question	Average	Standard deviation
Conceptual template	How complete do you think the proposed model is?	3.90	0.61
	How appropriate is the type and arrangement of pattern elements?	3.77	0.57
	To what extent is the proposed model suitable for creating and improving motivation by teachers for virtual learning environments?	3.67	0.61
	To what extent do you find this model appropriate for motivating and improving web-based teaching?	3.63	0.62
	To what extent is the model appropriate in terms of organization and structure?	3.43	0.63
	To what extent are the mentioned elements relevant to the research topic?	3.73	0.64
	How comprehensive do you think the model is?	3.93	0.58
Process pattern	How complete do you think the proposed model is?	3.93	0.69
	How appropriate is the type and arrangement of pattern elements?	3.77	0.82
	To what extent is the proposed model suitable for creating and improving motivation by teachers for virtual learning environments?	3.73	0.78
	To what extent do you find this model appropriate for motivating and improving web-based teaching?	3.80	0.76
	To what extent is the model appropriate in terms of organization and structure?	3.70	0.79
	To what extent are the mentioned elements relevant to the research topic?	3.87	0.73
	How comprehensive do you think the model is?	3.83	0.79

The results of Table 2 show that the average of all questions was higher than the theoretical average of three. This shows the internal validity of the conceptual model and research process. Also, in the conceptual model, the highest average was related to question 7, which indicates that experts in their evaluation have considered this model as comprehensive. In the trend model, the highest average was related to question 1, which indicates that experts in their evaluation considered this pattern complete..

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4. Discussion

The aim of this study was to design and validate a high school technological competency curriculum model. Findings showed that 6 indicators with 15 components including network infrastructure status with two components of network access and network quality, communication tools and interaction with two components of simultaneous and asynchronous communication, non-technical competencies and technical skills with three components Knowledge, skills and attitudes, facilitation training strategies with three components of modeling and participation, management and supervision, training strategies to increase trust with three components of trust, honesty and appreciation and management with two components of time management and support for high school technological competency model They have a good fit and credibility.

In the study background, no similar study was observed with the present study, but some studies had similarities with the present study. For example, Bagherzade (2017) in his study designed an engineering education curriculum with an emphasis on technological education based on classical context theory. Data were collected through semi-structured interviews with 10 technologies. The findings showed that 4 main themes: personal technological environment, technological social environment, technological industrial environment and technological education and 28 sub-categories and 64 codes form the model of engineering education curriculum with emphasis on technological education. . Consistent with the present study, based on the findings of this study, technological education in a structural and cultural way has functions focused on economic growth that should be highly considered by the authorities. Also Javadi Fard (2011) in his study comparative study of e-learning in the United Kingdom, Japan and Iran, The findings of his study showed that the authorities of the United Kingdom, taking into account the conditions and requirements of the time, have made special plans and plans, and by following these plans, have solved the relevant issues and problems effectively, and In terms of the history and evolution of e-learning, the country has already established distance learning and e-learning institutions, and two countries, Japan and Iran, have established such institutions with a short time lag, and all three To develop and improve e-learning, the country has set goals and policies, some of which are common among the three countries and some are different according to the specific requirements of the country. All three countries have different ways of providing e-learning. And the two countries, the United Kingdom and Japan, due to the availability of the necessary infrastructure of presentation methods, are of better quality than Iran. And in the United Kingdom and Japan, the interaction of the private and public sectors with Iran in the field of development Information and communication technology and the implementation of projects to develop and expand e-learning, much it's obvious. Although this study does not have the same goals in terms of content as the objectives of the present study, but in line with the present study, it emphasizes the importance of the management dimension in the design, construction and implementation of e-learning.

In addition, in the present study, the management index had the most impact and the network infrastructure index had the least impact on the model of measuring the technological competency curriculum of high school.

This study also had its limitations. In general, one of the limitations in this study was the lack of significant research background in the field of technology education in the country. In a way, it can be said that apart from one or two comparative studies and content analysis, no other outstanding work has been done in this area of learning. This hindered the identification of the problem, the existing needs and capabilities. Another limitation relates to the research method. Due to the fact that the method of this research was synthesis research and the model has not been implemented in practice, this research is limited in its recommendation to implement the model on a large scale. Another limitation was the lack of curriculum specialists and educators with sufficient experience and study in this area. This made the validation of this study difficult and limited the validity of the model to quantitative surveys (not in-depth interviews) of curriculum instructors and a few experienced teachers. Because in this study, the researcher

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was the most important tool for collecting information, the researcher was not able to attend one or more countries to review and collect information by observing classroom activities, so information collection resources are mostly limited to reviewing curriculum documents or reports other researchers were from these classes. Therefore, there may still be ambiguities in describing and analyzing learning experiences and teaching methods due to the new and complexity of the field of technology.

According to the findings of the research, the development of philosophical-educational foundations and technology education approach is one of the issues that should be considered. Because the analysis of the theoretical foundations of the transformation document and the national curriculum revealed that these sources lack the necessary clarity in this regard. Also, developing a curriculum for technology education that includes a comprehensive concept (including knowledge, process, and diverse fields) of technology; Designing technology education for elementary school in a combined form, and junior high school independently; Paying attention to various aspects of technology education such as the nature of technology, job competencies, thought processes, individual needs and community dimensions in developing a technology education curriculum and using all community capacities and out-of-school opportunities for technology education, such as industry participation And trade and research and technology departments of other organizations to help provide curriculum resources and equipment are among the other practical suggestions in the present study.

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