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Explaining a Model of Applying Critical Thinking Components in High School Curriculum Development: A Qualitative Approach

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Abstract: The main purpose of this study is to study the components of critical thinking and the extent to which it is used in the development of the curriculum of the first level of high school in order to provide an appropriate model. The present study is applied in terms of purpose and qualitative in terms of method. The statistical population was university professors, teachers and curriculum experts in education in Kohgiluyeh and Boyer-Ahmad province (Iran). Using purposive sampling method (theoretical saturation - key people selection approach), eleven of them were selected. The semi-structured interviews were used for data collection and data analysis was done via thematic analysis. According to findings, using of components (skills) of critical thinking in curriculum development as an inclusive theme (4 sub-thematic themes), 6 organizing themes and 121 basic themes were identified and a network of themes was extracted. The organizing themes include extracurricular-based curriculum, evaluation, interpretation, analysis, self-regulation, and synthesis. The alignment of the components and themes of the drawn theme network with theoretical and research bases was examined and approved.

Keywords: Curriculum, Evaluation, Curriculum Content, Curriculum Objectives, Teaching-Learning

Introduction

The ability to think critically is one of the skills that empowers a person to face new and unique issues in the current world (Lai, 2011). This ability helps a person to make the right choices by using reasoning skills and the ability to analyze and examine the situation and makes judgment and evaluation possible in the context of his choices (Davis-Seaver & Davis, 2000). One of the ways to acquire and develop critical thinking skills in learners is to develop appropriate curricula in the educational system (Thompson, 2011). In other words, critical thinking can be defined as the process of transforming the framework of the implicit analysis of the mind into an objective framework for transforming the information, experiences and skills acquired through the curriculum and experiences gained in teaching and learning situations (Swartz, 2018). Curriculum is the main element of the higher education system and the most fundamental tool for providing students with knowledge, experience and skills to provide services to the society (Barkhordary et al., 2009).

The curriculum in any society is responsible for preparing learners to achieve such a situation. This can be realized by paying attention to the cultivation of "critical thinking" and the growth and improvement of people's "power of judgment" (Flores et al., 2012). Critical thinking can be seen as consisting of two parts: "critical skills which are all cognitive skills" and "critical inclination and attitude". The main skills of critical thinking include: interpretation-analysis, evaluation-inference, explanation and self-

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regulation. The tendency to think critically is also the tendency to apply critical thinking skills (Ahmadian & Sobhaninejad, 2014).

Critical thinking is the most valuable skill that schools can impart to their graduates. Teaching critical thinking has always been a learning goal for teachers in all disciplines and levels (Sarigoz, 2012). However, this output is not always achieved. Critical thinking competence requires a philosophical shift from output to process, learning to think and subject isolation to subject integration (Thompson, 2011). In the following, to outline a framework for understanding critical thinking across the curriculum, traditional and contemporary theories related to this process are reviewed, as well as the nature of critical thinking is discussed, and teaching and assessment approaches that teachers may use to foster critical thinking critically used and analyzed. The analysis relies on describing the instructional practices used to motivate students to engage in the processes that determine critical thinking (Thompson, 2011). Critical thinking is the most important skill for problem solving, research and discovery. It is a systematic approach of skillfully evaluating information to arrive at the most practical solution to a variety of structured and unstructured problems (Laxman, 2010; Shah, 2010). However, teaching does not always lead to this result. In fact, research shows that many teachers who consider developing critical thinking skills as a learning outcome for their teaching fail to define the structure and differentiate between critical thinking and content coverage (Larsson, 2017).

Zamani et al. (2021) in research entitled the amount of attention to the components of critical thinking using educational technologies in the first-grade experimental science textbooks of Iran and Russia showed that in the content of the experimental science books of both countries hard and soft technologies have been used for critical thinking education. Furthermore, in Iran, the use of soft technology in experimental science books is more than the use of hard technology. The combination of soft and hard technologies in the content of books provides the possibility of more effective and attractive learning for students.

Mesri et al. (2019) in a research using the content analysis method showed in fiction literature of reading textbooks of the first elementary grade no reference has been made to the components of critical thinking, in fiction literature of reading textbooks of the second elementary grade, the most frequent components of the art of thinking about their thinking and the correct judgment (based on the criterion), in fiction literature of reading textbooks of the third elementary grade, the most frequent components of curiosity of thought and correct judgment (based on criterion), in fiction literature of reading textbooks of the fourth elementary grade, the most frequent component of curiosity of thought, in fiction literature of reading textbooks of the fifth elementary grade, the most frequent components of defining and clarifying the problem and in fiction literature of reading textbooks of the sixth elementary grade, the most frequent components of reasoning and correct judgment (based on criterion) have been belonged.

Jafariharandi (2018) in research using content analysis in the review of elementary science textbooks in 2017 showed that experimental science books have paid attention to the components of thinking 499 times, which is distributed in the components of feelings, emotions, negative judgment and pretending

to disagree; brightness and optimism and constructive and positive attitude; creative thinking, motivation and movement; control, leadership.

Erikson and Erikson (2019) aimed to explore valid, practical, and effective e-learning media. Reflecting the purpose of paper, this study is to improve critical thinking skills, to obtain an overview at high levels and increasing students' critical thinking skills including ability. The hypothesis is as a rational decision-making process on what believed is, through the aspect of providing basic explanations, building basic skills, concluding, making further explanations, and strategies and tactics in the lesson planning course, at the Faculty of Tarbiyah and Teacher Training at UIN Maulana Malik Ibrahim Malang. The paper explained ADDIE development model which included the design, development, analysis, implementation and evaluation stages which referred research and development (R & D). The data for testing e-learning media in learning and tests of critical thinking skills carried out from fourth-semester students. The study used the One Group Pretest-Posttest Design for trial design. The results concluded the average percentage of feasibility value of the e-learning media from the three validators was 86.6% with very feasible criteria, the critical thinking ability instrument was 79.9% through feasible criteria. E-learning media used in a limited trial that obtained an average score of 82.4% for lecturers and students with practical criteria. E-learning media is improving critical thinking skills effectively which indicated changes in students and critical thinking test presented the results from 56.7 to 81.3. The findings showed that the e-learning media is valid, practical, and an effective criterion to improve students' critical thinking skills.

Considering what has been said and also the lack of research conducted in the field of examining the extent of utilization of critical thinking capacities in the development of curriculum at the first level of high school, the necessity of this to help achieve the goals of education and other related institutions. In order to carry out the necessary reforms, especially the necessity and importance of research related to citizen training based on critical thinking is becoming more and more apparent. Therefore, the main goal of the present research was to explain a model of the application of critical thinking components in developing the curriculum of the first period of secondary school. Unfortunately, despite the great necessity and importance of the application of critical thinking in the effective and sustainable education and learning of students, balanced and appropriate attention has not been paid to this important issue in the first level of secondary school. Conducting this research, on the one hand, leads to the development of the theoretical foundations of the research, and on the other hand, it leads to the presentation of an appropriate model of critical thinking components in curriculum development.

Material and Methods

The current study is a qualitative study that used thematic analysis approach and forming a network of themes in order to develop a model of using critical thinking skills in curriculum development. Thematic analysis is one of the appropriate analytical techniques in qualitative research that transforms scattered and diverse data into rich data (Vaismoradi et al., 2013). Based on this, in the first step, the data was collected through a detailed semi-structured interview process. Then the written interview texts were

read and revised several times and a list of primary codes was created. In this step, 221 primary codes were identified. In the next steps, the obtained codes were categorized into similar and coherent groups, and the network of themes was analyzed and revised several times, and finally to explain the use of critical thinking components (skills) in developing a curriculum as an overarching theme (including four subthemes), 6 organizing themes and 143 basic themes were identified and the theme network was extracted.

The target population of the research was university professors, teachers and curriculum experts in education in Kohgiluyeh and Boyer Ahmad province (Iran). Sampling in this research is of the theoretical type, which is a purposeful sampling and leads to the creation or discovery of theory. A semi-structured interview was used to collect data. People were selected for the interview who were experts or had a major role in the application of critical thinking components in curriculum development. Sampling continued until reaching theoretical saturation. The number of participants in this research was 11 and after that the sample reached theoretical saturation. To calculate the reliability of the test, 2 interviews were selected from among the conducted interviews and each of them was coded twice in a specific time interval. In each of the interviews, codes that are similar to each other in the time interval were identified as "agreement" and non-similar codes as "disagreement". The retest reliability of the interviews conducted in this research was 0.81.

In order to check the validity, the prepared model was presented in the form of a questionnaire and its content validity was checked. In this way, the opinion of 10 experts regarding the relevance, clarity and simplicity of each item was used based on a 4-point Likert scale. The minimum acceptable value for content validity was considered equal to 0.79. After receiving the opinion of the experts, a number of themes that had a validity of less than 0.79 were removed, and by applying changes to consider the content validity of the extracted themes, 0.90 was obtained. To measure the reliability criterion, the opinions of three university professors and two PhD students were used in coding and interpreting the results. To measure the verifiability, the diversity of the interviewees and the recording of the interviews, as well as the confirmation of the findings by academic judges, were used. To measure the transferability, the opinion of three experts with relevant experience was used. In all these cases, the indicators were confirmed.

Results

In order to formulate the framework and model of using critical thinking skills in curriculum development, thematic analysis approach was used. Based on this, in the first step, data was collected during the detailed semi-structured interview process. Then, the written interview texts were read and revised several times and a list of primary codes was created. In this step, 221 primary codes were identified. In the next steps, the obtained codes were categorized into similar and coherent groups, and the network of themes was analyzed and revised several times, and finally to explain the use of critical thinking components (skills) in developing a curriculum as an overarching theme (including four

subthemes), 6 organizing themes and 143 basic themes were identified and the theme network was extracted. Based on this, 6 organizing themes were formed, which are presented in Table 1.

Table 1. The network of themes of critical thinking components in the evaluation of curriculum development

Overarching theme	Organizer themes	Themes
Components of critical thinking in evaluation	Extracurricular	Helping to evaluate and evaluate better
		Compliance of extracurricular activities with performance evaluation
		Compliance of extracurricular activities with the evaluation of effective teaching methods
	Evaluation	Determining essential information for curriculum evaluation and determining the scope and essential components of curriculum elements
		Gathering information related to declaring support or opposition to the existing curriculum
		Collecting information related to the evaluation of academic progress
		Collecting information related to curriculum goals-curriculum content-teaching method
		Collecting information related to the evaluation of curriculum implementation facilities
		Clarify the evaluation results of curriculum elements
		Interpreting the results and evaluation reports of curriculum elements
		Decision making and action and applying the results of evaluation of curriculum elements
		Conclusions and judgments about different dimensions of curricula
		Paying attention to the growth of "evaluation skills" in the evaluation methods foreseen in the curricula
	Self-regulation	Modifying - completing and changing various elements of the curriculum based on the results of the curriculum evaluation for the effectiveness of the curriculum
		Paying attention to the growth of "self-regulation" in the assessment methods foreseen in the curricula
	Interoperation	Paying attention to the development of "explanation and interpretation skills" in the assessment methods provided in the curricula
	Analysis	Paying attention to the development of the "art of thinking" skill in the evaluation methods foreseen in the curriculum
		Paying attention to the growth of "analytical skills" in the assessment methods provided in the curricula.
		Attention to the development of the skill of "curiosity of thought" in the evaluation methods foreseen in the curriculum
		Paying attention to the development of "correct judgment" skills in the evaluation methods provided in the curriculum
		Analysis of information obtained from the evaluation of curriculum elements
	Synthesis.	Paying attention to the skill of "creating-combining" in the evaluation section of the national curriculum
		Paying attention to the skill of "creating-combining" in the academic evaluation section
		Paying attention to the development of "combination skills" in the evaluation methods foreseen in the curricula

Based on the mentioned framework, the components of effective critical thinking in curriculum development include components that are effective on curriculum goals, components that are effective on the teaching-learning process of the curriculum, and components that are effective on curriculum evaluation. The organizing themes include curriculum-based curriculum, evaluation, interpretation, analysis, self-regulation, and synthesis. The features of the content element based on extracurricular activities are: aligning the content of extracurricular activities with the content of the curriculum, being based on the axis of modern teaching methods, being appropriate to local and regional talents and abilities, and the special features and facilities of each school, and being student-centered. Considering the key role of the target element in the curriculum, the special considerations of this element based on extracurricular activities are as follows: paying attention to the talent, needs and interests of students, transforming the educational environment into a lively environment, enriching learning and expanding learning from school to the community environment.

The special considerations of the teaching-learning process element based on the extra curriculum are as follows: paying attention to neglected subjects in the curriculum, compensating for the deficiencies and shortcomings of the curriculum, cooperation in carrying out activities, the lack of time for activities, strengthening the power of imagination and mental imagery, creating enthusiasm and healthy academic competition among students, flexibility, reducing academic dropout, paying attention to individual differences, paying attention to various interests, creating desire in students, implementing activities through agency and activating students and implementing extracurricular activities in a practical way and teamwork.

Discussion

The present study was conducted in order to develop a framework and model for using critical thinking skills in developing curricula using a qualitative method. To analyze the obtained data, the technique of theme analysis and theme network formation was used. Based on this, 143 primary codes were identified. In the next steps, the obtained codes were categorized into similar and coherent groups, and the network of themes was analyzed and revised several times. Finally, using components (skills) of critical thinking in curriculum development as an inclusive theme (4 sub-thematic themes), 6 organizing themes and 121 basic themes were identified and a network of themes was extracted. The organizing themes include curriculum-based curriculum, evaluation, interpretation, analysis, self-regulation, and synthesis.

The findings were somewhat in line with the results of previous studies. For example, in Ashouri et al. (2018) study, components such as educational and critical expertise were suggested as lesson goals and content. According to these researchers, components such as planning, problem solving, and teaching communication and critical skills play a role in developing curriculum content. Student-oriented methods, activity-oriented methods (exploratory, brainstorming, innovation), cognitive methods (exploration, inductive thinking method, question and answer teaching method) and cooperative

learning methods in the learning process and teaching the curriculum was considered as effective strategies (Popil, 2011; Ten Dam & Volman, 2004).

According to the findings of past researches, components such as evaluation based on the interpretation and explanation of the results, evaluation based on the way of implementation (opportunity to think after asking the question, evaluation during action, evaluation through discussion, threat evaluation, posing open questions), evaluation (self-evaluation, process evaluation, situation-oriented and practical evaluation), and group evaluation (participatory evaluation, mutual evaluation) were found to be effective in curriculum evaluation (Brunt, 2005). Components such as questionable and problem-oriented content, appropriate structure in compilation, multi-faceted learning, compatibility of content with real life and student-centeredness in curriculum content compilation have also been confirmed in numerous researches (Purwanto et al., 2022; Rahmawati et al., 2020).

Based on the findings of the present research, it is suggested to change and transform the headings of textbooks in secondary school by including the skills of problem solving, evaluation, synthesis and interpretation and reasoning. Since the component of analysis is a step before the components of evaluation and composition (creating), therefore, not paying attention to it causes failure to reach the next components. Paying attention to this component as well as paying attention to each component based on its position and order in compiling the content of the curriculum is also suggested. Based on the findings and in order to apply the components of critical thinking in the teaching and learning process, it is suggested to create classroom discussion situations between students to better develop questioning skills in students and critical thinking skills such as reasoning, criticizing and investigating various solutions to problems, using critical vocabulary and distinguishing different meanings of words in the text of lessons should be considered. Using active teaching methods in the classroom and reviewing educational methods with emphasis on group teaching methods and question and answer are effective strategies that can lead to the development of critical thinking in high school students.

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