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Providing a Curriculum Design Pattern for Green Technical and Vocational Education of Secondary School in Iran

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Abstract

Purpose: The present study aims to identify factors affecting the design of green technical and vocational curriculum and provide a curriculum design pattern for green technical and vocational education of secondary school in Iran and its validation. Green technical and vocational training relies on issues such as environmental pollution reduction and creation of workforce for clean industries, such as the recycling industry. This type of training is based on the new labor market (green economy) that has been created to address the environmental problems of human industrial life in the present age. **Method**: In order to achieve the research objective, qualitative research method with an approach to grounded theory has been used. Twenty-five individuals have been selected from among all faculty members and experts in the fields of curriculum and environment through targeted sampling. Analysis of data gathered through open interviews has been done using coding. **Findings**: In the final analysis, the extracted concepts have been classified into 86 sub-categories and 17 themes or categories. **Conclusion**: According to the research results, the components that directly affect the implementation of green technical and vocational education curriculum of secondary school are identified and a favorable pattern is presented. Based on this, "design of green technical and vocational curriculum," as the axial category, is realized based on the context of causal factors of "macro environmental policies," "relationship with the green labor market linked to the green economy through modular principles" and internship standards through the principles of "teacher participation in the design of green curriculum" and "continuous engagement with scientific and research centers" taking into account "learners' characteristics" and "professional qualifications required for green employment (as the background of the model)." Therefore, it will lead to the realization of "educational and economic consequences".

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1. Introduction

The need of the community for efficient forces has intensified the link between the labor market and the education institution, and the training of skilled and semi-skilled forces has become a target for world education systems (Whips, 2008). Technical and vocational education is a good way to achieve sustainable development in all countries, and it is considered as an effective factor in the elimination of unemployment, poverty, creation of peace and stability and environmental protection (UNESCO-UNEVOC statement, 2004).

In the Iranian society, environmental pollution is a major national threat that has endangered all opportunities for growth and development and employment creation (Environmental Performance Index Report, 2015). The process of environmental degradation and its acceleration requires the need to adapt curricula to the upward trend of this degradation, education of the environment to achieve this adaptation, and to go beyond the current curriculum (Johnson, 2009 quoted in Shobeiri and Shamsi, 2015).

The most important role in implementing an effective and appropriate curriculum for this kind of education will be by targeted educational institutions that will evaluate the results of their training in this area (Lee, 2013).

Developed countries, such as the USA and Germany, and developing countries, such as South Korea and Chile, have used technical and vocational training capacities called "green technical vocational training" to prevent and combat environmental problems (Majumdar, 2010). In this type of training, job volunteers are trained to meet the needs of the green work environment in three areas of recycling, eco-tourism and renewable energy (Kastrup, 2014).

The use of green technical vocational education capabilities is an appropriate approach to eliminate national environmental threats and create new labor markets (Nateghi and Bagbanpour, 2015).

Creating a technical vocational training structure tailored to this kind of labor market requires curriculum design. The curriculum should relate work and education and consider all elements of the curriculum, such as teacher, student, content, and equipment with industry and work environment (Keshavarzi and Rahgozar, 2010).

The curriculum design pattern is a practical guide in the hands of the planners and points to what should be addressed in determining the elements of the curriculum. In other words, it is the how of determining the main elements of the curriculum or curriculum design (David and Teresa, 2006). Regarding technical and vocational training in Iran, there is no systematic model for making curriculum of these courses green.

Industrial growth, without taking into account environmental considerations, is not sustainable development, and faces the society with serious problems that make it difficult to live on the planet (Faghihi and Bagbanpourasl, 2015).

Today, in the world of business, the situation is moving towards environmentally friendly occupational activities (Asnawi and Djatmiko, 2016). Green jobs are directed toward raising public awareness and include various commercial profitable areas and environmental protection (Syarif, 2011).

The stages of the formation of the green technical vocational educational system are expressed in three steps: the establishment of green schools, the establishment of national green policies and the formation and membership in international green institutions (Majumdar, 2010).

The structure of the green curriculum design in accordance with South Korean pattern is at three levels of teacher, middle educational managers, job market requirements, and industry representatives (Lee, 2013).

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2. Literature review

Curriculum planning in the technical vocational field will be intertwined in accordance with the needs of the world of work, the world of education, and theoretical foundations for the design of curricula in this area (Doorandish & Abdollahzadeh, 2017). Curriculum planning in the technical vocational field is oriented toward demand approach, which must respond to the actual and urgent needs of the labor market (Chaharband, 2012). In designing curricula, the appropriateness of programs with the resources and barriers of the local, national and international community is considered as one of the desirability criteria for programs (Fathi Vajargah, 2013). This criterion is very important in the curriculum planning of technical and vocational training. Because both the concept of technical and vocational education and the related scientific foundations indicate the very close relationship between these trainings and society (Sadri and Hosseini, 2015).

The curriculum should be linked to the needs of the community and the world of work and respond to the industry's demand (which is the industry and the green labor market here). To this end, technical agents and the managers of the industrial workplace should be involved in the design of curriculum in the technical and vocational education system (Akomaning et al., 2011).

The relationship between education and the age of learners and the flexibility of training in line with labor market changes, taking into account the results of studies on the inefficiency of the technical and vocational training system in the country will help to increase the returns of these new educational systems.

In general, curriculum developers at the beginning of the twenty-first century should note that the curriculum should be designed in such a way that the necessary competencies (knowledge, skills, attitudes) are created and strengthened to improve the success of the graduates in their job and life situations (Momeni and Kazempour, 2011).

The purpose of competency-based education is to ensure that the skills provided by the curriculum are matched to the skills required by the industry (Wong & Lee, 2017). Based on the definition of resources, the design or development of a curriculum includes the following steps (Print, 1993; Wiles, 2009; Van den Akker, 2003). 1. Planning and setting goals 2. Design 3. Implementation 4. Evaluation of students' findings based on the primary objective

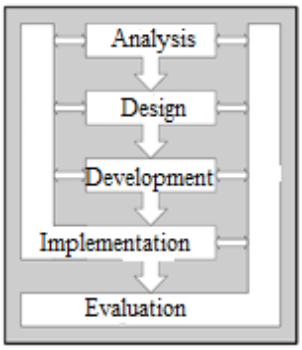

Figure1. Design or development of a curriculum (Print, 1993; Wiles, 2009; Van den Akker, 2003)

In the design of a curriculum, paradigm is: 1- instrumental, 2- communicative, 3- pragmatism, and 4- artistic. The first two paradigms are used in the design of technical and vocational curriculum. The implementation of the first paradigm is introduced as the systematic design method. In this approach, the goal of the design is the achievement of the table of contents, the strategy of teaching and the evaluation of the stages of this design (Visscher-Voerman, Gustafson, and Plomp, 1999).

This approach is presented in the form of Tyler method. The output of the curriculum learning is an important point of this approach. In this approach, design and evaluation are done according to the above design (Piskurich, 2006). In another approach that design is relational, design is done in collaboration and consultation with the labor market, teacher, and school principal (Walker, 1990). This approach is based on the Walker's method.

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The design of curriculum for technical and vocational courses is based on the combination of these two curriculum design approaches (Albashiry et al., 2016). Combination of these two approaches should be done in a way that a homogeneous and systematic structure is created based on internal and external curriculum beneficiaries. The internal compatibility of the combined curriculum is achieved in relation to the three elements of the desired changes in the status quo, the competencies required in the learner, and learning situations. Regarding the technical and vocational curriculum, this is a view of external adjustment, the coordination between expectations and achievements (determined by stakeholders, government and society), and the competence of students to meet the expectations of the learning environment (Mckenney, Nieveen, and Van den Akker, 2006).

Internal consistency is in the following three forms: 1. Relationship between curriculum components (statutes, objectives, headings, strategies and evaluations); 2. Consistency between indices (preferences, approvals and curriculum achievements); 3. Consistency between educational institution and educational system (Teacher and school development). Based on the requirements of the curriculum of the technical and vocational program, which is creation of an independent job-learning ability in graduates and being up-to-date based on labor market changes, the curriculum design is systematically revised and design in relation to the stakeholders (industry, trade, teachers and designer). Given this structure and requirements in order to achieve the goals of a curriculum, there is a need for an administrator in each institution to implement the role of local leadership in the curriculum. Curriculum leadership is a process in which the leader builds a team together with other components of the curriculum to achieve the joint objectives in order to accomplish complex activities (Wiles, 2009).

The achievement of curriculum objectives and the efficiency of the education system are highly dependent on the power and competence of school and center managers. In this structure, managers should be in the form of a curriculum leader trying to create an appropriate atmosphere for conducting educational activities, creating motivation for teachers, and, in addition, providing a space for teachers to present their ideas during the teaching process in order to find out curriculum problems and play the role of teacher collaboration to promote the curriculum (Stark, Griggs, and Rowland-Poplawski, 2002). Teachers' views on curriculum should be presented in the form of corrective proposals to top executives. In this regard, the manager must have effective cooperation with teachers in order to achieve the objectives of the curriculum. Based on this, the strategy for designing and revising curriculum is proposed in the form of teacher collaboration (Bakah et al., 2012: Huizinga et al., 2015).

Although the TCCD strategy is generally presented in the design of technical and vocational curriculum in the form of a school-centered and industry-centered integration strategy (Sadri, 2009; Keshavarzi and Rahgozar, 2010), no emphasis has been placed on the effective components and teacher's role in the combined view. Based on this strategy, the coordination between the executive and the legal curriculum increases, the teacher feels a greater share of the ownership of the curriculum and feels more collaborative in the implementation and evaluation phases. Teacher with this position requires the constant development of specialized skills and knowledge. The teacher plays a role that can find out the problems of the curriculum during implementation, analyze it, provide solutions, and evaluate the effectiveness of the solution (Voogt et al., 2015).

These curriculum design strategies in technical and vocational courses need to combine the collaborative role of industry representatives and employers. This concept further illustrates the concept of external sustainability in curriculum design. Akomaning (2012) used this strategy in collaboration with teachers, industry representatives, students and managers to refine the curriculum for technical and vocational apprenticeship courses. Based on the results of this research, a collaborative platform is created that all stakeholders in the curriculum are involved. And the collaborative structure makes teacher's teaching capabilities up to date in relation to the work environment and the needs of the market are considered in teaching and modifying curriculum (Bakah, 2011; Bagherzadeh and Osare, 2015).

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In addition, needs assessment is of special importance in curriculum designing for technical and vocational training system. The difficulty of analyzing the influential factors and determining the impact of each one has made the need assessment complex and difficult for the curriculum developers. Technology orientation, employment orientation, future orientation, demographic orientation, higher education for graduates, and the current needs of industry, services and agriculture (Sadri, 2009) in the field of green economy are among the major parameters influencing needs assessment.

Habibi et al. (2016) conducted a study entitled "comparative study of green chemistry teaching in the secondary school curriculum". The obtained results show significant similarities and differences between logic, goals, content, teaching methods, and assessment methods among the countries under study and Iran. Similarities are more commonly found in the intended curriculum logic, but differences are more evident in goals, content, teaching methods, and evaluation practices. On the other hand, the findings show that the content of the curriculum for green chemistry in Iran has not been transformed in line with the development of science and technology.

Parishani et al. (2016) carried out a research study entitled "investigating the status quo and desired situation of the overall objectives of environmental education curriculum of second grade of secondary school from the viewpoint of environmentalists and curriculum experts." They showed that from the perspective of both curriculum experts and environmentalists, the overall objectives of environmental education course of second grade of secondary school is not desirable. This is because what is stated in some of the existing documents as general objectives of environmental education is non-transparent and without prior needs assessment, which is not operational.

In a research entitled “environmental education and its position in the curriculum of guidance school,” Taghiyeh et al. (2012) addressed the objectives and content of the teacher's guidebook. They concluded that the technical and vocational curriculum of guidance schools only focused on the environmental cognitive aspect and the attitude is neglected.

Chakraborty et al. (2018) conducted a study entitled “green curriculum analysis in a technical education.” They found that technical education in India, with a low emphasis on horizontal organization, pursues the vertical organization of a green curriculum, leading to environmental behaviors and unsustainable green culture.

Taherkhani et al.’s (2009) study was “offering a theoretical framework for instruction of environment at primary school with an emphasis on teaching method.” In this study, it was shown that almost all countries in the world have included environmental education in elementary courses and most of them bind the child to day-to-day environmental issues outside the school. In elementary school formal education, it is tried to tailor content to the students' intellectual development, it should be learner oriented and considered in textbooks.

Yapin et al. (2017) carried out a research entitled as “implementation of green skills through the co-curriculum activities among technical and vocational students.” They stated that the curriculum in a technical and vocational training program plays an important role in the training of future green skills. Education experts should not forget the role of people in all these concepts. Implementing green skills through the curriculum should focus on students. Students should see what working in a sustainable way means in practice.

3. Methodology

In order to identify the effective factors on the design of the green technical and vocational secondary school curriculum and present the curriculum design pattern for the green technical and vocational courses in high school in Iran, the qualitative research method (Yin, 2003) with Grounded theory approach has been

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used. This is a method that directly extracts theories, concepts, hypotheses, and theorems from the acquired data, instead of deducing from previous assumptions, other research or theoretical frameworks.

The data was collected through interviews. Interviews with samples were continued until it was felt that new information was not obtained (information saturation). The statistical population of the study consisted of environmental experts and curriculum professors, of which 25 people were selected by targeted sampling.

This analysis was carried out by adopting Strauss and Corbin's interpretive interpretation method and carrying out an open, axial, and selective coding process.

Data analysis in this step was performed on the basis of the theoretical coding method. Coding is a process in which data is decomposed, conceptualized and newly introduced together. This is the main process in which the theory is formulated based on data.

The coding steps used in this research are: 1. Open coding; 2. Axial coding; 3. Selective coding.

1. Open coding brings topics and concepts from the depth of the data to the surface. In this step, the codes that had a common concept were placed under one category, and thus, several categories were formed. Based on the concepts derived from this step, the initial categories were formed (Strauss & Corbin, 2006). This step is done to identify the criteria and sub-criteria for the design of green technical vocational secondary education curriculum. In this section, the data from the analysis of the content of the interviews includes 86 concepts.

After formulating the table of concepts and initial categories, to complete this process, the concepts at a higher level and more abstract were grouped to achieve the main themes. Based on titles in related theories or concepts derived from the research literature, general titles were considered for these themes.

Regarding the general purpose of the research, the elements and themes of the green technical and vocational secondary education curriculum design pattern were extracted. In the final analysis of the initial concepts, with sufficient knowledge of which different themes are, how they are proportional to each other and the whole story they are telling about the data, it was attempted to present a satisfying map of the themes (Bozorgnejad and Sharifzadeh, 2016). In Table 1, the themes are presented in a concise and comprehensive manner.

Table 1. Common themes extracted from analyses

	Theme 1: macro environment policies	Code
Concepts	Development and implementation of educational system policies for implementing green education in curriculum	42
	Acceptance of green science in the social environment	43
	Allocate funds to research in the field of environmental protection	44
	Training the human resources needed for the green labor market	15
	Governmental support of graduates of technical and vocational schools	16
Theme 2: green curriculum content		Code
Concepts	Match curriculum content to professional qualification standards	5
	Observe the choice of curriculum content with the green knowledge structure (topics and content of environmental protection)	6
	Production of electronic content for green technical and vocational courses	11
	Adopt and coordinate the content of the green curriculum with the interests of students	35
	Satisfaction of students with green curriculum content	36
	Emphasis on research dimension in green curriculum content	37
	Careful consideration of the specialty of green curriculum content	38
	Attention to community demand in choosing curriculum content with an environmental approach	39
	Disseminating and developing curriculum content for priority sectors and professions	4
	Develop creative and critical thinking skills and student problem solving skills through the green curriculum	34
Theme 3: Relationship with the labor market linked to green economy through modular principles		Code
Concepts	Determine professional qualification standards	7
	Need assessment for green labor market	56
	Organizing technical and vocational courses based on real job situation indicators	8
	Emphasis on activity in real business situations	9

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	Development of basic skills through on the job training and education for the development of self-employment	10
Theme 4: green curriculum objectives		Code
Concepts	Leading the green curriculum to address economic and social problems	12
	Awareness of teachers and students of developments in the technical and vocational system	13
	The success of the curriculum in the ever-increasing development of students with an environmental approach	14
	Matching curriculum to improve student leadership in the green area	40
	Determining the goals of the curriculum according to the students' interests and abilities	41
	Changing the course syllabus with regard to new scientific advances in the subject area	45
Theme 5: Teaching and learning processes		Code
Concepts	Adaptation of modern teaching methods to the goals of green technical and vocational curriculum	17
	Student active participation in teaching - learning green technical and vocational courses	18
	Student's individual capabilities for acquiring new skills in the green field during teaching-learning process	19
	Providing effective feedback to student functions	46
	Provide students with the right opportunity to think about environmental issues	47
	Growth of cognitive and meta-cognitive dimensions of students	52
	Create an opportunity for students to analyze green issues	54
	Emotional support in the educational environment	55
	Continuous improvement of teaching methods to better match with the skills required by the green labor market	70
	Use of teaching methods based on discussion, industrial visits, and scientific research	53
Theme 6: Professional qualifications required for green employment		Code
Concepts	Providing skill-driven trainings	1
	The relevance of learning outcomes to the skills required for green employment	2
	Production of curriculum content in order to be qualified in the profession	3
	Updating and developing curricula for priority sectors and professions	4
Theme 7: Use of Information Technology		Code
Concepts	Making green classrooms smart	20
	Teachers' use of new and up-to-date technologies for teaching	21
	Use of the most up-to-date information and communication technology in green conferences	22
	Easy access for teachers and students to the internet in teaching and learning activities in the green field	57
	Revision of course syllabus based on new technologies	58
Theme 8: Internship Standards		Code
Concepts	Adaptation of the internship period to modern green education theories	23
	The allocation of adequate time to students' field activities in green internships	24
	Dynamic interaction between technical and vocational schools and industry	25
	Establishing successive workshops for troubleshooting during the green internship	59
	Holding virtual retraining courses for graduates of technical and vocational schools	60
	Increasing the specialized and general competencies of technical coaches	61
Theme 9: Continuous engagement with scientific and research centers		Code
Concepts	Promotion of professional knowledge and teacher skills with continuous training and in-service training in the area of green curriculum	26
	Providing scientific opportunities with environmental attitudes by powerful managers for teachers	27
	Provide decision making opportunities for teachers and students	28
	Continuous interaction of technical and vocational schools with environmental advocacy organizations and experts	64
	Concentrate on national and international conferences with a green approach	65
	Conducting scientific meetings for the transmission of up-to-date information with other scientific centers	66
Theme 10: Teachers' Participation in Green Curriculum Design Activities		Code
Concepts	Motivate teachers to work and participate in creating a green curriculum	29
	Attention to land design in green curriculum design	30
	Observation of scientific developments of technical and vocational education by teachers	31
	Participation of students and teachers in green curriculum design	67

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	Teachers' participation in leading a curriculum towards promoting students' knowledge, attitudes and research spiritual in the green area	68
	The participation of teachers in the production of electronic content	69
Theme 11: evaluation methods		Code
Concepts	Evaluation of students' performance in the green area using the checklist	62
	Evaluation of students by observing their performance in different situations	63
	Evaluating green skills of trainees through individual and group projects	71
	Continuous evaluation of green curriculum by receiving feedback from student activities in the green field	32
	Self-centered evaluation with student participation	33
Theme 12: learners' characteristics		Code
Concepts	The motivation of learners to learn green lessons	48
	Attitudes of learners to environmental protection	49
	Considering environmental protection as a value	50
	The individual capabilities of students in the green field	51
Theme 13: Facilitating factors		Code
Concepts	Qualified senior management support	72
	The structure of technical and vocational training centers	73
	Applying qualified and trained teachers	74
Theme 14: barriers		Code
Concepts	Lack of managerial support	75
	Value barriers	76
	Legal barriers	77
Theme 15: Educational outcomes		Code
Concepts	Generate effective green content	78
	Use the best teaching methods in green education	79
	Promoting knowledge of teachers in the field of green	80
Theme 16: Fosterage outcomes		Code
Concepts	Increasing the level of knowledge of apprentices with an environmental approach	81
	Promoting trainees' professional competencies with a green economy approach	82
	Promoting environmental protection by students	83
Theme 17: Economic outcomes		Code
Concepts	Entry into the green labor market and employment of skilled learners	84
	Elaboration of skilled labor force in the field of environmental protection	85
	Increase productivity	86

Axial coding: In this research, axial coding is done based on the use of the paradigm pattern (Fig. 1). Therefore, sub-categories are associated with the main categorization according to the paradigm pattern, which is depicted in Fig. 2. And the main goal is to enable the researcher to systematically think about data and associate them (Creswell, 2005).

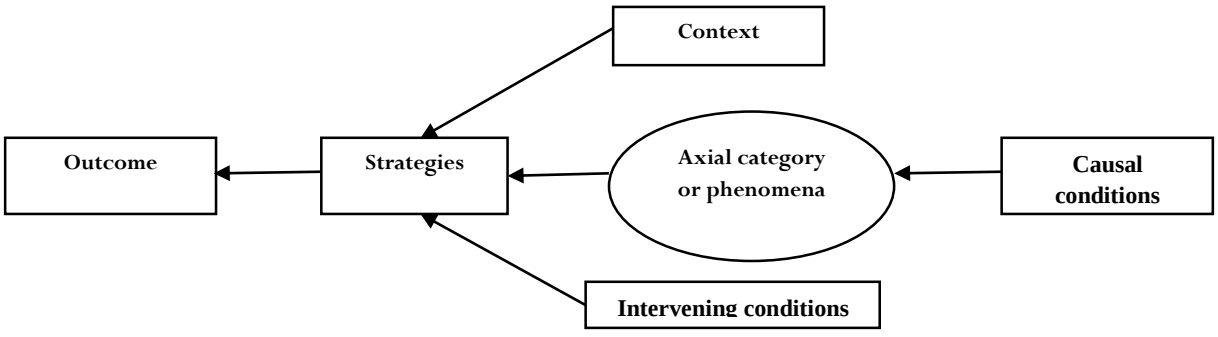

Figure 2. Paradigm pattern (Creswell, 2005)

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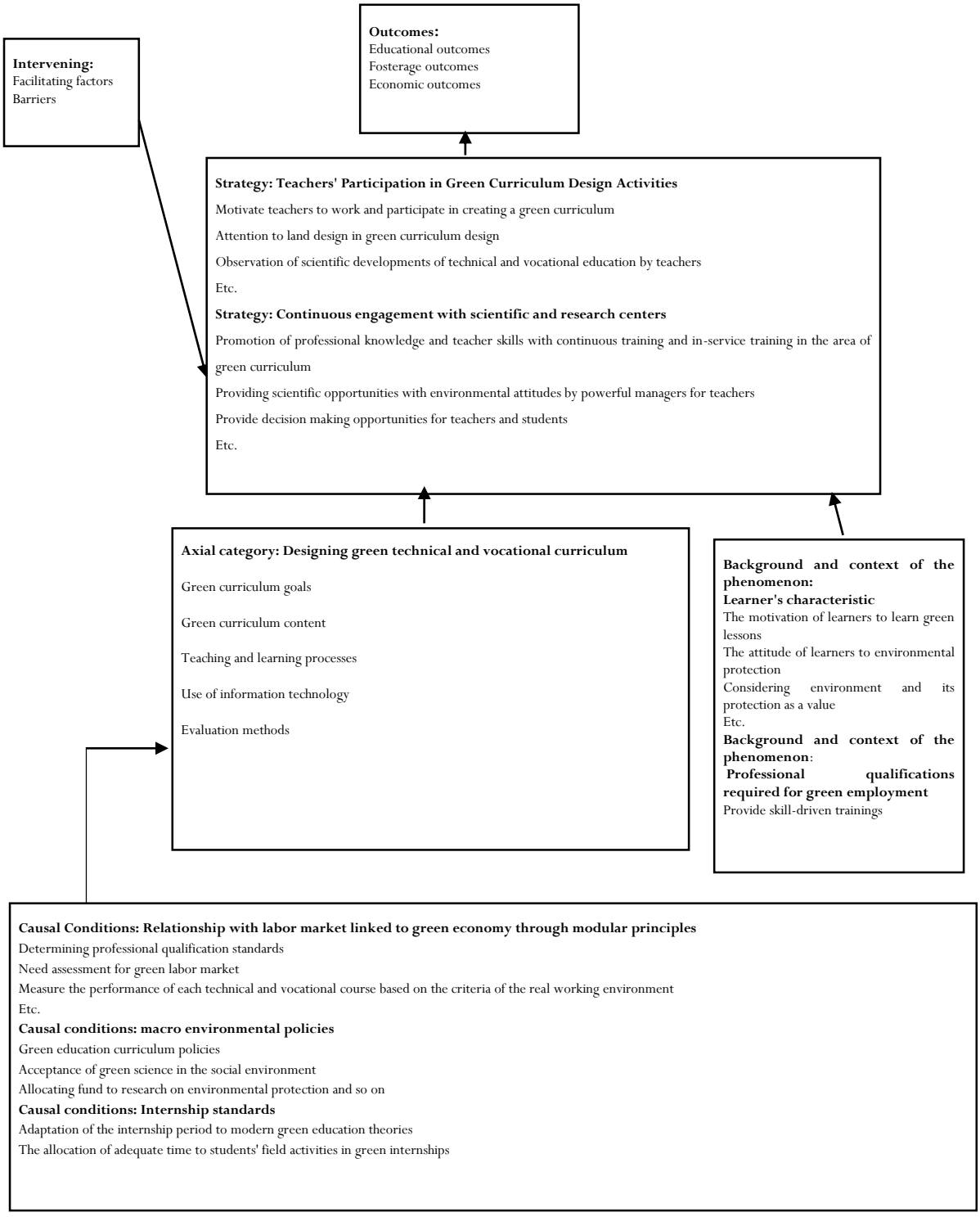

Figure 3. Relationship between different categories identified in the paradigm pattern

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4. Findings

What are the causal conditions affecting the design of the curriculum of green technical and vocational education in high school in Iran? Causal conditions create and develop an axial phenomenon or category. Among the existing categories, "macro environmental policies" and "relationship with the labor market linked to the green economy through the modular principles", "internship standards" are considered as causal factors that play an active role in the curriculum design for green technical and vocational secondary education in Iran. As far as these factors are not achieved, the green curriculum will not be realized.

Research question number two: What are the effective strategies for designing curriculum for green technical and vocational education in Iran? Actions and interactions represent the intended behaviors, activities, and interactions that are taken in response to the axial category and are influenced by the intervening conditions. These categories are also called strategy. In the present study, teachers' participation in green curriculum design activities and continuous engagement with scientific and research centers are strategies.

Research question number three: What is the context required for curriculum design for green technical and vocational education in Iran? A specific condition that affects actions and interactions is called a context. These conditions are a set of concepts, categories, or underlying variables. In the proposed model: the characteristics of adopters and the adaptation of industry needs to competencies obtained in technical and vocational institutes are contexts.

Research question number four: What are intervening factors affecting the design of curriculum of technical and vocational education in high school in Iran? Intervener conditions are factors that contribute to the implementation of the curriculum of secondary technical vocational education in Iran. The factors that play the facilitator role in the curriculum design for the green technical and vocational secondary education in Iran include senior managers' support, the structure of technical and vocational training centers, and trained couches. Also, barriers, lack of managerial support, value barriers and legal barriers are obstacles to the design of green technical and vocational curricula.

Research question number five: What are the outcomes of green technical and vocational secondary education curriculum design in Iran? Some categories represent the results and consequences that result from the adoption of strategies. In the present study, the results of the decision-making process include the educational, fosterage and economic outcomes, the result of the actions and interactions that have been made and affected by causal conditions, axial category, and the dominant context.

Research question number six: What are the characteristics of green technical and vocational secondary education curriculum design in Iran? Considering that according to the designed model, "the design of green technical and vocational curriculum" has been considered as the basis and the main pillar of realization of green technical and vocational curriculum design in Iran, after collecting and analyzing the data in the open coding step and reviewing the features presented, the category of "green technical and vocational curriculum design" was selected as the axial category. Curriculum design includes green curriculum objectives, green curriculum content, teaching and learning processes, use of information technology, and evaluation methods.

Research question number seven: What is the optimal pattern of green technical and vocational curriculum design in high school? The optimal design pattern is depicted in Figure 2.4. as "axial coding based on the paradigm pattern."

In the selective coding stage, the relationship between the design criteria is determined in the form of a narrative analysis (Bozorgnejad and Sharifzadeh, 2016). Based on this, "design of green technical and vocational curriculum," as the axial category, is realized based on the context of causal factors of "macro environmental policies," "relationship with the green labor market linked to the green economy through modular principles" and internship standards through the principles of "teacher participation in the design of green curriculum" and "continuous engagement with scientific and research centers" taking into account

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"learners' characteristics" and "professional qualifications required for green employment (as the background of the model)." Therefore, it will lead to the realization of "educational and economic consequences".

5. Discussion

In creating a green technical vocational training system, attention should be paid to the fact that the development process in this kind of system should be created in such a way that new educational concepts are welcomed. The curriculum of technical vocational training should address the requirements of the course title. In addition, based on the need of the labor market and the workplace, it should provide the trainee the ability that the person can understand and apply new subjects and changes in the workplace in his or her profession (Baqadir et al., 2011). The technical and vocational capacity can be used to prevent the environmental pollution problem as green technical and vocational education. The aim of creating green jobs is striving for sustainable development, opportunities for staff and social learning in the green economy. With the development of environmental problems, job positions also significantly decrease. The research shows that contrary to the old theory of the need to spend a high cost on environmental protection and pollutants' reduction, technical and vocational education in the green economy is not only an expense, but also an economic benefit that creates new and expanding labor markets. This preservation and expansion of the current environmental conditions of the present pollution leads to the deaths and abandonment of industrial units and widespread unemployment. Technical and vocational education is one of the most powerful tools in this problem. Curriculum design indicators for green technical and vocational training are identified through interviews with curriculum and environmental experts.

The green technical and vocational education curriculum design has two sections of main components and their indicators. The green technical and vocational education curriculum has 17 main factors, including 86 indicators that make up them. Table 4 illustrates the main factors and number of indicators for green technical and vocational education curriculum design in the final model.

Table 2. The main factors and indicators of green technical and vocational education curriculum

Main factors	No. of indices
Factor 1: Macro environmental policies	5
Factor 2: Green curriculum content	10
Factor 3: Relationship with the green labor market linked to modular principles	5
Factor 4: Green curriculum goals	6
Factor 5: Teaching and learning processes	10
Factor 6: Professional qualifications required for green employment	4
Factor 7: Use of information technology	5
Factor 8: Internship standards	6
Factor 9: Continuous interaction with scientific and research centers	6
Factor 10: Teachers' participation in green curriculum design activities	6
Factor 11: Evaluation methods	5
Factor 12: Learners' characteristics	4
Factor 13: Facilitating factors	3
Factor 14: Barriers	3
Factor 15: Educational outcomes	3
Factor 16: Fosterage outcomes	3
Factor 17: Economic outcomes	3

In the proposed pattern, there are relationships between the different categories identified in the form of the communicative paradigm, according to which some categories are considered as axial categories, some as intervening and causal conditions, some as action and interaction, and some as the dominant context and consequences. The present study was carried out considering the importance and the lack of academic studies

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on green technical and vocational education curriculum design. Therefore, the most important features of green technical and vocational education curriculum design are: 1) A qualitative method with grounded theory approach has been used for green technical and vocational education curriculum design. 2) The specificity of this template for technical and vocational centers. 3) Explaining the relationship between the factors and indicators of green technical and vocational education curriculum design and investigating the status of its application.

The findings of this research are in line with the studies of Habibi et al. (2017), Parishani et al. (2016), Azizi et al (2013), Taghiyeh et al. (2012), Abdolahi and Sadeghi (2012), Tahrkhani (2009), Tansel (2008) , Oguz et al. (2010), Foo (2013), Mustapha (2016), Knibb and Paci (2016), Yapin et al. (2017), and Chakraborty et al. (2018). In this research, the dimension of green technical and vocational education curriculum design is also highlighted.

Considering the growing problems of human societies such as drought, environmental pollution, poverty, and unemployment, achieving efficient solutions is one of the important concerns of the authorities of the countries, including the developing countries. The importance of human capital has a special place in all economic developments of human history. Solving these problems will certainly be possible with the workforce, having effective knowledge in problem solving. One of the training courses that, given its ability and flexibility, has an effective role in solving the problems of human society is the technical and vocational training course. UNICEF defines vocational and technical education as a learning process perspective that in addition to comprehensive education, includes technology education, related sciences, technical skills, academic performance, and their relationship to business and social life. The role of the technical and vocational system in the elimination of the educational system's deficiencies in dealing with the labor market and its complexities and the creation of sustainable development in each country has been shown repeatedly in different countries such as South Korea, Chile and Ireland. Using this kind of educational (green technical and vocational) system, it tried to eliminate two social problems simultaneously. These two problems are related to the problems caused by air pollution and the resulting adverse changes and the use of the industry's labor market in a new economy called the green economy.

In another definition, green job is a desirable job which, while producing goods and services, reduces energy consumption, raw materials and water, as well as minimizes pollution, and preserves the quality of the environment, and finally leads the economy and enterprises towards sustainable development. The goal of creating green jobs is to strive for sustainable development, opportunities for staff and social learning in the field of green economy. The transition to low-carbon and sustainable development will bring about changes in the labor market and demand for new skills and skills restructuring programs, and will focus more on social security, financial planning and business creation. Creating new training courses requires curriculum design and creation of curriculum documents.

Any educational process that does not have a strategic attitude, is resistant to change, and is not reviewed, faces its audience with a declining trend instead of directing them to excellence systems, and fails to respond to the needs of the community (Hatami et al., 2016).

In this research, green technical and vocational education curriculum design with environmental considerations can be used to train the workforce needed for anti-drought and environmental pollution projects.

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