

Identifying the components and presenting the curriculum model based on increasing environmental Literacy of first stage of secondary schools students in Varamin city

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Abstract

Research methodology is practical in terms of purpose; it was descriptive-survey in terms of data collection method, and it was a compound (qualitative - quantitative) of exploratory type in terms of data type. The statistical population of the qualitative part of the research was the experts of the academic scientific community and experts, and in the quantitative part, statistical population included the teachers and experts of the first stage of secondary school of Varamin city. The sample size in the qualitative section was determined 10 people by the non-probability sampling method and snowball and the principle of theoretical saturation and 229 people for quantitative section using the Cochran's formula and multi-stage random sampling method. The data collection tool was a semi-structured interview in the qualitative section and a researcher-made questionnaire in the quantitative section. The triangulation method was used to ensure the validity of the interview and the re-coding method was used to ensure the reliability of interview and the content and structure validity was used to validate part of the experts' point of view, and Cronbach's alpha reliability coefficient was used to measure the reliability of the interview. The method of data analysis in the qualitative part is based on grounded theory based on content analysis. Exploratory factor analysis and One-Sample T-tests were used in the quantitative section of the research. The results showed that the components of the curriculum based on increasing students' environmental literacy include environmental goals, content of environmental issues, teaching and learning methods of environmental issues and environmental assessment methods.

Keywords: curriculum planning, environmental Literacy, including goals and content and teaching and learning methods and environmental assessment methods, first stage of secondary schools

1. Introduction

After the 1970s, especially after the advent of the Internet, the concept of literacy has changed in general and have emerged concepts such as information literacy, statistical literacy, media literacy, environmental literacy, etc. These concepts have been considered in two ways. The first is that they make the practical dimensions of knowledge more prominent, and the second is that they show human beings of the third millennium age look at life and the world with a more problematic view than before (Pourmasoom et al., 2016).

In 1968, Charles E. Roth, known as the father of environmental Literacy, first raised the term "environmental literacy". In 1992, he wrote a book on the roots, evolution, current state, and perspectives of environmental Literacy and declared environmental Literacy in its broadest

sense, the growth of awareness, the acquisition of new perspectives, values, attitudes, skills, and behaviors in the form of formal and informal processes for achieving a sustainable environment. Environmental education experts and planners around the world believe that the main problem with the environment is the low level of public awareness and attitudes about the environment and the lack of information about it. Students in schools play the role of ambassadors who carry these environmental teachings with them to family and community. Therefore, attention to environmental education and environmental literacy is considered as a basic need of the 21st century (Aghayari et al., 2016).

The World Commission on Environment and Development considers sustainable development to meet the needs of the present generation without compromising the ability of the next generation to meet their needs. This development has three dimensions: human, environment and future. Therefore, sustainable development requires development without creating environmental problems.

Sigrid Hunke et al. (2001) consider educating people to be the best way to reduce environmental problems. Achieving this goal globally for all ages through formal and informal education systems and applying the knowledge and methods of all disciplines through awareness, knowledge, attitude, skills and participation should be the basic guide for developing an environmental curriculum (Sarabi et al., 2020).

The purpose of environmental education is to raise awareness of the environmental information of each individual so that the person understands the values of the environment and is diligent in protecting it and supports it by thinking and meditating on biological processes. On the other hand, changes in lifestyle have separated children from daily experiences and connections with the natural world, and schools are a place to re-establish this connection and understand the mutual occasions and relationships between man and nature. (Curdt-Christiansen, 2020).

- In environmental education, such goals should be considered (Ghaemi et al., 2014):
- Considering the environment as a common heritage of human beings;
- The role of the common task of maintaining, protecting and improving the quality of the environment in protecting public health and maintaining ecological balance;
- Utilization of natural resources in a prudent and rational way;
- The way each person behaves, especially as a consumer, in order to contribute to the preservation of the environment.

UNESCO cites environmental literacy as the most vital type of literacy, environmental Literacy is defined as the ability to receive knowledge from nature, to understand the basic principles of ecology and to live in harmony with these principles. (Tharasook, et al, 2020) The following framework for environmental literacy is defined by the North American Environmental Educators Association:

An environmental literate is someone who, individually and in groups with others, makes informed decisions about the environment, and is ready to act on this decision to improve the well-being of other individuals, communities and the environment of the world; and participate in civic life. The processes that underlie awareness and environmental literacy are divided into different degrees:

- Extensive knowledge and understanding of environmental concepts, issues, and issues
- A set of cognitive and sensory tendencies
- A set of skills Cognitive abilities

Behavioral strategies are appropriate for applying such knowledge and perceptions in order to create harmony and make effective decisions in a wide range of environmental contexts (). The most important areas that an environmental literate should be aware of are: Air, Climate, Ecosystems, Energy, Environment and Society, Food, Land Management - Effective and Sustainable Land Use (Curdt-Christiansen, 2020).

environmental Literacy encompasses a variety of components of knowledge and Understanding a wide range of environmental concepts, problems and issues, a set of value and emotional dimensions, a set of cognitive skills and abilities and appropriate behavioural strategies for applying it and making effective decisions in a wide range of environmental contexts, and one must know how to use one's abilities to make changes in society, to make others aware, and to make informed judgments and decisions (Saribas, et al., 2017).

The following ladder describes the five essential pillars of environmental Literacy:

The design of this ladder is a hierarchy from simple to complex that you can go through step by step: Awareness, knowledge and deep understanding, tendency and sensitivity, learning skills and action. Of course, when you step in, you will see that these stages have overlaps in real life. The various aspects of environmental education (And related disciplines such as social marketing) are devoted to the various stages of this ladder, and this leaves us with slight confusion as to what exactly is environmental education. Another important point is that environmental education will not be achieved without going through all these steps; Climbing a ladder and reaching the end is not just one step, and we cannot tell an environmentally literate person.(Seraji and ghamari .Wafa, 2016) Being literate in its broadest form, means to having knowledge or expertise. When we bring this concept to the field of environment, according to the definitions of the North American Environmental Education Association, knowledge and expertise include the following points, 2017 (Saltan & Divarci):

- Understanding the earth as a biological system and living environment includes humans and human societies within it.
- Understanding the ideals, principles, and experiences of citizenship in order to participate in solving environmental issues.
- Having the motivation and ability to act, an understanding of what people can do to make a difference, and in short: understanding, problem solving, civil partnership and action.

Expanding environmental Literacy includes activities such as taking school children on a nature walk with a naturalist and nature lover or attending a family tree party. It may also involve setting up joint work on site and sharing equipment and resources available in all neighbors' homes. Sharing items in place will help keep consumption good.

Maurer & Bogner (2020) conducted a study entitled "Modeling Environmental Literacy with regard to Environmental Knowledge" in which they argued that Environmental Literacy is tied to Environmental Knowledge, and, in fact, Environmental knowledge is one of the main factors of environmental Literacy.

ZHENG, et al (2020) conducted a study entitled "The Impact of Environmental Education on Environmental Literacy". The results showed that environmental education is necessary in today's world and in this study it was found that appropriate education has a significant effect on improving students' media literacy.

Valipour and Farrokhian (2019), Conducted a study entitled "The effect of environmental education on environmental awareness, attitude and behaviour in high school girls (Case Study: District 4 of Ahvaz) "Findings obtained by comparing the three levels of attitude, knowledge and behaviour of the control and experimental groups showed that there was no significant difference between the means of the two groups before the educational intervention. But after the educational intervention, there was a significant difference in students' knowledge, attitude and behavior.

Khajavi et al. (2019) also conducted a study entitled "Comparative study of environmental education in the curriculum of primary school in Iran and selected countries." This study was done to make a comparative study of environmental education in the elementary school curriculum of Iran with the curriculum of selected countries, based on four elements: purpose, content, teaching methods and evaluation methods. This research is a qualitative and comparative research that has used Bereday model (George Z. F. Bereday (1920-1983)) to compare research data. The statistical population included all countries on five continents, from which the five countries of the United States, Britain, Canada, Australia and Iran were selected as a sample by purposive sampling. The most important documents related to environmental education were collected through databases of selected countries and library resources and then analyzed by the four-step Bereday method. The findings indicated that the objectives and content of Iran's environmental education curriculum are well explained and do not differ much from the objectives and content of the environmental education curriculum in selected countries. Also, the use of teaching methods of simulation, brainstorming and multimedia resources and ICT (Information and Communication Technology) has been neglected. In addition, the use of diagnostic evaluation methods and standardized tests in Iran's primary education curriculum has been neglected.

Mashaallahinejad et al. (2019), in a study, analyzed the content of the elementary school textbook from the perspective of environmental components. Findings showed that the books pay the most attention to environmental education according to the five Environmental education, respectively, related to question and analysis and then to the knowledge of natural processes and systems, environmental skills and personal and civic responsibility standards and do not pay attention to teaching action and decision making skills.

Pourmasoom et al. (2017) also conducted a study aimed at forming children's environmental literacy based on strategic curriculum, multidimensional planning and multimedia learning package. Findings of the study According to the analysis and Quantitative and qualitative documents and review of the education process and its quality and the author's continuous presence in the educational centres of Alborz province showed that children have achieved such literacy that shows their attachment to all living and non-living factors of the earth and their active participation in environmental protection.

Mazlounian and Salehi (2015), in a study entitled "The role of environmental tourism literacy in environmental protection and tourism attraction Case study: Darab city", stated that the tourism industry is the largest and most diverse industry in the world. The success of any country in attracting tourists depends on maintaining its competitiveness in attracting

tourists. The connection between the environment and tourism is very close, because the environment itself is an attraction for tourists. Such an approach has raised concerns about environmental degradation. In general, human beings, through their actions and behavior, can both cause the destruction of nature and the environment, and can also use their technical principles and science and knowledge to cause biodiversity, vegetation and forests. Environmental protection means the optimal use of the environment so that it can maintain its quality in terms of human life. In this regard, environmental Literacy is basic practical training for all tourists that provides them with basic knowledge, skills and motivation to be able to meet their environmental needs, and contribute to sustainable development by improving economic power by providing services to tourists. The development of environmental literacy is a major task for us as a community, which ultimately leads to an increase in knowledge and a positive attitude and responsible attitude towards environmental protection.

Approaches to environmental education are complex and include resources, time, space, curriculum, student characteristics, and a wide range of factors that can affect any type of applied education. (Winther et al, 2010). In many countries of the world, there are fully operational programs in the form of environmental curriculum training packages, all of which provide interdisciplinary programs. One of them is the creation of green schools in educational systems.

The International Green School Program was started in 1994 by the International Foundation for Environmental Education. This program is planned with the aim of educating the environment in the official system of the country in seven stages and based on the guidelines of environmental management (ISO 14001). According to which a wide range of stakeholders, including principals, teachers, families, students and school parents, are trained with a focus on students. Finally, member schools will receive a special Green School flag after completing the seven phases of the program.

Despite the establishment of a green management system in the country, the practical implementation of green schools in Iran was relatively late. During this period, the Environment and Sustainable Development Headquarters of Tehran Municipality, in cooperation with Setareh Sabz Jahan Company, which is a non-governmental organization, implemented an environmental education project in schools (Green School). Finally, after several reviews in the [Foundation for Environmental Education (FEE)], in March 2009 he was elected as the 69th member of the foundation. (Shobeyri & meybodi, 2013). Currently, there are green schools in Iran that go through the approval process through Setareh Sabz Jahan Company and receive certification as ecological schools. But according to available statistics, energy consumption in Iran is more than five times the average growth of energy consumption in the world (Statistics of the Energy Efficiency Organization of Iran). On the other hand, a large part of the existing environmental problems is rooted in the lack of necessary awareness and cultural weakness in the relationship between man and nature and is in fact a kind of cultural problem; therefore, it requires national and international determination for policy-making in the field of environmental education and culture. Policy-making in environmental education is considered as one of the branches of public policy-making in the government and a legal-political tool for managing educational issues in the field of the environment. So there is no doubt that optimizing energy consumption can be a great help to the growth and development of our country. Also, the study of the situation of

our graduates after leaving the education system, which is often considered as the input of other social, political and economic systems of society, shows that they do not have the necessary and expected capabilities and skills. (Environmental thinking, environmental behaviour, problem-solving, environmental initiatives and innovations, environmental responsibility and participation, etc.), and can be said that education has not been able to create these necessary abilities to respond to society in students and most of the problems and shortcomings of other social systems in the country are also rooted in these cases.

(Jahaniyan, 2008)

Evidence also shows that research on indoor environmental education has analyzed the content and compared the three areas of cognition, value and skill in the content of textbooks. Evidence also shows that research on indoor environmental education has analyzed the content and compared the three areas of cognition, value and skill in the content of textbooks. Therefore, considering the importance of the subject of this research with the general question "What are the components of the curriculum based on increasing environmental literacy in junior high schools?"

Therefore, considering the importance of the subject of this research with the general question "What are the components of the curriculum based on increasing environmental literacy in junior high schools?"

- 1- What are the components of the curriculum based on increasing environmental literacy?
2. What is the status of each component of the curriculum based on increasing environmental literacy in first stage of secondary schools?
- 3- What are the effects and consequences of the curriculum based on increasing environmental literacy in schools?
4. What curriculum model based on increasing environmental literacy can be offered in first stage of secondary schools?

2. Materials and methods

Considering that the subject of this study was to identify the components of the curriculum based on increasing environmental literacy of first stage of secondary school students in Varamin, the research method was practical in terms of purpose. It was a descriptive survey in terms of the data collection method, and it was mixed (qualitative-quantitative) exploratory in terms of data type.

Statistical population, sample size and sampling method

The statistical population of the qualitative part of the research was the experts of the academic community and experts, who have executive records at decision-making levels and are so-called knowledgeable experts; the sample size in the qualitative part was selected using the targeted method and snowball. Also, in the quantitative section, the statistical population, including teachers and experts of the first stage of secondary school of Varamin city, consisted the academic year 2020-2021, whose number is 569 people and including 303 women and 266 men. Using the sampling volume formula from limited communities (Cochran's formula); the number of samples was determined to be 229.

Data Collection tools

Qualitative research tools included semi-structured interviews that were used to answer the question of identifying the main components of the research and its indicators. In the quantitative section of the research, a researcher-made questionnaire was used as research tool, which was compiled by reviewing the theoretical and practical foundations as well as the results of exploratory interviews (with open and pivotal coding of exploratory interview texts).

Validity and reliability of research tools

Validity: content validity method was used to determine the validity of the questionnaire used in this study. Therefore, the questionnaire developed in this research was provided to the relevant experts and their opinions were obtained to better obtain the validity and make the desired corrections. In addition to content validity, construct validity was also used to assess the validity of the questionnaire. The results of exploratory factor analysis were used to this end, which showed the validity of the tool structure.

Reliability: In this study, test-retest reliability and intra-thematic agreement method were used to calculate the reliability of the interviews conducted. To calculate the reliability of the Test-Retest, several interviews were selected as a sample from each of the interviews, and each of them was coded twice in a short and specific time interval. The codes were then compared at two time intervals for each interview, which showed that the test-retest was appropriate. Also, to calculate the reliability of the interview with the inter-subject agreement method (Inter coder reliability (ICR), one of the professors of educational management familiar with coding was asked to participate in the research as a secondary coder. The researcher then coded three interviews with this research colleague and calculated the percentage of agreement within the topic that is used as an indicator of the reliability of the analysis. The reliability of the two coders was obtained according to the calculations of 82.8, which indicates its suitability. Also, after confirming the content validity and structure of the research tool, in order to ensure the reliability of the questionnaire, it was performed on a sample of 30 people from the statistical population and the data were analyzed using two methods (alpha coefficient and retest). The results showed the reliability of the questionnaire, which can be seen in the table above.

Data analysis methods

The method of data analysis in the qualitative part of the theoretical coding was derived from the method of data theorizing of the foundation; also in the quantitative section, data analysis was performed using descriptive and inferential statistics (Exploratory factor analysis and One-Sample T-Test). It should be noted that the Spss22software was used in this study.

3. Results and discussion

In this section, research data are analyzed and evaluated using scientific methods. Given that the research is of the mixed type. Data analysis consists of two parts: qualitative data analysis and quantitative data analysis. In the following, the content of the interview data is analyzed.

Qualitative data analysis

The answers to the interview questions were analyzed in order to identify the components of the curriculum based on increasing environmental literacy of junior high school students in Varamin city in the form of identified codes based on the opinion of experts. The results of this section showed that the components of environmental objectives, environmental content, teaching and learning methods of environmental issues and environmental evaluation are the dimensions of the environmental Literacy curriculum. The following table shows these dimensions separately:

Table 1: Dimensions of the environmental curriculum

Structure	dimension	Number of indicators
Curriculum based on increasing environmental Literacy	Environmental goals	14
	Environmental content	12
	Methods of teaching and learning environmental issues	10
	Environmental assessment	12

Quantitative data analysis

In this section, quantitative data analysis is performed using SPSS 22 software. Based on the results of the qualitative part of the research in relation to the concept of the curriculum based on increasing environmental literacy, 48 indicators were identified and after reviewing the content validity by CVR and CVI forms, all indicators were confirmed. In the following, the exploratory factor analysis of these indicators is discussed. Based on the results of content quality and validity, exploratory factor analysis was performed on 48 identified indicators. Index subscription table showed that no index was deleted because subscriptions for all indices were above 0.5.

In the table below, the explanation of the total variance can be seen.

Table 2 - Explanation of variance

Agents	Initial eigenvalues			Total square, Number of times extracted			Total square of rotated loads		
	Total	Variance	cumulative percentage	Total	Variance	cumulative percentage	Total	Variance	cumulative percentage
1	4.5605	33.78148	33.78	4.5605	33.78	33.78	1.886	6.985	6.985
2	1.339	9.918	43.698	1.339	9.918	43.698	1.803	6.678	13.6625
3	1.0065	7.454	51.152	1.0065	7.454	51.152	1.7185	6.365	51.152
4	0.934	6.918	58.07	1.0036	5.786	59.273	1.7069	6.257	59.268
5	0.7925	5.87	63.94						
6	0.5095	3.773	67.713						
7	0.4345	3.22	70.933						
8	0.3785	2.804	73.737						
9	0.3355	2.487	76.224						
10	0.322	2.387	78.611						
...									
27	0.0685	0.508	100						

In the table above, the first 4 components have eigenvalues greater than one and remain in the analysis. These factors, up to about 51%, explain the variance of curriculum indicators based on increasing environmental literacy.

The scree plot also showed the above results.

In the matrix table of rotating factors, the indicators related to each of the components of the curriculum based on increasing environmental literacy were given.

What is the current state of the curriculum based on increasing environmental literacy?

One Sample T-Test was used to test the above hypothesis, considering that the distance measurement scale was considered and the data distribution was normal. Also, considering that the scale is five degrees, the numerical value was considered to be 3 compared to the T statistic. The result of the One-Sample T-Test is given in the table below.

Table 3- One Sample T-Test to check the current status

Component	Test value = 3					
	T	Degrees of freedom	of <i>Level</i> Significance	Mean Deviation	confidence interval 95% From the dispute	
					Lower Limit	Upper limit
Targets	15.868	399	0.000	0.609	0.534	0.685
	-13.384	399	0.000	-0.455	-0.522	-0.388
	-16.931	399	0.000	-0.751	-0.838	-0.664
	-18.023	399	0.000	-0.605	-0.671	-0.539
Content	13.036	399	0.000	0.747	0.634	0.859
	-15.060	399	0.000	-0.651	-0.736	-0.566
	-8.267	399	0.000	-0.413	-0.511	-0.315
Teaching and learning methods	-15.331	399	0.000	-0.604	-0.681	-0.526
	13.750	399	0.000	0.676	0.579	0.773
	11.846	399	0.000	0.691	0.577	0.806
	13.945	399	0.000	0.673	0.578	0.768
	13.383	399	0.000	0.614	0.524	0.704

As can be seen in the table above, the level of significance in all components is less than one hundredth and therefore the null hypothesis is rejected with 99% confidence and the research hypothesis is confirmed. For the variables of environmental goals, content of environmental issues, methods of teaching and learning and environmental evaluation, the mean difference is negative, which indicates that the status of these variables is in an unfavorable state. But for the other variables, the positive mean difference indicates that they are in good condition.

Based on reviewing the theoretical foundations and identifying the components of the curriculum based on increasing environmental literacy, the curriculum model based on increasing environmental literacy can be drawn as follows.

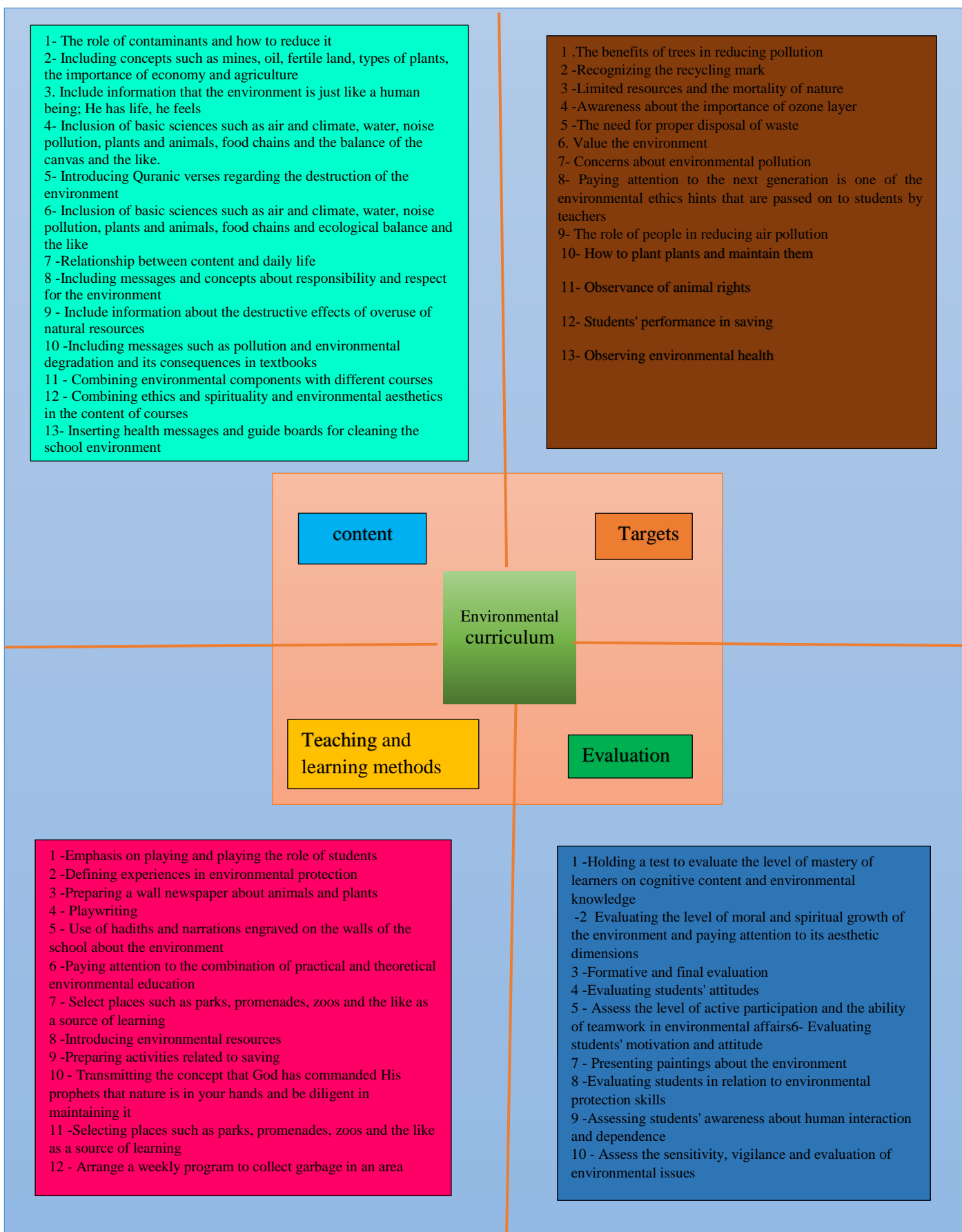


Figure 1. Curriculum model based on increasing environmental Literacy

4. Discussion and conclusion

This study was done to identify the components and present a curriculum model based on increasing environmental literacy of junior high school students in Varamin. Therefore, first, the dimensions and components of the curriculum based on increasing students' environmental literacy were identified, and then, the current status of the identified variables was examined.

The results of the study showed that the dimensions of the curriculum based on increasing environmental literacy of first grade high school students in Varamin city include environmental goals, content of environmental issues and methods of teaching and learning environmental issues and environmental assessment.

It should be noted that today the environment is exposed to serious threats globally and nationally, and the changes that humans make in the environment, and irresponsibility and ignorance about environmental issues, have caused many problems in the environment and its adverse effects are increasing. Therefore, having citizens with environmental literacy is an undeniable necessity. One of the most important ways to achieve environmental Literacy is environmental education, which plays a key role in the formal and informal education sectors. Environmental education is a teaching process that connects the natural and man-made elements of the human mind to each other and to various disciplines. One of the most important institutions that can train people with environmental literacy by creating and developing curricula in the field of environment is education.

According to the theoretical foundations of the curriculum based on environmental literacy, high school students should first increase their knowledge of the environment, and then change their attitude and this issue should be reflected in their behavior and then change their attitude in their performance.

High school students are studying at a time when the world is full of environmental disasters, and it is feared that if humans do not pay attention to the environment, it will soon be destroyed, leaving future generations virtually useless. On the other hand, High school is close to entering college or the job market, and students need to apply the skills of using and preserving the environment properly in their job and field, so it is a good time to teach environmental literacy. Students receive the necessary knowledge and training in their curriculum but do not apply it in real life. In addition, the observed behaviors indicate that students have not changed their behavior based on the content taught and that the environment is still not a priority in their lives. Consequently, environmental ethics is not taken into account. In other words, high school students have become people who have the knowledge necessary to distinguish between good and bad things, but do not use this knowledge, and touch it only with beautiful words in their books.

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