MODESTUM

Research Paper

The Decision-Making Ability of 10th Grade Students in an Arab Community in Israel to Preserve Sea Turtles

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Abstract

This study examined Arab high-school students' decision-making ability (their cognitive level) regarding a sea turtle conservation issue in relation to three independent variables: the proximity of their residence to the sea, the type of residence (city or village), and their gender. The study population consisted of tenth-grade students in high schools from the Arab sector: from urban localities, rural localities, localities close to the sea, and localities far from the sea.

The main findings of the study are as follows: (1) The average Arab student's decision-making ability is low. Most Arab students were found to have a low cognitive level. (2) A clear difference exists between students from localities close to the sea and those far from the sea. Students from localities close to the sea had greater decision-making ability. (3) A clear difference exists between students from urban localities and those from rural localities. Students from urban areas had more decision-making ability. A significant difference exists between boys and girls: girls had more decision-making ability.

The main conclusion from the study is that the cognitive level of Arab students' decision-making ability in the context of sea turtle conservation is low. This finding indicates that traditional teaching in the Arab education system does not promote, develop, and improve this ability. Most of the time the teacher asks questions and is situated in the center of the activity. Students noted that their teachers tend to involve them in lessons, but not enough in class discussions.

Keywords: decision-making ability, 10th grade students, sea turtle conservation, Arab community in Israel

INTRODUCTION

The goals of education in the 21st century and the development of critical thinking have recently been on the educational agenda in various parts of the world. The new curriculum requires the development of thinking skills and personal abilities, combined with all areas of study including thinking strategies, problem solving, decision-making ability, creativity, information management, self-management ability (meta-cognition), and the ability to work collaboratively with others (Adair, 2007; Gallagher, 2011; Mettas, 2011).

Perkins and Wieman (2008) explained the importance of developing thinking based on examples from everyday life: We want young people and adults to be actively thinking; this is critical when dealing with unfounded rumors, and their rationale should be used when solving a complex problem, or while arguing or listening to sweeping statements of politicians, for example.

Studying Sea Turtles as an Endangered Species

Many species of sea turtles are endangered; their numbers are shrinking because of people's unthinking

Contribution to the literature

- The study adopted the decision-making framework to teach students about sea turtles; thus, it adds to the literature regarding applying this framework for investigating students' knowledge on important environmental issues.
- The study is the first empirical study in the Arab sector that has examined students' ability to make decisions on environmental issues such as preservation of sea turtles and students' willingness to preserve the environment.
- This study investigates a society that constitutes a national minority and whose education system is integrated into the Israeli education system. Therefore, its findings have implications not only for Arab society in particular, but also for the State of Israel, in general, which is interested in the integration and assimilation of minority groups. In this way, the study will serve as a role model in multicultural countries around the world.

actions on shallow beaches and coastal waters, with devastating results regarding sea turtles' preservation. Therefore, environmental education programs are urgently needed to increase people's awareness and appreciation of sea turtles, and to teach about the possible harmful effects that human behavior can have on them. In such efforts, people should share ideas regarding making the right decisions about how they can help sea turtles and how they can reduce damage to them and increase their chances of survival (Swindall, Ober, Lamont, & Carthy, 2019a, 2019b).

Exposing students to scientific research that clarifies problems involving sea turtles increases students' understanding of them and their habitat needs and also increases students' willingness to contribute to and preserve the environment. Students were also evaluated on their understanding of how humans affect sea turtles, and were asked how often they engage in beneficial or harmful behaviors to sea turtles and what decisions they are willing to make in order to preserve their environment. Issues that can be addressed when teaching students about environmental problems regarding sea turtles and specific actions that should be taken for their conservation and preservation should be raised and appropriate decisions should be made (Swindall, Ober, Lamont, & Carthy, 2019a, 2019b).

Decision Making

Decision making is one of the major cognitive processes of human beings; it is important to develop students' awareness of socio-scientific issues, and their ability to make sound decisions. Particularly in the socio-scientific context of sustainable development, decision-making is required for information processing and for implementing sustainable actions; decision making is a key component in teaching and formal learning (Wang & Ruth, 2007; Zeidler et al., 2005)., Many of our decisions are made intuitively on a daily basis. Making these decisions is often unconscious, quick, and justified. Aside from making these sub-boundary decisions, certain decision-making situations require more conscious considerations. Decision making thus describes a rational process that leads to choosing a preferred option or acting on multiple alternatives based on specific criteria (Garrecht et al., 2018; Stefanou et al., 2004).

Decision making can be used as a separate or inclusive subject within environmental education study units; students should be taught how to decide on actions involving controversial environmental issues (Temel, Birol, Nas, Akpinar, & Tekin, 2015). Many studies have shown that environmental education goals are essential and not difficult to achieve. However, the gap between environmental awareness and everyday actions seems to be particularly large and highly dependent on personal factors; therefore, assessment of everyday environmental situations should be considered and different personal directions addressed (Altmeyer & Dreesmann, 2020).

One of the basic goals of environmental education is to equip students with the requisite skills to make more informed decisions on environmental issues by providing them with up-to-date information on a myriad of environmental issues and from a variety of scientific fields. To help students become better environmental decision-makers, educators need to incorporate decision-making lessons into curricula, which may help improve students' environmental decision-making skills (Arvai et al., 2004; Singh & Chaudhary, 2015).

In recent decades, teachers have been exposed to a wide range of teaching-learning methods aimed at further improving students' thinking abilities. Researchers and educators have developed teaching-learning programs that combine the development of thinking in the teaching of various subjects (Mahasneh et al., 2017). For example, *Raleigh* school, in the state of North Carolina (USA), has taught thinking skills to 7th grade students. The teacher, Rita Hijwick, participated in a program that dealt with integrating skilled thinking into the regular curriculum, and as a result, changed the way she taught in class. She began helping her students develop thinking skills and cognitive habits to improve their critical and creative skills, especially decision

making, by creating a Mind Map strategy. In this way, her students learn thinking strategies that will help them later in their daily life (Swartz, 2001).

Decision making is a long and ongoing process that begins with identifying, defining, and conceptualizing the problem; it ends with making a choice and taking responsibility for the results (Kurtam, Najmi, & Hugerat, 2011). It is seen as a process that leads to a commitment to action and a desire to create a desired outcome. Therefore, high cognitive abilities are required, which are essential in democratic societies, in which the active participation of enlightened citizens of a scientific, technological, and environmentally oriented society is required in the decision-making and problem-solving processes, regardless of their role or career in society (Zoller & Levy Nahum, 2012). For many years, the environmental discourse in Israel regarding nature conservation has been perceived as a luxury, especially when development and construction considerations had to take ecological constraints into account. In Israel, the level of consumption is constantly rising, a process that ensures a relatively high standard of living for a large part of the population. Manufacturing, which often produces air pollution to the point of endangering public health and increasing anthropogenic morbidity, has been associated with pollution and a negative lifestyle (Frumkin, Hanin, & Eidelman, 2004).

The Israeli curriculum in environmental sciences focuses on internalizing environmental values among students; this can lead to future changes, resource conservation, and sustainability. The curriculum also suggests incorporating research processes during learning. Learning through research enables the development of an in-depth understanding of the content while actively building the learners' knowledge. In the scientific research process, students face a complex process that involves performing many thinking skills such as understanding complex problems involving choosing solutions and making decisions that include a critical analysis of a research process (from sources of information), identification and formulation of a research problem, raising questions and formulating a research question, raising well-founded and reasoned hypotheses, exploration planning, making observations and conducting experiments, data processing and presentation, drawing conclusions; discussing the findings as well as representation of the research process and new knowledge acquired (Israeli Ministry of Education, 2007; Tal & Abramovitch, 2013).

Azaiza, Kortam, and Zoller (2009) noted that for many generations Arab society has been influenced by traditional environmental characteristics that stressed the importance of preserving water sources, air, natural resources, as well as the importance of pollution prevention and the preservation of flora and fauna. These aspects are considered important in order to provide education for sustainability and for preserving the environment.

Following the results of the 2009 PISA study (OECD (2010), decision-makers and policy-makers in education began to wonder why the Israeli education system was inferior to other education systems, and following the conclusions of a special international team, it was decided that students should soon be examined in areas such as decision making and crisis management. The way in which the Israeli students used problem solving in science shows that a large part of the failure in their methods of problem solving does not stem from their ignorance of the scientific content, but instead from insufficient experience with problem-solving processes in science. Decision making is an essential component in solving a problem; it arises from a gap between a given initial situation and the goal, and there is no one known and simple way to solve it. The main conclusion is that students' low decision-making ability stems from the low contribution of frontal (traditional) teaching in the sciences and teachers' failure to develop high cognitive abilities (Brandes & Strauss, 2013).

Previously reported research findings on young Arabs and the way in which problems have been solved in science indicate that their low level of problem solving is not due to a lack of knowledge of the scientific content, but rather, to improper experience in problem-solving processes, of which decision-making is an essential component (Azaiza et al., 2009; Kortam, Najame, & Hugerat, 2011). The decision-making process is one of the only processes in which the students are allowed to achieve personal expression and real involvement, which is an important driving force for further learning. The more correct, logical, and rational the decision-making process is, the more likely it is that the decisions that will be made will be correct (Nasir, Baba, & Antoine, 2006).

Preservation of Sea Turtles

The sea turtle is in danger of extinction; for many years sea turtles and their eggs have been harvested for food. However, the main threats to sea turtles include being trapped in fishing gear as well as marine pollution, and other factors such as urbanization, lighting on beaches, and global warming. Consequently, many plans have been proposed worldwide to protect sea turtles from extinction. Thus, conservation programs are necessary to restore and conserve their populations (Swindall, Ober, Lamont, & Carthy, 2019a).

In this study, an effort was made to promote the Sea Turtle Conservation Awareness Program and in an appealing way to expose students to this important environmental issue. To this end, students can read and respond to scientific literature about the actions needed to preserve sea turtles through proper environmental decision making.

Study Objective, the Research Questions, and Hypotheses

The main objective of this study is to investigate the ability of high-school students in the Arab sector to make decisions regarding environmental issues (sea turtle conservation) as well as to analyze how the sectoral characteristics of Arab society affect high-school students' decision-making regarding sea turtle conservation. For this purpose, two main *research questions* were formulated:

1. What are tenth-grade high-school students' cognitive ability levels regarding decision making in the context of sea turtle conservation?
2. Is there a difference in this ability, and to what extent between students from localities close to the sea and those far from the sea?
3. Is there a difference in this ability, and to what extent between students from urban localities and those from rural areas?
4. Is there a difference in this ability between girls and boys and to what extent?

Hypotheses

1. Differences will be found between students in their ability to make decisions regarding sea turtle conservation; thus, it is expected that most of them will have a low cognitive level regarding this ability.
2. Differences will be found between students from localities close to the sea and those far from the sea regarding their ability to make decisions. Thus, it is expected that students from localities close to the sea will have a higher ability to make decisions.
3. Differences will be found between students from urban localities and those from rural localities regarding their ability to make decisions. Thus, it is expected that this ability will be higher in the urban students.
4. Differences will be found between girls and boys regarding their ability to make decisions. Thus, it is expected that this ability will be higher in the girls.

METHODOLOGY

Sample

The study involved 210 tenth grade students from seven high schools from the Arab sector: 150 students live close to the sea (urban and rural), and 60 students live far from the sea (urban and rural). The schools have been described as institutions whose student population is heterogeneous academically and socio-economically. All selected students studied science according to the

Israeli curriculum. All the classes were from the northern parts of the country. One of the important considerations in choosing the research sample was to select schools from a locality located in the coastal plain (close to the sea) and schools far from the beach, so that the research questions could be accurately answered. The people responsible for administering the questionnaires were asked to fill in the background data, the location of the locality, the type of locality, and the students' sex.

Research Tool

The study was conducted using a quantitative research method (a decision-making questionnaire (Appendix 1), which was preceded by a qualitative ordinal coding of the students' responses to the questionnaire sections. The questionnaire consists of a section that discusses sea turtle conservation taken from the website of the National Teachers' Center for Science and Technology (Levy Nahum et al., 2010); it works in accordance with the current study. The questionnaire included sections that examine the student's ability to make intelligent decisions regarding sea turtle conservation. The questions are based on students' concern for the environment and consisted of open-ended questions and yes / no questions with a request for justification.

The questionnaire is largely based on an existing questionnaire (Levy Nahum et al., 2010) and was validated and considered trustworthy by its developers. In addition, the decision-making questionnaire was validated in a pilot study. Part of the study population changed, and as a result, some of the questions were changed regarding sentence clarity and length.

Furthermore, the content validity was examined by three experts in science and environmental education who teach and understand the subject; they were asked to judge the extent to which the questionnaire examines the factors it was intended to measure as well as the scope and form. Needless to say, the questionnaire in Arabic was carefully examined by an Arabic language expert to avoid syntax and grammar problems. The text provided to students regarding sea turtles well-matched the students' reading level according to three experts. Before starting the study, the researchers give a lecture about the sea turtles, so that they would be sure that the students know about the sea turtle and its lifestyle, without addressing any environmental problems associated with it.

Study Design and Research Process

The study is quantitative. The data were collected using one questionnaire without an intervention set.

The time allotted to students to answer the questionnaire was one study hour (45 minutes). Students were given a brief explanation at the beginning of the lesson as follows:

- To test the decision-making ability of high-school students, it is very important to answer the questions seriously and honestly.
- In questions in which you are asked to answer and express a personal opinion, or report behavior and customs - there is no right or wrong answer.
- The questionnaire is not a test and no scores will be given for correct or incorrect answers. The questionnaire is anonymous.

Most students completed the task before the end of the allocated time.

Method of Analysis

The quantitative study was based on an analysis of the decision-making questionnaire that the students filled out. The students' responses to the questions were analyzed, noted, and coded as follows:

- Zero (0) points were given for an irrelevant student response (i.e., the student gave a rationalized response regardless of the text he had referred to); zero points were also given to students who did not respond.
- One point (1) was given to a student's response at a low cognitive level.
- Two points (2) were given for a student's response at a high cognitive level.

A low-cognitive response is a random, superficial, one-dimensional response that is within the knowledge-understanding range (Zoller, 2000). A high-level cognitive response is not unequivocal or one-dimensional, but rather, it is complex and requires the student to delve deeper and to be able to make rational decisions. The total score of the decision-making questionnaire is calculated as the sum of all the points that each student will receive for all his responses in the questionnaire. The overall final grade a student can achieve is in the range of 0-26. The minimum is 0 (13 questions in questionnaire X 0) and the maximum is 26 (13 X2). This is how each student's average is calculated, followed by the average of each grade (range 0–100). The data were compiled in an Excel sheet and transferred to SPSS software, through which statistical tests of averages, standard deviations, and significant levels were determined.

The following are examples of the content analysis of students' responses according to the questionnaire sections (see Appendix 1):

Question 2-A: Can you offer additional solutions to the sea turtle problem?

Level answers (0):

A. Provide light like moonlight.

B. Build low-rise buildings close to the sea in order to prevent the light from reaching the sea conditions at night.

C. Many plants feed on sea turtles.

It can be seen that the students' answers to a given question were not relevant. They were asked about one thing and answered about another.

Low Cognitive Answers - Level 1:

A. Prevent sea turtle hunting.

B. Take sea turtles to a suitable environment.

It can be seen that answer (A), for example, is one-dimensional and superficial, and that the student is not trying to find an in-depth justification for the phenomenon.

High Cognitive Level Answers - Level 2:

A. Prohibit hunting during the fertilization period, in the summer season.

B. Encourage residents to protect sea turtles during fertilization and the hatching of eggs, such as closing these beaches to vehicles traveling on the beach during the fertilization season and destroying everything in their path.

It can be seen that answer (B) indicates high thinking ability and cognitive skills and the active participation of environmentally based students in the problem-solving and decision-making processes.

RESULTS

Description of Decision-Making Ability

As mentioned, the first question was what decision-making cognitive ability level is needed among tenth-grade high-school students in the context of environmental education?

The questionnaire was administered in seven high schools in the northern region of Israel. It included a section on an environmental issue: rescuing sea turtles. Students were asked to read and complete the questionnaire. Table 1 shows the distribution of students' decision-making ability in this context.

Examination of the findings in Table 1 shows that most of the students displayed low cognitive ability in making decisions in the context of sea turtle conservation (low cognitive level = 72.3%). The most prominent decision-making concerns the wording of the first question to an unanswered text, noted by 88.1% of the respondents, followed by a proposal for additional solutions to the problem of diminishing sea turtle populations (86.2%). A lower percentage was reported regarding the wording of the second question to make a decision regarding the preferred solution for rescuing sea turtles (51.9%) and about students' willingness to get up at six in the morning to ensure that sea turtles will hatch and succeed to crawl into the sea (50%).

The students had to answer all sections of the second research question: determine whether differences in the ability to make decisions depend on gender (boys and girls), determine whether there are differences between

Table 1. Distribution of the cognitive ability of students' decision-making (N = 210)

Question item in the questionnaire	Not answered / Not relevant	Low cognitive level	High cognitive level
1a. Formulate a first question related to the text but there is no answer to it.	11.9%	88.1%	0%
1b. Formulate a second question related to the text but there is no answer to it.	15.2%	83.8%	1%
1c. Is the subject of the text important and interesting? Explain why.	14.8%	81%	4.3%
2a. Can you offer more solutions to the problem of diminishing sea turtle populations?	11.9%	86.2%	1.9%
2b. Choose the best solution, in your opinion, and explain why you chose it.	19.5%	80%	5%
3a. The first question you would like answered before making a decision.	35.7%	64.3%	0%
3b. The second question you would like answered before making a decision.	48.1%	51.9%	0%
4a. The first criterion that helped you make a decision.	22.9%	76.2%	1%
4b. The second criterion that helped you make a decision.	31.4%	62.4%	6.2%
5a. Benefits of the solutions you proposed.	25.7%	73.8%	0.5%
5b. Disadvantages of the solutions you proposed.	35.2%	64.3%	0.5%
6. Are you ready to get up at six in the morning to help sea turtles crawl into the sea? Explain your answer!	47.6%	50%	2.4%
7. Do you think it is worthwhile to intervene to help the animals in their natural environment? Explain your answer!	19%	78.1%	2.9%
General average	26%	72%	1.7%

Table 2. Averages, standard deviations, and t values used to examine the differences in students' cognitive ability to make decisions

Variable	Value	N	M	SD	T
Location of the settlement	Far from the sea	60	8.65	4.74	-2.44*
	Near the sea	150	10.29	3.34	
Type of settlement	Rural	120	8.68	4.33	-5.65**
	Urban	90	11.33	2.39	
Gender	Boys	111	9.24	4.09	-2.34*
	Girls	99	10.46	3.48	

**p<0.01, *p<0.05

Table 3. Averages, standard deviations, and t values used to examine the differences in students' decision-making ability

Variable	Value	N	M	SD	T
Locality location	Far from the sea	60	8.65	4.74	-2.44*
	Near the sea	150	10.29	3.34	

*p<0.05

students living far from the sea and those living close to the sea, and between students living in a rural area and those living in an urban area. T-tests were performed for independent samples. The results of the students' cognitive ability to make decisions in accordance with all the different independent variables are presented in Table 2.

The following are the results of testing students' cognitive ability to make decisions according to each variable independently:

To answer question 2: Is there a difference in this ability, and to what extent between students from localities close to the sea and those far from the sea?

The locality factor of each school was examined regarding students' decision-making ability. A t-test was performed to test for significance; the results are shown in Table 3.

The table shows that a significant difference exists between students from localities close to the sea and those far from the sea regarding their ability to make decisions about sea turtle conservation; therefore, students from localities near the sea showed higher decision-making ability (M = 10.29 vs. 65M = 8).The locality type factor (urban or rural) was examined to answer question 3: Is there a difference in this ability, and to what extent between students from urban localities and those from rural localities?

The results are shown in Table 4.

The table shows that a significant difference exists between students from rural localities and those from urban localities regarding their ability to make decisions

Table 4. Averages, standard deviations, and t values used to examine differences in students' decision-making cognitive ability

Variable	Value	N	M	SD	T
Type of locality	Rural	120	8.68	4.33	-5.56**
	Urban	90	11.33	2.39	

**p<0.01, *p<0.05

Table 5. Averages, standard deviations, and t values used to examine differences in students' decision-making cognitive ability

Variable	Value	N	M	SD	T
Gender	Boys	111	9.24	4.09	-2.34*
	Girls	99	10.46	3.48	

*p<0.05

about sea turtle conservation issues: students from urban localities exhibited higher decision-making ability (M = 11.33 vs. 68M = 8). The gender factor was examined to answer question 4: Is there a difference in this ability between girls and boys and to what extent?

The results are shown in Table 5.

The table shows that a significant difference exists between boys and girls in their ability to make decisions regarding sea turtle conservation issues: girls exhibited a higher decision-making ability (M = 10.46 compared to M = 9.24).

DISCUSSION

The appropriate worldview for interdisciplinary teaching-learning using the science, technology, environment, and society approach is based on a systemic approach. This approach allows students to solve real problems and the ability to make decisions in everyday life, especially problems with environmental consequences (Barth, 2016; Gallagher & Hogan, 2000; Scott & Gough, 2008).

The transition to interdisciplinary teaching requires changes in both the cognitive and the pedagogical realm as well as in the realm of the teacher's educational and social views and beliefs. In the cognitive field, teachers must expand their knowledge to deal with the teaching of content areas beyond their area of specialization and basic training. At the pedagogical level, teachers must apply a variety of teaching skills and strategies and direct students to perform independent and active learning to develop, promote, and improve their high cognitive abilities (Zoller & Levy Nahum, 2012). Teaching-learning in this way aims to bring the student to high levels of thinking and promotes skills involving asking questions, critical thinking, and decision making.

The present study did not include classroom intervention, but instead examined the situation among different groups of students in Arab schools in the north in terms of their decision-making ability level regarding the sea turtle conservation issue.

The research findings will be discussed in conjunction with the following hypotheses:

Hypothesis 1: *There will be a difference in the cognitive level of students' decision-making ability regarding the sea turtle conservation issue; therefore, it is expected that most of them will have a low cognitive level in this context.*

The findings emerging from Table 1 are as follows: The distribution of the decision-making ability in the context of sea turtle conservation issues for tenth-grade students in Arab high schools indicates that their ability is low: Level (0) = 26.1%, Level (1) = 72.3%, Level (2) = 1.9%. That is, most students are at a low cognitive level in terms of their decision-making ability. This finding confirms this hypothesis.

This finding indicates that traditional teaching as it is carried out in the Israeli education system, and especially the Arab education system, does not promote, develop, and improve this ability. This finding is in line with many similar findings. Based on much of the professional literature, traditional frontal teaching is dominant in the Arab sector (Abu-Asba, 2015). Teaching methods in Arab schools are usually based on frontal teaching; however, it is repeatedly argued that alternative teaching methods should also be adopted (Arar, 2012). This finding is also consistent with a study by Kurtam and colleagues (2011) who found that the two cognitive abilities tested were low: students' decision-making ability and their systemic thinking ability. They also attributed this finding to components mainly related to traditional teaching, such as an analysis of lesson observations, which indicated that teachers usually taught according to the "traditional" frontal method, which is mainly the transfer of (cover) material. In this system, the teacher is usually the questioner and is at the center of the activity. Students noted that their teachers tend to involve them in lessons but not enough. Some students indicated that they do not ask or seldom ask questions and do not participate in class discussions. Kurtam et al. (2011) also found that the only assessment method used by all teachers is a standardized closed exam "in the spirit" of the annual matriculation exam.

Hypothesis 2: *Differences will be found regarding the cognitive level of students' decision-making ability between students from localities close to the sea and those far from the*

sea. This ability will be higher among students from localities close to the sea.

Table 2 shows the means and standard deviations of t values used to examine the differences in the decision-making ability between students from localities far from the sea (M = 8.65, SD = 4.74) and those close to the sea (M = 10.29, SD = 3.34). It was found that students from coastal areas (close to the sea) had greater cognitive ability to make decisions than did students who lived far from the sea.

This finding can be explained by the fact that students from coastal communities probably feel a stronger affinity and connection to an issue related to marine animals (sea turtles) than would students from communities far from the sea. Students from the coastal communities faced an issue taken from their real life (preserving sea turtles), stimulating curiosity and interest, evoking sympathy, empathy, caring, and a sense of responsibility. The affinity for a place is the basis today for what is called place-based education in science teaching. Today it is common to examine the concept of 'place' in its broadest sense. A place is not only a physical space but also a space that represents a variety of factors, aspects, and values: historical, cultural, political, environmental, personal, and social (Tal, 2009).

Relationships and interactions between humans and a place have been created since humans have existed. Many definitions describe these interactions. One of them is an affinity for a place, which refers to the complex set of cognitive and emotional connections that we develop with our physical environment and with the community in which we live. The connection to a place is expressed in four dimensions: physical, which creates the general context and defines our connection to a clear physical space, whether it is in an open space (e.g., a neighborhood, yard, and field) or in a closed space (e.g., a school classroom), which emphasizes the emotional connection of individuals, families, communities, and societies to a particular place. This connection can help to form a personal identity that is dependent on the environment and creates a personal dependence on the environment; cultural-social, which represents the connection between the person and cultural and social systems such as traditions, ceremonies, and historical symbols that belong to a place. This occurs through our connection to the cultural and social symbols that a place represents for us: civic, which expresses our involvement in the environment as a society. This dimension emphasizes the community's activity in the place and for the place (Tal & Alkaher, 2010; Turner & Turner, 2006). Therefore, apparently it was the connection to the place that created the students' sympathy and identification with the place and the subject (Smith et al., 2019).

Hypothesis 3: Differences will be found in the cognitive level of students' decision-making ability between students from rural localities and those from urban localities, and this ability will be greater among the urban students.

According to Table 3, apparently, the ability to make decisions regarding students from urban localities (M = 11.33, SD = 2.39) is greater than that of students from rural localities (M = 6.68, SD = 4.33). The findings indicate that a relationship exists between the type of locality and the cognitive level of the students' decision-making ability. In Israel the urban localities are characterized by a higher standard of living, a higher level of education, and better employment characteristics than those characteristics of the rural localities; this consequently affects the level and decision-making ability of students in that locality.

This finding is very interesting but not surprising. Over the years, the professional literature has dealt with defining and identifying the differences in students from urban and rural areas. When the concept of a village is used, there is a tendency to link the image of a village to morality, conservatism, belonging, uniformity, agriculture, and others (Hamaisa, 2006). In contrast to the village, when one mentions the city, one refers to modernity, openness, freedom of movement, dynamism, opportunities, and individualism. Therefore, it can be argued that the findings can be attributed to the fact that urban students are more open and liberal, which is consistent with the principles of environmental education, sustainability, and sustainable development; therefore, a high average cognitive level of decision making was obtained. On the other hand, it is possible that because of the many and varied environmental problems, which are associated more with cities than with villages, for example, air pollution due to transportation, factories, green spaces, population density, site preservation, waste disposal, animal and plant problems and others have increased environmental awareness among urban populations more than among rural ones. Likewise, because of the special environmental problems associated with cities, the Ministry of Education in Israel has activated and implemented many educational projects to increase environmental awareness and sustainability within cities.

Moreover, studies conducted in the field of environmental psychology, and their impact on behavior, indicate that humans are aware of the global environmental crisis. Humans also understand that they must implement behavioral changes regarding nature and its resources, but most still find it difficult to minimize the environmental damage caused by their lifestyle (Halpenny, 2010). Because of their deep connection and identification with the place where they live, urban inhabitants can more easily adopt new perceptions and behaviors for preserving the environment (Manzo, 2003). Thus, these findings also reinforce the findings of the present study regarding how the city contributes to an awareness of

environmental issues, because of its characteristics of having a sense of belonging, responsibility, and environmental activism. Nevertheless, this finding requires further research.

Hypothesis 4: There will be differences between girls' and boys' ability to make decisions. This ability will be greater among girls.

Table 4 shows that the cognitive ability of girls' decision-making ability (M = 10.46, SD = 3.48) is significantly higher than that of boys (M = 2.4, SD = 4.09).

The advantage of girls in the current study, at least in terms of achievement, is supported by recent data from national and international tests conducted in the education system; the data indicate that significant gaps exist in academic achievement and abilities between girls and boys in the Arab sector in Israel. In some of the tests, a gap exists between girls and boys in the Jewish sector as well, but in the Arab sector the findings are more consistent and prominent (Vargen, 2009):

1. A gap exists in the rate of matriculation eligibility between boys and girls, favoring girls, both in the Jewish and the Arab sector. The gap, favoring girls in the Arab sector, is much larger than the corresponding gap in the Jewish sector.

2. A gap also exists regarding the rate of compliance with the universities' minimal acceptance requirements favoring girls, both in the Jewish and the Arab sector. However, the gap between girls and boys in the Arab sector is larger and has been on the rise in the last seven years.

Another explanation for these findings, according to various researchers, focuses on the claim that girls' educational aspirations are supported by several sources: First, parents encourage girls to achieve higher education, since the work of an educated woman brings respect to the family. Second, the education of women increases the human capital of Arab society. Third, education enables girls to break through the traditional life cycle of their mothers' generation and improves their social status. Fourth, women with professional careers can serve as a model for younger girls (Abu-Asba, 2005; Birenbaum & Nasser, 2006). In addition, a study by Birenbaum and Nasser (2006) found that girls in the Arab sector have a pattern of supportive learning attitudes, which is reflected, among other things, by the fact that they exhibit higher self-efficacy levels than boys do. The study found, for example, that girls in the Arab sector tended to try to answer more questions, whereas boys tended to leave a greater number of unresolved questions. This finding could support the finding of the girls' advantage in the present study. Abu-Asba (2005) noted that one of the most interesting topics for examination and research while discussing the Arab education system is the success of Arab students (both boys and girls) in achieving more academic success than the boys alone did.

Our findings are also somewhat in line with the conclusions of the Israeli National Authority for Measurement and Evaluation in Education report (2013), which examined trends and the adjustment of data to different models of gender gaps. It found that a gap exists in achievements, favoring girls among the Arabic speakers. A similar picture is obtained in international tests among Arab countries. This phenomenon tends to exist to some extent in low socio-economic background groups in Israel, and in economically weak countries that are not considered Arab.

From the results, it can be seen that the cognitive level of students' decision-making ability is low. This indicates that traditional teaching, as it is done in the Israeli education system and especially in the Arab education system, does not promote this decision-making ability in students. In conclusion, the low cognitive level of the research sample regarding the ability to make decisions on an environmental issue, as reflected in Table 1, indicates the low contribution of traditional teaching as it is carried out in today's education system, which does not give sufficient emphasis and attention to promoting students' decision-making ability, despite the reforms made. On the other hand, significant differences were found between different components within the study sample; this indicates a dependence on the ability to make decisions and on certain variables.

Acquiring high-level thinking skills for students in general, and for science students, in particular, is now a major goal in education worldwide. These skills will enable the learner to function as an active and helpful citizen in his community; the real challenge today is to find ways to teach and develop this approach. In addition, according to the findings of the present study, consideration should be given, when constructing curricula, to asking questions. The findings indicate students' difficulties, especially if they involve high levels of thinking.

To learn decision making, it is important to practice it on a cluster of important events in the lives of the learners. For example, if you are teaching high-school students to make the right decisions, you should focus on events such as choosing a course of study or planning and making an annual trip. It is advisable to bring the future closer to the students and allow them to face the decisions they are likely to make later in their lives as adults.

Underlying the new science curricula is the need to emphasize the connections and interactions between the theoretical and the technological sciences as well as the environmental and social consequences that this has on society. This approach allows for solving real problems in daily life, especially problems with environmental and social implications.

The transition to interdisciplinary teaching requires changes both in the cognitive and pedagogical fields and in the teacher's educational and social views and beliefs. At the pedagogical level, the teacher must apply a variety of teaching skills and guide the students to achieve independent and active learning. Teaching and learning in this way aims to bring the students to high levels of critical thinking and acquiring the requisite skills of asking questions, critical thinking, and decision making.

Organizational and geographical constraints sometimes lead to a decrease in schools from the desired target population and a decrease in students outside of the sample; indeed, the findings of the present study prove that this issue should be addressed. The sample included subjects from a specific geographical area, all from the northern region. The main research method is quantitative; therefore, a mixed qualitative research method is needed, which will allow a deeper and long-term examination of the independent variables (the decision-making ability), and the independent variables (the type of locality, location, and sex of the subjects). The study must compare the Jewish and the Arab sectors; both represent two fundamentally different socio-cultural worldviews.

CONCLUSION

The term "decision making" refers to a strategy (plan) for solving problems, tasks, and goals, with a clear sequence of actions. It is recommended to start learning decision making in early adolescence, which is characterized by the rapid development of reflective and meta-cognitive processes that allow for the control and supervision of thought processes. However, it is highly desirable to start as early as elementary school to instill basic concepts such as "goal," "data collection," reflection, and "feedback" (Klaczynski, Byrnes, & Jacobs, 2001).

Critical thinking should be developed based on examples from everyday life. A task related to students' daily lives stimulates their curiosity and arouses their interest and deep thinking. Interestingly, in the present study, students slightly identified with statements expressing personal involvement in environmental issues. However, students living in localities close to the sea coped nicely with a problem possibly involving their daily lives (conservation of sea turtles). The study also revealed that in multicultural cities there is a positive effect of multiculturalism on the Arab population, which leads to an intelligent decision-making process.

Our recommendation for further research is to examine how integrating critical thinking methods and strategies into content teaching affects students' thinking ability, and especially their decision-making ability. This should take place after the researcher participates in a program that deals with integrating skilled thinking into the regular curriculum.

In light of the interesting research results, we are now trying to determine whether students who have been exposed to environmental problems such as preserving sea turtles will advance their level of arguments and their willingness to act to preserve the environment regarding various environmental issues such as air and water pollution, climate change, and global warming.

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APPENDIX 1

Decision-Making Questionnaire

Dear student,

The following questionnaire investigates high-school students' ability to make decisions. Please fill it in accurately and objectively.

Name: _____ Class: _____ Locality:

Please read the following text and then answer the questions.

Rescuing sea turtles

Recently, there has been a decrease in the number of sea turtles, due to their lifestyle and environmental issues, which endanger their lives.

Their respiratory system is in danger. Sea turtles breathe air from the atmosphere, and when they rise above the water to breathe, they are sometimes trapped in a fishing net and die by drowning.

During sea turtles' breeding stages, there is another danger: the fertilization of sea turtles occurs in summer, in shallow water close to shore, and ships in the sea can injure them.

On the other hand, sea turtles lay their eggs on the beach in a nest, which is a large pit that they dig with their claws. Sometimes they are startled by the noise of the vehicles, then they lay their eggs in the water rather than in the nest, and sometimes nests are destroyed after vehicles carrying people collect the eggs for eating or animals eat them.

While the eggs are hatching, the small sea turtles remain exposed to danger, because they reach the sea at night and are aided by the moonlight projected on the sea waves. Sometimes the lights of nearby buildings deceive them and they remain on land and die.

Recently, nature reserve inspectors have made efforts to help small sea turtles by transferring their eggs to protected "nesting fields" and by transferring small turtles that hatched at night to the sea.

In fact, humans are primarily responsible for the damage caused to sea turtles; therefore, sea turtles must be protected and their reproduction must be encouraged to prevent their extinction.

Write two questions related to the text to which the answers are not found.

first question:

Second question:

Read the text again and answer the following questions:

1) Is the topic that the text deals with important to you and interesting to you? Explain your answer.

2-a) Can you suggest additional solutions to those proposed in the text regarding the problem of protecting small sea turtles? Explain your answer.

2-b) In light of the previous question, choose what you think is the best solution and explain why you chose it.

3) Do you think you need more information so that you can decide the best solution for rescuing and preserving sea turtles?

Formulate two questions that you want answered before making a decision.

first question:

Second question:

4) Write down two criteria that helped you decide the solutions you proposed.

The first criterion:

The second criterion:

5) Briefly explain the disadvantages and advantages of the solutions you have proposed, compared to other solutions you have not proposed.

The benefits:

Disadvantages:

6) Are you ready to get up at six in the morning to help the sea turtles to successfully hatch and crawl into the sea? Yes/No.

If your answer is yes, what is the motive for it? Explain your answer!

7) In your opinion, should humans intervene and come to the aid of animals in their natural environment? Explain your answer!

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