



Teaching Values via the Problem-Solving Approach in Mathematics

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Abstract: Mathematics is not an independent science, and teaching it is strongly related to daily life. Teaching mathematics, in general, embraces teaching mathematical values that are of three types: general educational values, mathematical values, and educational values. However, more precisely, one of the approaches employed in teaching mathematics is the problem-solving approach, which instills values in the characters of students which help in shaping their personalities by granting them the chance to rely on themselves. In this way, it helps students to become independent, to have strong personalities, and to be capable of solving problems in their lives. In addition, problem-solving teaches students to be collaborative, innovative, and socially-active. However, the problem-solving approach consists of three levels, namely tasks, cooperative groups, and sharing. In brief, the approach urges students to interact with other students in a group in order to find the proper solution for a certain task and then share the solution alongside the reasoning with the other students of the other groups. This approach encourages reasoning and creative thinking alongside with group work and self-reliance. Consequently, teaching mathematics through employing the problem-solving approach is of great importance for the individual and the community as well taking into consideration how important the values the approach instills in students. This study recommends employing this approach in teaching mathematics for students to be self-confident, critical thinkers, and problem-solvers in real and social life, which will benefit the country as a whole.

Keywords: Teaching Values, Problem-Solving, mathematics.

Introduction

Values play a vital role in the development and cohesion of society; they qualify it to meet the challenges of all times and help it to anticipate the behavior of its members in the light of their values and responses in different situations. They are also considered one of the most important cultural elements of individual and social life, and they are a pillar of the educational process in which they represent a crucial goal and function of education in general. Therefore, the educational system is aimed at constructing positive values and eliminating negative ones from the minds and behavior of emerging members of society through various means and methods. All the various educational institutions are urged to take responsibility for instilling values in the community members (Al-Dahash, 2012).

Moreover, values are fundamental concepts in all fields of society, economy, and politics. They are the standards and objectives that every society seeks to possess in an interdependent and integrated system. It is well known that the primary function of schools is to prepare the individual to meet the needs of society and to maintain its values and basic principles, as well as to respond to its ambitions and aspirations. This is why the teaching of values must receive adequate attention in the process of building curricula (Al-Dahash, 2012). Accordingly, Gutstein (Gutstein, E., 2006) emphasize that the curriculum objectives should be defined and the content should be carefully chosen and organized in such a way as to help the individual meet the needs, values, and aspirations of society.

Hence, the inclusion of values in the educational process at the present time is an urgent necessity; they constitute the moral basis and normative implicit norms that are formed by individuals through their interaction and experiences during the learning process. Besides, Algani Yousef (2018) argues that values are the “leaders and means of behaviors” (Dede, 2006).

However, an important question arises which this study aims to answer: **How is teaching mathematics in general, and through problem-solving in particular, relevant to teaching and instilling values in society?**

Mathematics is an important part of our daily lives, because people use it to understand their environment and related aspects such as values and attitudes. It also helps in managing their own lives, so mathematics is closely related to values. Besides, it is characterized by logic, clarity, and beauty as it works to

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develop many educational values such as applied, systemic, cultural, mental, aesthetic, professional and personal values (Al-Dahash, 2012).

Many researchers have highlighted the values in teaching mathematics, such as Bishop and his colleagues (Bishop et al., 1988, as cited in Al-Dahash, 2012; Bishop, A., Clarke, B., Corrigan, D., Gunstone, D. 2006). They classify values into three types, namely, general educational values, mathematical values, and educational values. General educational values are the values that reflect the relationships and interactions between teachers and their students and the reflection of their behavior on society and on life in general. They also include moral values such as good behavior, integrity, obedience and humility.

The second type is mathematical values. These are the values that reflect the nature of mathematical knowledge including, first, rationalism. According to this value, it could be noted that mathematics depends on ideas based on theory, logic and hypothesis. Besides, it shows deductive reasoning for the validity of results and interpretations, including logical thinking and interpretation, theorizing, assumption and reasoning. The second value is objectivism, which includes standard thinking and symbolic representation. The third value is control, which includes prediction, recognition and adherence to rules. The fourth value is progress, which includes cognitive development and generalization. The fifth value is openness, which includes verification, inclusiveness, and the expression of facts. The last value is mystery, which includes abstraction, abbreviation, questioning, and imagination (Al-Dahash, 2012).

The third type is the educational values of mathematics, which is summarized by Seah and Bishop (2000) in twelve values related to the process of teaching mathematics. These values are: accuracy, clarity, conjecturing, consistency, creativity, effective organization, efficiency in working, enjoyment, flexibility, open-mindedness, persistence, and systematic working (Dede, 2006).

In the context of successive and varied developments affecting the field of education in general, and the field of teaching in particular, many educators wished to go beyond traditional education and the resulting strategies emerged from the set of data and conditions that accompanied it and led to it, and gave them reasonableness at the time. These theorists say that because of the change of previous circumstances, and the progress in all different areas of life, they have to develop new teaching strategies. Those strategies should be able to produce a new generation capable of coping with the new developments taking place at an amazing speed. This new generation would be more flexible and open, able to renew knowledge and information, solve problems, and be innovative, and its inventions and creations will contribute to the formation of improved human surroundings in the future, rather than just being submissive and acquiescent to current circumstances. Thus, the focus in mathematics is on – amongst all – problem-solving skills as they teach students vital values and lifestyles. As-Sa'idi (2011) argues that the best kind of education is one that is based on problem-solving in which problems are realistic taken from the learners' environment and are of urgent necessity, significance and meaning for them.

The problem-solving approach teaches students many values such as the importance of seeking alternative solutions, finding scientific justifications, and logical reasoning (Dahash, 2012). Furthermore, Edri (2014) states that values are considered "the most important element of raising mathematics learning and teaching qualities" (Dede, 2006). Besides, one of the various aims of problem-solving is "to provide a new approach to remedial mathematics (basic skills) or to try to induce "critical thinking" or "analytical reasoning" skills" (Schoenfeld, 2016).

Schoenfeld (2016) states that there is a "general acceptance of the idea that the primary goal of mathematics instruction should be to have students become competent problem solvers in life via acquiring problem-solving skills" (p.1). In addition, he states that mathematics "is a living subject, which seeks to understand patterns that permeate both the world around us and the mind within us" (ibid, p.2). Similarly, many scholars consider learning mathematics "as an inherently social (as well as cognitive) activity, and an essentially constructive activity instead of an absorptive one" (Schoenfeld, 2016, p.2). Consequently, the result of making students skilled problem-solvers "may be as much a matter of acquiring the habits and dispositions of interpretation and sense-making as of acquiring any particular set of skills, strategies, or knowledge" (ibid). Thus, the problem-solving approach produces problem-solving behavior.

To be able to solve problems, one must have a deep, conceptual understanding of the mathematics involved; otherwise, one will be able to solve only routine problems. Therefore, to become a good problem solver, a student must truly understand the inherent concepts. Thus, understanding enhances problem-solving.

Lambdin (2003) defines the term problem as "a situation that causes disequilibrium and perplexity". Besides, "[a] primary tenet of teaching through problem-solving is that individuals confronted with honest-to-goodness problems are forced into a state of needing to connect what they know with the problem at hand" Therefore, it is more beneficial to employ problem-solving in teaching mathematics as "[s]tudents' mental webs of ideas grow more complex and more robust when" students use problem-solving because it "force[s] them to think deeply and to connect, extend, and elaborate on their prior knowledge" (p. 7).



Recently, teaching mathematics through problem-solving promised to achieve an improving mathematics teaching and learning (Selmer & Kale, 2013), in which “it embraces the idea that aspects of problem-solving and learning substantive mathematical concepts are recognized as interdependent” (p. 49). This means that learning problem solving is dependent upon the content of mathematics. Thus, problem-solving and mathematics are interdependent (Selmer & Kale, 2013).

A problem-solving approach is an educational strategy aimed at linking real problems with the learning process. It is carried out within student groups discussing problems and trying to reach the appropriate solution via employing the appropriate laws and relationships and practicing various educational activities through collecting data that can identify and clarify the problem and reach and interpret the results. The task of the teacher is to facilitate and encourage the learning process and be a consultant to the student discussion groups, which provides interaction between students and information (Najm, 2011).

Developing problem-solving skills is a prerequisite for human development, which links teaching problems with real life and makes them similar to everyday problems related to students' interests. In addition, the skills give them the opportunity to think freely and go through scientific experimentation and descriptive identification of the problem, and purposeful planning to solve it by presenting hypotheses, interpreting data, and achieving the results that can be applied in new situations (Sharif, 2011).

The most important thing that students need in their schools is their ability to communicate with each other and with others. The limitations that limit the ability to work, meditate and creativity fade away. The comfortable atmosphere is an entrance to deep thinking, to the expression of opinions, experiences and information, and to using them in lesson situations (Naser & Hammad, 2013). In addition, the lack of social skills that enable them to communicate effectively with their peers may be due to the neglect of these skills in the curriculum, especially by teachers when carrying out teaching activities (Nath & Ross, 2001).

Educators have recently paid attention to the positive role of the learner, not only as a recipient but also as an active participant. Therefore, it was necessary to choose teaching methods adapted to this new role of an effective self-reliant learner including the problem-solving approach. Thus, it would be useful to introduce multiple definitions of this approach, taking into consideration that it is concerned with teaching mathematics and science as well (Al-Masri, 2017).

- A teaching plan that starts with the teacher introducing the unit's subjects as real tasks in the form of problems. Students begin to think about them to find solutions by practicing activities through small cooperative groups ending with the participation of all groups in the discussion of what was reached and evaluated under the supervision of the teacher.
- A strategy based on the constructivist theory of learning consists of three components: tasks, collaborative groups and participation.

One of the strategies of constructivist theory in learning, based on teamwork, allows the learner to form a meaningful understanding by linking previous knowledge and integrating it with what he has learned (Al-Masri, 2017).

- High-level mental processes used to find solutions to given situations (Ahmad, 2011)

Before delving into more details, it is important to go through the three levels of the problem-solving approach, namely tasks, cooperative groups, and sharing (Al-Masri, 2017)

Starting with the first level, which is tasks, it represents a set of problems that the teacher prepares and plans through worksheets provided to student-groups involved in developing solutions. These tasks are the basis of the problem-centered learning strategy in which success depends on the careful and optimal selection of these tasks by teachers. Thus, a set of conditions and criteria are required for the strategy to be fruitful. For instance, tasks should include a problematic situation that is appropriate to the level of knowledge of each learner and encourage learners to engage in research, discussion, dialogue and decision-making, not to mention that it should lead to certain results. In addition, they should be closely related to the students' previous experiences to students' interests and help them to solve later life problems. The tasks should be accomplished by the learner without any intervention from the teacher except with the guidance necessary to maintain the interest of learners and enable them to continue to work on the task (Al-Masri, 2017).

The second level, which is the cooperative groups, adopts the principle of cooperative learning in which students are divided into several groups consisting of students unequal in achievement. In other words, each group should have at least high, medium and low achievement students. Members of each group plan to resolve the task at hand and may need to exchange roles. However, there are conditions that need to be met in small groups to be cooperative including positive participation, enhanced student interaction, appropriate use of social skills required by collaborative work, and interaction between groups (As-Sa'idi, 2011).

Consequently, if the above conditions are met, this will yield many positive results, such as increased ability to remember and higher student achievement rates, developing problem-solving skills, increasing self-motivation for learning, positive relationships between students, an increase in the student's self-confidence, reducing



behavioral problems among students, and acquiring many social skills that only grow by cooperative work (As-Sa'idi, 2011).

Ultimately, in the final stage, students will present their solutions and the ways in which they have reached these solutions to the rest of the groups. Discussions will take place under the leadership of the teacher. However, it is necessary to give the students sufficient time to present their solutions. Given the possibility that the groups can come up with different solutions, discussions should take place between the groups to reach some sort of agreement, if possible. Discussions deepen students' understanding of all solutions and methods. At this stage, the teacher works to guide discussions without interference and without judging groups (ibid). This final stage enables pupils to summarize what they have learned and integrate it with previous knowledge (Naser, H., Hamad, R. 2013).

Presenting the problem and developing problem-solving skills is the motivational part, which is more important than the mere teaching of skills. The problem-solving approach enhances students' logical thinking and provides them with the ability to make decisions. It can also provide opportunities for students to develop a wide range of emotions and values associated with the different stages of the solution process.

The importance of this educational method emanates from the fact that it puts learners in a real situation in which their mind works in order to reach a state of knowledge equilibrium. Thus, the learners' motivation works to maintain their mental activity and maintenance until they reach the goal. Moreover, it helps learners to develop "upper level skills such as problem solving and critical thinking while eliciting information from personal real life experiences and acquiring determinate knowledge about their own learning" (Ceker, &Ozdamli, 2016).

It also aims at preparing pupils for real-life settings, and enhancing pupils' learning outcomes by "promoting their abilities and skills in applying knowledge, solving problems, practicing higher order thinking, and self-directing and reflecting their own learning" (Ceker, &Ozdamli, 2016).

Furthermore, it aims at constructing a knowledge base that is extensive and flexible, developing self-directed and lifelong learning skills, becoming effective collaborators, and intrinsically motivated to learn (Ceker, &Ozdamli, 2016). Not to mention that it "strengthens cooperative learning skills" (Abdelkarim et al., 2018) because it requires working in groups, thus, it develops pupils' communication skills, and it also enhances the learner's self-confidence (Al-Masri, 2017). Besides, knowledge acquired via this approach is gained at the individual level as well as through group collaboration, thus constituting a social constructivist paradigm (Abdelkarim et al., 2018).

By the same token, Al-Hassan (2014) proved the positive impact of teaching problem-solving skills on students' self-efficacy and academic performance. Makhluhi (2009) identified the relationship between the problem-solving approach and innovative thinking.

Employing problem-solving in education makes learning interesting, enjoyable, effective and solid; it calls for the previous experiences of the learner to link them with subsequent experiences.

Problem-solving could be practiced collectively or individually, while teamwork is better because it gives the learner the ability to listen to others, respect, criticize, and discuss their opinions to evaluate them. Thus, teachers interact with their students after dividing them into groups. This encourages creativity, innovation, and develops learner's decision-making skills.

Some of the characteristics of this strategy include the following benefits:

1) Pupils take responsibility during education, as they develop potential solutions to the problems they face, and use the various sources of information they expect to help.

2) The focus of teaching this strategy depends on the skill of designing the problem, in a way that allows free open research.

3) This strategy helps to develop the concept of self-learning and develops many social skills, such as communicating with others, respecting their opinions, and listening to them.

4) Collaboration is a basic principle in this type of learning, as students discuss it, learn together and help each other to gain an understanding of what they are learning, and then apply it.

5) The student does not feel any restriction on his ideas or opinions but feels free to express his views without the authority of the teacher.

6) The role of the teacher in this model is limited to guidance for the learning process.

7) Pupils are evaluated by measuring their performance when they face other problems.

8) This strategy would modify the negative trends of students towards science, because they are accustomed to working eagerly, without feeling embarrassed, or ashamed of error. (Felton, M. D., Muller, K. S. & Menendez, J. M., In: Jacobsen, L. J, Mistele, J & Sriraaman, B, eds., 2012).



Conclusions

To sum up, the most important educational values of the problem-solving method in teaching mathematics can be summarized in the following points:

1. Training students to think and help them to understand correctly.
2. Employing the problem-solving approach in teaching develops a skill to face the problems of daily life properly.
3. Developing the tendency of students to search for information. This also helps them to be liberated from the slavery of textbook schedules, and to proceed to a wider world of periodicals, books and other sources that include many educational values.
4. Training pupils not to rush to make a judgment before a proper understanding based on sufficient accurate information.
5. Helping pupils to participate effectively in the collection and criticism of information and distinguish between basic information and secondary information.
6. Encouraging friendship and cooperation, and establishing a good relationship between them and their teacher, as well as strengthening vigilance and patience and thinking to face the difficulties encountered.
7. Making the goal clear to students who will realize that thinking without purpose is a waste of time.
8. Helping pupils and training them to take responsibility and become self-reliant.
9. Helping teachers to take into account the individual differences between the students and to respect their words and spontaneity.

Shectman (1980) proposes a three-stage model for teaching with the aim of applying value education in teaching in general and in mathematics in particular. The three stages are: knowledge level, conceptualization level, and value level.

Bishop (1988) deals with values in mathematics education and proposes a theoretical framework:

1. Mathematical values: (rationality, objectivism, development, control, openness and mystery).
2. Values in mathematical education: (accuracy, consistency, order, doubt, ...).
3. General values (tolerance, helping others, social justice, ...).

The research of Edri (2010) proved the advantages of the integration of education with social values in the teaching of mathematics in Grade 8, and applications for this was proven in three ways:

1. Transferring mathematical problems from their textbook context to problems that are value related, with added value clarification questions.
2. Expanding the discussion about a mathematical concept to its social context.
3. Assigning students with the task of connecting mathematical problems to their value significance.

According to Edri, the main results from education for values are:

- 1) That the integration of education and values in the teaching of mathematics is possible both at the theoretical level and at the empirical level.
- 2) That teachers of mathematics feel the need to deal with values in education and are aware of the failure to realize the integration of value education in the teaching of mathematics.

His conclusions were:

- 1) There is lack of training in the integration of education and social values in the teaching of mathematics.
- 2) There is a lack of available teaching materials for the integration of education with social values in the teaching of mathematics.

Methodology

Life stories expose the significance and subjective interpretation given to the life of an individual, and to certain events that occur during the course of his life (Plummer, 1995).

Raising their personal stories is intended as information that can be used as a parameter for the effective improvement of their experience in the school.

The researcher has adopted the qualitative approach in the framework of this research. In this framework, a focus group was conducted in order to achieve the aim of the research.

How relevant is teaching mathematics in general to teaching and instilling values in society?

The collection of research data was done through a **focus group** in the school. Focus groups are group interviews that are intended to create knowledge. In the framework of focus groups people are invited to examine together



their views in relation to the phenomenon under research. Focus groups are effective and widely used tools among qualitative researchers. The purpose of focus groups is to understand in depth the emotions, attitudes and experiences of the research participants. Focus groups make intentional use of social interactions among the participants as a means for exposing hidden knowledge that is not usually revealed in personal interviews (Morgan, 1988).

Focus groups allow access to shared knowledge within various groups of research participants. The basic idea of this tool is that group processes are liable to contribute to knowledge that is not exposed in any other way such as personal interviews. Focus groups produce knowledge through the contemplation of various expressions in interpersonal communication (the use of language, phrases, idiomatic terms, body language, emotional expressions, anecdotes, jokes, moments of silence, etc.). Focus groups are effective in examining half-open questions. Through them, the participants examine the relevance of the research questions, propose additional subjects and issues, expand the questions and suggest additional lines of research that were not noticed when the research proposal was written.

Focus Groups

Selection of schools in which group interviews with pupils were held

Three schools that were used as estimation models conducted group interviews with pupils (focus groups). The choice of these schools was carried out through the method of convenience samples.

Among the five schools that were used as estimation models, three were selected in which group interviews with pupils were conducted (focus groups). The choice of these schools was carried out through the method of convenience samples.

The first condition was the logistical ability of the school to coordinate the conduction of the focus groups during the estimation period. Another objective was to conduct focus groups with pupils from different geographical areas as far as this was possible. A map of the schools in which the group interviews were conducted with pupils was provided.

In the framework of the qualitative research, three research groups were conducted each consisting of 45 high school pupils studying in various schools throughout the country.

All of them are of the different socio-economic background. According to the report of their teachers, their achievement in mathematics ranged in level from low to high (all the names of the interviewees are fictitious).

In the first trimester of the school year 2019-2020:

The research process after receiving authorization from the ethics committee, focus groups were conducted in three different high schools in Israel in order to allow for maximum representation. The groups were guided by a supervisor and an observer.

The research environment

The present research was accompanied by a series of lessons (12 lessons once a week, 45 minutes per lesson) for high school pupils in Israel during the school year 2019-2020.

The main task of the lecture series for the focus group was reflection on the lesson system integrated with education for social justice in the teaching of mathematics.

Tools for data gathering

In the research framework the pupils responded to pre-interview questions and to post-interview questions in order to examine their perceptions regarding the integration of education with social values in the teaching of mathematics. This was after the researcher had transmitted to them the series of lessons in mathematics on the subjects of probability, series, graph reading, and the solution at every stage to the series of question on the mathematical subject that was prepared for this purpose.

Results and Discussion

In this section the findings of the interviews are presented in an attempt to understand the methods the students learn in their mathematics lessons in problem solving questions in mathematics. The research findings indicate six categories:

Three categories for questions before carrying out the lesson series and three categories for interview questions after the transmission of the lesson series.

The three categories for questions before carrying out the mathematical lesson series of the focus group:

For a mathematics teacher who is not an educator, the integration is forced. The teacher must be a personal example.



The three categories for questions after carrying out the lesson series of the focus group:

I have no objection. The teacher is an educator, and the integration generates interest in mathematics.

In order to identify How relevant is teaching mathematics in general to teaching and instilling values in society?

the interviews in this research contained a central question: What, in your opinion, are the types of teaching practices that promote significant learning which the teacher has applied in teaching the subject you are studying?

Analysis of the students' answers to the above question was made according to a previously described qualitative analysis. The categories were constructed from an analysis of the content of the interviews with the students according to key words. The content analysis which was collected from the interviews and classified into categories was based on the professional literature. The findings of the question were compared to the literature background and to other research studies.

Method of interviews conducted with focus groups

In each of the lesson series transmitted by the interviewer, he referred to the values important for the pupils and on dealing with values from the viewpoint of the pupils before the beginning of the lesson. (For example: What values are important for you? What values, in your view, are stressed in your school? Does your school have activities relating to values? What values have you learnt in mathematics lessons?). After the transmission of the mathematics lesson and the preparation for mathematical activities associated with the internalization of value among the pupils, they are asked to refer to values they have learnt and are given questions such as: What did you learn in this lesson? What was said in the lesson about values? What insights did you have? Did you intend to express your position regarding values during the lesson?

The importance of integrating values in a mathematics course in schools:

Before the course, the pupils in the focus group responded to questions on their view against the integration of social values in the study of mathematics:

The mathematics teacher is not an educator:

Danny said: "It is not possible to educate for values during a mathematics lesson". Sammy responded to our question: "There is no connection between educating for social values and mathematics". David said: It is not possible because there is a difference between educating for values in the home and education at school". Tomer added: "Values are learnt only at home". Danny added: "Values are learnt from the environment and not from school". Joseph responded: "At school, education for values is the duty of the educators, and the duty of the teachers of mathematics is to teach mathematics". Ahmad said: "There is no overlap between education for values and mathematical education".

Sammy added: "There is liable to be a conflict between education for values at home and education for values at school". Ali said: "It is possible that the values of the teacher will be different from the values of the school". Andre added: "There is no time to educate for values in teaching mathematics". Gulit said: "The study program is heavy and the teacher is under pressure to complete the study material and does not let us breathe". Danny replied: We are always rushing through the study material and there is no time to add other subjects".

This corresponds to what Al-Hassan (2014) claims, that the lack of exercise in mathematical problems associated with values in disciplinary lessons in general and in mathematical lessons in particular causes the pupil to think that the professional teacher cannot be an educator except in an educational lesson, and that the burden on the pupils in mathematics lessons gives them the feeling that they must complete the study material and there is no connection between education for values in the home and the school, or the values of schools.

Forced integration

Dorit said: "Mathematical assignments do not deal with social matters". Hamed added: "The connection between studying mathematics and education for values seems insignificant to me". Tal said in addition: "There is no overlap between education for values and mathematical education". Sandy asked: "How can this be done, to integrated education for social values and a lesson in mathematics?". Johnny added: "Social discussion can hurt weak pupils in the class".

This corresponds to the research of Edri and Movshovitz-Hadar (2013) who reached two important conclusions. The first conclusion was the lack of training for integrating social values with the teaching of mathematics, and this caused the pupil to feel that there was no connection between mathematics and values, and that the mathematics teacher cannot be an educator during a mathematics lesson. The second conclusion was the lack of available teaching materials for integrating education for social values with teaching



mathematics, and this gives pupils the feeling that it is not possible to integrate values with the teaching of mathematics.

The teacher must be a personal example

Hadi said: "The mathematics teacher like every other teacher constitutes a model for imitation for his pupils". Fadia said: "A teacher who gives consideration for his pupils educates them to give consideration to others". Gabi added: "If the teacher behaves in a decent and fair manner, the pupils will want to behave likewise". Nadia said: "A teacher who emphasizes the way and efforts given in reaching the solution, contributes to an atmosphere of tolerance in the classroom".

This corresponds to the conclusions of E. Gutstein (2006) that teachers are models for imitation, and that pupils behave like their teacher who is the one that contributes to a comfortable atmosphere in the classroom.

At the end of the course the pupils in the focus group responded to the question regarding their view about the integration of social values with the teaching of mathematics:

I have no objection

Sammy said: "I have no objection to the integration of social values with lessons in mathematics, and in my opinion, this is possible and very important". Julia said: "Values are more important than the discipline". Johnny said: "Now I begin to understand mathematics and the study of values". David added: "I want to apply the values that I have learnt". Dana said: "It is necessary to prepare well for such a lesson because every time we learn mathematics it is interesting and we understand it more". Joseph responded: "There is a close connection between social values and mathematics, and now I understand that I missed the pleasure of mathematics in the past". Ahmad: "This requires the teacher to be a person of high standing in the field of values".

This finding is supported by Edri (2010) who concluded that the integration of education for values with the teaching of mathematics is possible both on the theoretical level and on the empirical level. He also arrived at another finding that teachers of mathematics also sense the need to deal with education for values and feel helpless in the realization of integrating education for values with the teaching of mathematics.

What do you say in support of integration of education for values with the teaching of mathematics?

The teacher is an educator:

Sandy says a mathematics teacher is an educator for thinking. Paula said: "Every teacher must be an educator and therefore must deal in values as well". "The school is an educational place, and the supreme aim is to acquire values for the graduates who will be integrated into a just and moral society and not only study mathematics for examinations". Mina adds: "The integration allows for personal expression by the pupil and strengthens the possibility of being a personal example for his colleagues, not only in the school but in the neighborhood".

Mahmud said: "The integration allows for a personal connection between the pupil and mathematics and also with the teacher who represents a personal example".

This finding is supported by Edri (2010) who concludes that education for values is part of the duty of mathematics teachers in spite of their difficulties in application which results from the need to prepare and invest efforts beyond the normal preparation for a mathematics lesson.

The integration arouses interest in mathematics

Fadia said: "This is a way to add interest to the usual questions in mathematics".

Sandy added: "Mathematics becomes relevant to the world of the pupil". Mahmud also added: "This exposes the pupils to matters of daily life and broadens the horizons of the pupils". Nadia added further: "It is possible with the help of calculations and graphs to present situations in society that raise difficult questions to be discussed in order to advance education in certain values". Johnny also added: "The integration enriches the world of the pupil as a citizen in the state".

This finding is supported by Voss (2012) who arrived at the conclusion that integration of education for values with the teaching of mathematics strengthens and broadens horizons and enriches the world of the pupil.



To sum up:

Before the course	After the course
<ul style="list-style-type: none"> - There is no doubt about the need to integrate education for social values with the teaching of mathematics - The pupils regarded education for values as a very important part of mathematics lessons. - They found that the integration adds interest to the mathematics lesson and allows for discussion that contributes to the broadening of horizons among the pupils. 	<ul style="list-style-type: none"> - The pupils expressed the importance of social values, tolerance, and acceptance of others - The pupils said that they were studying about social values as part of the education lessons and not all the time - The pupils said that there was no integration of education for social values in the lessons for mathematics - The pupils said that it was impossible to study social values during lessons for mathematics because they had to complete the material for final examinations and also that mathematics was a subject purely in itself. - The teaching of mathematics is not connected with the study of values - There is a lack of time for doing this - They expressed doubt of the possibility to integrate social values with mathematics

Recommendations

- The pupils expressed the feeling that it was difficult to integrate social values with mathematics because:
 - It is not usual to educate for values in mathematics lessons.
 - Tools are lacking to cope with education for values in mathematics lessons.
 - There is not enough teaching time to integrate education for values with mathematics.

The conclusions of the author:

- There is no doubt of the need to integrate education for social values with the teaching of mathematics which is very important and interesting.
- Education for social values is an inseparable part of the disciplinary duty of the teachers and of mathematics teaching in spite of the difficulties in application due to the need to prepare and invest efforts beyond the normal preparation for lessons in mathematics.
- The integration of social values in mathematics lessons adds interest to the lesson and allows for discussion that contributes to broadening the horizons among the pupils.

This study recommends the following:

- Mathematics teachers should take advantage of employing the problem-solving approach in their classrooms in which they should be patient and provide sufficient time to employ the approach properly and to reach the desired aims.
- Mathematics teaching should be student-centered.
- Values to be taught via problem-solving should receive considerable attention as they have a great impact on individuals and society as well.



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