

# **NIRP Research for Policy Series 15**

Education for international cooperation:  
the Middle East water management case

**Based on the work of  
Ruth Zuzovsky and Ruth Yakir (Israeli case study)  
and Marwan Haddad (Palestinian case study)**

## Colophon

### NIRP Research for Policy Series

#### **Part 15: Education for international cooperation: the Middle East water management case**

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## Preface

This booklet reports on a study that began in 1995 as a collaborative effort between Palestinian, Israeli and Dutch researchers who shared the same hope regarding a peaceful solution to the dispute between Jews and Arabs living in the region. Their collaboration was centred on studying the opportunity to change the prevailing public attitude towards peace and cooperation in one of the issues that captures the essence of the conflict between groups competing for scarce resources – the water issue. Most of the data for this study was collected during 1997-1998. The Netherlands-Israel Development Research Programme (NIRP) funded the project. NIRP aims to encourage development-related research focused on socio-economic and cultural change.

Being policy-oriented in nature, NIRP aims to make the results of research accessible to anyone interested in solving the problems investigated. The target groups for such knowledge include policy makers, representatives of non-governmental and donor organisations, and the scientific community. With this aim in mind, the Publication Board has launched the NIRP Research for Policy Series as a channel for the publication of “user-friendly” summaries of more than 30 scientific reports.

The NIRP Publication Committee commissioned Dr. Mirjam A.F. Ros-Tonen to summarise and integrate the final reports submitted by the Palestinian and Israeli researchers and to edit this booklet. The respective authors subsequently endorsed the result. The Publication Board wishes to thank Dr. Ros-Tonen for this effort. Thanks are also due to Mr. Howard Turner for revising the English.

Last but not least, the Publication Board wishes to thank the research team for the successful completion of this study, despite the difficult situation the Middle East is presently facing.

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# I. General information<sup>1</sup>

## I.1 Framework of the study

The present study centred on an examination of the opportunity to change the prevailing public attitude towards peace and cooperation in one of the issues that captures the essence of the conflict between groups competing for scarce resources – the water issue. Peaceful solutions to such conflicts demand a willingness to compromise and cooperate. In the existing psychological atmosphere in the region this willingness is weak. Ideological factors only add to the existing barriers of mistrust and fear, thus making negotiations on compromise solutions difficult to be accepted. Public opinion is not yet ready for a change in attitude. In such cases of conflict, education is called upon to mobilise prevailing public opinion.

The study aimed to evaluate the impact of an educational programme dealing with water issues on the knowledge base and attitudes of youngsters in both Israel and the Palestinian Authority. The programme offered high credibility information related to water management issues. More specifically, the aim was to delineate existing knowledge and attitudinal structures of youngsters in both countries and to find out whether and in what way these had changed during an eight-week intervention period. An additional aim was to validate the cognitive approaches to attitudinal change and to measure the impact of knowledge gains on the change in attitudes.

The educational programme (also referred to as ‘the intervention’) consisted of two curricula offering relevant information on the water conflict in the Middle East, and especially on the conflict between Israelis and Palestinians. The two curricula were developed separately in the two countries.<sup>2</sup> Although not identical, they centred on similar topics. Among these were: water as a global resource, water sources and systems in the region, groundwater, main aquifers, technologies for using groundwater,

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<sup>1</sup> Based on Zuzovsky and Yakir (1999) and Haddad (1999).

<sup>2</sup> Formal institutional cooperation between Palestinian and Israeli institutions was prohibited due to Palestinian Authority regulations on Palestinians.

water uses and users, factors affecting water availability and consumption, the water balance of the countries in the region and possible solutions to water scarcity. The two curricula were put on trial and taught for two consecutive years (1996-1997 and 1997-1998). In Israel it was implemented in six teacher colleges and was later taught by the student teachers as part of their practice in junior high schools. In the Palestinian Authority, the programme was introduced into three junior high schools in the Nablus area and was taught by members of the Palestinian research team.<sup>3</sup>

This study evaluates the impact of this educational programme on the knowledge base, beliefs and attitudes of the participants in both countries.

The State of Israel<sup>4</sup> covers 20,770 km<sup>2</sup> with 6.03 million inhabitants (The CIA World Fact Book, 2002) and a high population density of 288 persons per km<sup>2</sup>. It is a country with a semi-arid climate and wide fluctuations in its annual precipitation. It frequently suffers from a series of very dry years during which the annual evapo-transpiration may be greater than the annual precipitation. Israel's water potential is derived from four sources: groundwater and aquifers (about 1,082 mcm), natural surface reservoirs, storm run-off and recycled domestic and industrial effluent (about 1,843 mcm). Its annual renewable water resources equal about 2,040 mcm which is derived from three major reservoirs: the coastal aquifer, the mountain aquifer most of which lays beneath the West Bank (Palestinian Authority territory) and Lake Kinneret (the Sea of the Galilee). All three main sources suffer from relatively small volumes of their effective stock and salination. This potential of water was almost exhausted in 2000 when the demand of Israel, the West Bank and Gaza almost equalled the supply of water: 1,209 mcm for irrigation, 903 mcm for urban and industrial usage (Government of Israel, 1996). The Israeli water problem is further complicated by the high rate of population growth, high rates of per capita water consumption including water for intensive agriculture, contamination of aquifers and rapid development over the aquifer recharge area (Feitelson and Haddad, 1998; Kartin, 2000).

Palestine, or the Palestinian Authority, as presented in this booklet consists of the West Bank and Gaza Strip, which are those parts occupied by the Israeli army during the 1967 war. The land area of the West Bank is

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<sup>3</sup> Student teachers from Palestine could not be included in the study due to official reservations of the authorities.

<sup>4</sup> The area of the State of Israel excludes the West Bank and Gaza Strip, as well as the Israeli-occupied Golan Heights.

estimated at 5,572 km<sup>2</sup>, extending about 155 km in length and about 60 km in width. It is located mainly in the mountainous lay and has an average population density of around 335 people/km<sup>2</sup>. The Gaza Strip, with an area of 367 km<sup>2</sup>, extends over an area of approximately 41 km in length and varying between 7 and 9 km in width (Figure 1). It is situated in the southern part of the coastal plains and has an average population density of approximately 2,797 people/km<sup>2</sup>. Palestine, in general, is a semi-arid area where water resources are scarce.

Since the first days of Israeli occupation of the West Bank and Gaza Strip, the actual regulation, control and management of all elements of water management were in the hands of the Israeli authorities. These authorities had issued a series of military orders limiting the use of natural resources, confiscating agricultural land and restricting the development of all other natural resources. These orders and all practices related to their implementation have negatively affected water management in Palestine (UN, 1991; Abdulhadi *et al.*, 1994). Palestinians were only responsible for minor administrative and financial aspects of water supply for municipalities, villages and refugee camps. Requests or proposals regarding their water needs could only be submitted to the Israeli authorities.

In September 1995, the Palestinians and Israelis signed Article 40 of the Oslo B agreement (the Oslo Declaration of Principles – DoP) on the transfer of authority on water and sewage. Both parties agreed on each others' rights to water resources and cooperation in the field of water management and investments. A Joint Water Committee and Joint Supervision and Enforcement Teams coordinate and supervise the implementation of tasks mentioned in the article. Definitive arrangements concerning water resources management and control are still being negotiated.<sup>5</sup> Until the conclusion of these negotiations, the overwhelming Israeli control of Palestinian water resources is still effective with the exception of some arrangements for the management of daily needs in the areas under Palestinian control. This implies that Palestinian people living in the West Bank and Gaza Strip are still experiencing water supply shortages, that Palestinian water use is subject to fixed quotas, and that investments in water infrastructure and in human and institutional capacity building are

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<sup>5</sup> Under current political conditions in the Middle East, it is hard to obtain neutral information on the present water situation from both sides. The information about the resource status and supply trends in Palestine in this section comes from the Palestine author, Marwan Haddad, and refers to the period in which the data was collected and reported (1995-1998). It was not possible to get the data in the table confirmed by Israeli sources.

deficient (UN, 1991; Haddad, 1994; Haddad and Mizyed, 1996) (see also Section III.1). Presently, there is no adequate mechanism or legal authority to force any of the two sides to implement the article, to find a solution to a conflicting issue or even to pursue a meeting between the two sides.

In addition to the water rights issue, the water *problem* in the two neighbouring countries – Israel and Palestine – stems from both objective-realistic and less realistic conditions (Naff and Matson, 1984). Realistic conditions include, for example, the semi-arid climate in the region, agriculture-based economics and scarce water resources. Besides scarcity, other factors have also resulted in an imbalance in the equation between available water supply and demand (Haddad and Bakir, 1998). One such factor is the high population growth through migration of native Palestinians outside Palestine and the massive immigration of Jews from all over the world to their homeland, while industrialisation and urbanisation are two other mitigating factors. The water *conflict* is, however, linked to unrealistic features such as the association of water to security needs and ideological commitment.

Since water is physically inseparable from the territory through which it flows, conflicts over water can be conceived as territorial in nature. Here, the issue of sovereignty over territory, including its resources, comes into play. Sovereignty over land and resources becomes an object to defend and secure. Due to contemporary technological advances and the growing interdependence among states – environmentally, economically and politically – the concept of sovereignty has been challenged.

People, products and pollutants all cross borders, with the result that any territorial unit becomes hard to defend and keep secure.

In case of the Palestinian-Israeli water conflict, for instance, 75% of the water that Israel consumes comes from aquifers that are bisected by political borders. The main watershed occurs on Palestinian territory, whilst Israeli per capita consumption is three times that of the Palestinians. The fact that the Palestinians reside in the upper aquifer area where they also have their industrial areas constitutes a threat to the territorial sovereignty for the Israeli. Israelis feel that this threatens not only the availability of water for the upper country, but also the quality of the ground water of the lower country.

## **1.2 Objectives and research questions**

The main topic of this study is the attitude towards the management of shared water resources in a situation of real conflict. Possible solutions to

the conflict require cooperation and compromise. Only a positive attitude towards cooperative water management can ensure efficient management, the fair allocation of water currently available and the generation of new sources. This study aimed to change prevailing attitudes among Israeli and Palestinian young people towards coexistence, cooperation and compromise in issues related to the water conflict. An educational intervention based on a cognitive approach to attitude change was introduced into teacher colleges in Israel and into junior high schools in Israel and the Palestinian Authority.

The objectives of the research were:

1. To delineate existing knowledge and attitudes of young people in both countries towards a peaceful solution, cooperation and compromise related to water resources.
2. To develop and estimate the impact of a short (6-8 weeks) educational programme about water management issues based on introducing new information (persuasive messages) on the participants' initial knowledge base.
3. To measure the impact of knowledge gains on attitudes to the water dispute.
4. To explore a cognitive approach to attitudinal change with the intention to validate Fishbein and Ajzen's (1975) cognitive approach to attitudinal change (see Section I.3).

The corresponding research questions were:

1. What was the attitude change towards a set of beliefs regarding allocation, sharing, collaboration and efficiency of a technological solution related to water management issues?
2. What are the structures (attitudes) underlying this set of expressed beliefs?
3. How did the attitudes that were delineated in the study change as a result of the educational intervention?
4. Is there an interaction effect between exposure to the educational programme and the ethnic affiliation of the participants?
5. To what extent did the knowledge of water resources and management issues of Israeli student teachers and their pupils and that of Palestinian pupils change during the educational intervention?
6. Was there an effect of knowledge gains on attitude changes and, if so, what was it?

7. Is there an interaction effect between the educational programme and the ethnic affiliation of the participants on attitudes towards peace, collaboration and technological solutions?

### **I.3 Theoretical orientation**

The rationale of the educational intervention is based on several theories, most of them cognitive in nature. One set of such theories deals with attitudinal change, *i.e.* the idea that knowledge (or beliefs) may lead to changes in attitudes. Another set of theories focuses on conflict termination. Within this set of theories, some view conflict from a web of socio-psychological processes and others from an epistemic framework as cognitive schemes, mental representations of knowledge, the content of which typically refers to the incompatibility of goals between parties.

Viewing attitudes as shaped by knowledge and conflict between groups as cognitive schemes is congruent with the educational intervention used in this study and described below. In the following section we will elaborate on these theories. Further details can be found in Zuzovsky and Yakir (1999) and Zuzovsky (2000).

#### *I.3.1 Theories about cognitive attitudinal change*

We based this study on Fishbein and Ajzen's (1975) distinction between attitudes and beliefs. Attitudes refer to a person's favourable or unfavourable feelings towards an object (affect). Beliefs link this object to specific attributes (knowledge). The more probable the association between the object and its attributes, the stronger the belief will be. This probability is, of course, experienced subjectively. According to Fishbein and Ajzen, attitudes are built upon beliefs. Some of these beliefs are more salient and play a more important role in attitude formation. The totality of salient beliefs multiplied by the strength of these beliefs serves as the informational base that ultimately determines our attitude. Underlying this is a view of humans as rational, knowledgeable organisms who use information to form and evaluate their beliefs, make judgements and build their attitudes. This view thus opens a door to educational intervention, such as the one which was part of this study which aimed at changing the existing beliefs of young Israelis and Palestinians.

If we link the formation of attitudes and beliefs to the processing of new information, this leads us to two mechanisms of information processing: persuasion and epistemic restructuring. Although rooted in two different traditions, the two mechanisms share many elements. Persuasion is defined as a "conscious attempt to bring about a jointly developed mental

state common to both source and receiver, through the use of symbolic cues” (Koballa, 1992: 63; Larson, 1986; Reardon, 1981; Trenholm, 1989). At the heart of this process is the formation or modification of beliefs with regard to evidence and good reasons. Persuasion is considered successful when a belief formation or attitudinal change is based on grounds considered convincing by the recipient.

As persuasion uses information, it has many things in common with instruction. Both communicate arguments and evidence for the purpose of getting someone to believe in something or to do something and both require conscious cognitive activity on the part of the recipient. Both are concerned with the modification and formation of beliefs which are held “evidentially” (Green, 1971). A purpose of instruction is “to shape someone’s belief or behaviour by helping him to see that the belief is reasonable and the behaviour is justified” (*ibid.*, p. 29). In this sense, the aims of persuasion and instruction appear to be very similar.

The persuasion scholars (Petty and Cacioppo, 1981; 1986a; 1986b; Chaiken, 1987; Chaiken, Lieberman and Eagley, 1989) assume that individuals process a message carefully when they are motivated and able to do so. If the strength of the argument or the relevance of the information in the message is the primary determinant of whether persuasion occurs, subsequent attitudinal change will last. If persuasion is determined by factors external to the message argument (*e.g.* reward or punishment associated with the message or attractiveness of the source of information) attitudinal change tends to be temporary or unstable.

The second mechanism of attitudinal change is laid down in the lay epistemics theory (Kruglanski, 1980a; 1980b; 1989). Here the process of beliefs/attitude formation or change is described as having two phases: the generation phase and the validation phase. In the generation phase, information is stored in knowledge structures. In the validation phase, the individual tests the generated cognitive structures or their implications against the evidence he/she possesses. The more mutually consistent the two are, the more confident the individual will be in the belief.

Since the targets of the educational interventions were people’s beliefs about coexistence, cooperation and compromise related to the Israeli-Palestinian water conflict, we also recurred to theories on inter-group conflicts and conflict termination. Here too, conflicts can be viewed from different perspectives. A psycho-sociological view distinguishes between “realistic” and “unrealistic conflicts” (Coser, 1956). Realistic conflicts stem from

opposing interests between two parties that may have negative relationships of two types: dominance or competitiveness over rare resources such as land and water. (Campbell, 1965; Levine and Campbell, 1972). Unrealistic conflicts are mainly regarded as psychological responses in which there is a perceived conflict of interest that is not necessarily realistic. Generally, realistic and unrealistic conflicts occur intertwined. An alternative way to view conflicts is not in terms of psycho-sociological processes, but rather in terms of the aforementioned epistemic approach: conflicts are then viewed as cognitive schemes: mental representations of knowledge which affect the way new information is assimilated and organised in cognition. In the case of a conflict scheme, this knowledge determines whether a situation can be considered as a conflict and whether it should be maintained, terminated or enhanced as such. The knowledge content typically contained in a conflict schema refers to the incompatibility of goals between parties. If parties identify at least two goals – its own and that of other party – and these goals are incompatible, the situation can be labelled as conflictive.

Bar-Tal and his colleagues (Bar-Tal, Kruglanski and Klar, 1989; Bar-Tal and Geva, 1985; Klar *et al.*, 1988) identified two methods of conflict termination. In the first – conflict resolution – the conflict scheme is replaced with an alternative scheme, *e.g.* a compromise scheme. This is possible when there is motivation for openness and when new information is available. This new information highlights the situation from another angle and justifies abandoning the conflict scheme for the alternative one.

In the other mode – conflict dissolution – the belief about the existence of conflict loses its place as the focus of attention and moves into relative obscurity. In contrast with conflict resolution, this does not affect judgement, evaluation or behaviour (Bar-Tal, 1986). In conflict dissolution, no essential change occurs in the conflict beliefs of the parties; they are just less central in the cognitive system of both parties.

It should be noted that although the discourse on conflicts within the epistemic and the psycho-sociological framework is different, the essence of conflict termination remains the same. According to both approaches, conflict termination seems to be dependent on processing new information, forming new beliefs and attitudes or changing existing conflict schemata. In light of the above described “information processing model” we can turn to the educational approach adopted in our study.

### *1.3.2 The educational approach to change attitudes*

The background provided in the previous sections enables us now to describe the educational approach adopted in this study. The cognitive

theory on attitudinal change adopted here was the theory of reasoned action (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980). By adhering to this theory, we intended to change attitudes towards cooperation and peaceful coexistence in the region by forming or changing the salient beliefs that underlay these attitudes via the provision of unbiased information. This information was supposed to be processed in a systematic way which would allow persuasion, belief formation and, ultimately, attitudinal change.

The view of conflict as cognitive structures which store information or knowledge regarding an object enables us to articulate Fishbein and Ajzen's terminology and their theory on attitudinal change to the lay epistemics framework (Bar-Tal *et al.*, 1989; Kruglanski, 1980). The content of the conflict scheme can be regarded as the set of beliefs that a person holds about the conflict. It is the perceived conflict of interests or the knowledge stored in the conflict scheme that is subject to change; and the attitudes for or against peaceful co-existence that is the target of educational intervention.

#### **1.4 Hypotheses and methodology**

In line with the theories outlined above, we assumed that knowledge is one of the keys to building beliefs and attitudes. We therefore developed and implemented an educational programme that aimed to broaden the knowledge base of young Israelis (Arabic and Jewish citizens) and Palestinians on topics related to the water dispute and management. We believed that exposing teachers and student teachers, and later on their pupils, to new information on these topics, may lead them to reflect on their existing beliefs and attitudes. This, in turn, might induce them to change these beliefs and attitudes towards favouring peaceful solutions of compromise and cooperation.

Two curricula were developed that offered relevant information on the water conflict in the Middle East and, in particular, on the conflict between Israelis and Palestinians. This occurred separately in the two countries, but meetings of the teams from both sides brought about a growing similarity in instructional modes. The Israeli programme was more experiential and contained field trips, discussions, simulation games, etc. The Palestinian programme was a more frontal one in the beginning and based mainly on providing written and graphic representations followed by class discussion. Over time, additional elements such as laboratory work, group discussion and project work were added. Palestinian pupils were asked, for example, to draw pictures that they feel indicate what they think and feel about

water management. They were also asked to write plays and play with puppets in front of the class, summarising what they understand from the research. The idea of the project work was transferred to the Israeli programme. The programmes were subjected to trials in both countries during 6-8 school weeks in two consecutive years (1996/97 and 1997/98). All participants found the programme very interesting and motivating. Many participants even continued to bring items of information to the class regarding water issues several weeks after the programme had ended.

The topics that appeared in the Israeli curriculum included the following topics: war and peace and the issue of water in the region; water as a substance, its properties and uses; the importance of water to living organisms and humans; use of water in industry, agriculture and domestic sectors; water as a global resource; factors affecting availability and consumption; groundwater, main aquifers and technologies for using groundwater; water balance of Israel and other Middle Eastern countries; technological solutions to water scarcity (such as desalination, transport, sewage reclamation, cloud seeding and dams); and agreements and ways to settle disputes regarding water rights. A reader was published in a commercial format and offered to the student teachers who participated in the study and other interested people, such as educators and hydrologists. The reader contained articles from professional journals dealing with water management, chemical physical properties, technologies and a collection of extracts from daily newspapers related to the water dispute, sorted according to the curriculum's topics. In addition, participants were exposed to lectures on relevant issues.

The Palestinian curriculum was based on an extensive media survey of public concern over various water management aspects. It included seven interrelated groups of issues: water sources and systems; water uses and users; economic activities and their impacts; social, cultural, and financial aspects; waste water management; research and development; and political and regional aspects.

Student teachers from five teacher colleges and one school – three Jewish and three Arabic – and teachers from one junior high school participated in the Israeli sample. Their pupils, from 19 classes, joined the programme at a later stage. The sample consisted of 120 student teachers and teachers (50 Jews and 70 Arabs; see Table 1) and 525 pupils, while data on the belief system was obtained from 111 student teachers and 508 pupils. Most of the adult participants were females (96 out of 111), and there was an equal number of boys and girls.

In the Palestinian Authority, the programme was introduced into three junior high schools in the Nablus District; two urban and one rural school. Here, the curriculum was taught to junior high school pupils as part of their practice activities. The population included pupils of the ninth grade, with age ranging from 14-16 years (average: 15 years). The total number of pupils participating in the educational programme amounted to 245; 140 females and 105 males. Data on the belief system was obtained only from 106 participants.

Table 1 The sample of the main study

College/School	Student teachers and teachers	Pupils
<i>Israel</i>		
Kibbutzim	17	69
Levinsky	13	37
Alon (school)	20	261
Haifa (Arab)	26	60
Beit Berl (Arab)	17	57
Oranim (Bedouins)	<u>27</u>	<u>41</u>
Total	120	525
<i>Palestinian Authority</i>		
Kamal Junblat Girls School	-	100
Qadri Turkan Boys School	-	105
Almajdal Girls School	-	<u>40</u>
Total		245

The knowledge base, knowledge gains and attitude change of the participants were tested through the application of an attitude questionnaire and a knowledge test. This will be further dealt with in Section I.5.

## I.5 Elaboration of the research

### I.5.1 *The 'belief and attitude' questionnaire*

The Israeli and Palestinian researchers jointly developed the belief and attitude questionnaire. A set of belief statements was transformed into items with five response options ranging from 1 (full disagreement) to 5 (full agreement). The items in the questionnaire fell into six categories:

1. Statements expressing beliefs regarding ownership claims to ground water or surface water in cases where rain falls in one territory and is pumped into another, or emerges from springs or rivers in one territory and flows into another.

2. Statements expressing beliefs regarding criteria for water allocation (according to needs, present consumption, future consumption, population size, standard of living, geopolitical factors, history of use, amount of rainfall in a country, international laws, and moral or religious principles).
3. Statements expressing an intention to act for the sake of peace: willingness to share, reduce water consumption, produce and use water in a more efficient way, trade, develop alternative sources, import food, increase water price, etc.
4. Statements expressing beliefs in the vitality of water to a country and the objection to give it up or to share it.
5. Statements expressing preference for either separate or joint water management policy.
6. Religious or moral considerations regarding management of water resources.

All statements could be linked to the two main attitudes that were studied: attitudes in favour of peace between Israelis and Palestinians and attitudes in favour of regional cooperation regarding water resources and treatment. Attitudes in favour of peace are generally based on beliefs associating peace with economic growth and welfare, national security, etc. Attitudes in favour of cooperation are based on beliefs of increased productivity and efficiency in collaborative endeavours. In our case, the set of beliefs relevant to the water conflict issue would involve the consequences or impact of cooperation on the availability and quality of water.

The questionnaires went through several transformations. In the pilot phase, the Israeli questionnaire administered to student teachers contained 58 items. A 35-item version of this questionnaire was administered to the pupils of the Israeli student teachers. In the Palestinian Authority, the questionnaire could be given to pupils only (see footnote 2). This questionnaire initially comprised 66 items, dealing mostly with water allocation and water management, collaboration and attitudes towards peace.

Analysis of responses to the items in the pilot phase resulted in revision or elimination of several items. Towards the main phase of the study, an agreed selection of items from both sources – the Palestinian and the Israeli groups – constituted three forms: the Israeli belief questionnaire with 71 items later administered to Israeli student teachers, a sub-set of a 35-item belief questionnaire administered to Israeli junior high pupils, and a 50-item belief questionnaire administered to Palestinian junior high

students. Twenty-three common items appeared in the pupil version of the belief questionnaire. The reliability of the attitude questionnaires was found to be acceptable.

### *1.5.2 The knowledge questionnaire*

The knowledge questionnaires reflected, to a large extent, the contents of each curriculum (Israeli-Palestinian) and the nature of the instruction carried out in each country. Since neither the curricula nor instruction were identical, the knowledge questionnaires were not comparable. In Israel, two versions of knowledge questionnaires were administered: one for student teachers and the second for their pupils. The student teacher questionnaire was administered twice: at the very early stages of the programme and at the end of the student-teaching period after they had completed teaching the programme. Pupils' knowledge questionnaires were administered at the beginning and at the end of the teaching period.

The Israeli student teacher knowledge questionnaire contained 28 questions: ten multiple choice items and 18 open-ended questions. The Israeli knowledge questionnaire for pupils contained 17 questions, of which only five were multiple choice and the rest (12) open-ended.

The Palestinian knowledge questionnaire contained 5 open-ended items and 12 true/false items, bringing the total number of items in the questionnaire to 17.

### *1.5.3 Data analysis*

Several meetings of the Israeli and Palestinian researchers were held to coordinate data analysis procedures. Several statistical procedures were applied in the analyses of data, most of them based on repeated measures techniques. A *t*-test for dependent samples was carried out to determine the change in the groups' means on the knowledge and beliefs' scales. Factor analysis was carried out separately on responses to the beliefs' questionnaire at the beginning of the programme and at the end to delineate initial and later attitudinal structures. These structures were then used in the construction of indices representing attitudes. Change in these attitudinal indices was determined, again by using the *t*-test procedure for dependent samples.

Several methods were applied to answer the theoretical questions concerning the relationship between knowledge gains and the change in attitudes. First, Pearson correlation coefficients between the knowledge gain scores and the attitudinal scores were computed. Second, a repeated measure analysis of variance was conducted to estimate the effect of the

curriculum and the interaction effects of the curriculum on the variance in the measures of knowledge and attitudes. Lastly, multiple regression analyses on post attitude scores with prior attitude scores and knowledge gain scores as predictors enabled to estimate their impact on the explained variance in the resulting attitudes.

A comparison between Israeli and Palestinian pupils' responses on the items that the curricula had in common was done using *t*-test procedures of dependent samples.

## II. Results

### Part A: The Israeli case study<sup>6</sup>

#### II.1 Beliefs and attitudes of Israeli student teachers and teachers

##### II.1.1 *Changes in beliefs: findings at the item level*

The Israeli sample consisted of 120 Israeli student teachers and teachers (50 Jewish and 70 Arab). Full data (measures before and after the educational intervention) were obtained from only 111 respondents (48 Jewish and 63 Arabic student teachers).

Statistically significant changes occurred in 20 out of 71 items. These items and the direction in which they changed are listed in Table 2. In most cases, the changes were in the direction of the beliefs scale (*i.e.* increased agreement with the belief statements). Many of these changes point towards increased willingness for cooperation and acting for the sake of peace. In seven items there was a decrease in the level of agreement, mostly in the case of items expressing territorial or even separatist views (*i.e.* 3, 16).

##### II.1.2 *Comparing changes in beliefs of Israeli Jewish and Israeli Arab student teachers*

The pattern of change in beliefs<sup>7</sup> appeared to be fairly similar for the two ethnic groups (Jews and Arabs). Regarding the issue of ownership (items 1 and 2), for instance, Jewish student teachers believe less after the educational intervention that water belongs to the country where it falls. After the educational intervention, Arab student teachers are less inclined to believe that the water belongs to the country in which it is being pumped. These are similar one-sided territorial views that are weakened as a result of the educational intervention. Moreover, in other items (3) it is

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<sup>6</sup> Written by Ruth Zuzovsky and Ruth Yakir.

<sup>7</sup> Measured using a paired *t*-test for dependent samples for all items in the questionnaire.

Table 2 Belief items list showing statistically significant changes among Israeli student teachers

No. item <sup>a</sup>	Content	Direction of change
1	Rainfall that enters the soil in one country and is pumped or flows in a neighbouring country belongs to the country in which the rain fell.	-
2	Rainfall that enters the soil in one country and is pumped or flows in a neighbouring country belongs to both countries equally.	+
3	Water in Israeli territories belongs to the Israelis alone and no other has the right whatsoever to use it.	-
4	In order to implement the peace process we should share the water sources available to us.	+
5	In order to conserve water, agricultural products should be imported instead of grown.	++
6	I am willing to reduce my personal intake of water in order to determine relocation of water resources.	+
7	For the sake of peace, allocation of water to tourism should be curtailed.	+
8	For the sake of peace, sectors consuming very large amounts of water should be curtailed.	+
9	For the sake of peace, we should share the mountain aquifer with our neighbours.	+
10	For the sake of peace, water should be made expensive.	+
11	Water consumption in Israel is twice that of the West Bank. For the sake of peace, this gap should be closed.	+
12	For the sake of peace, the gap in water consumption between Israel and Palestine should be closed by reducing Israeli consumption.	-
13	For the sake of peace, developing alternative sources of water will help closing this gap.	-
14	Food should be imported if growing it requires a great quantity of water.	++
15	Additional water for other purposes in the countries of the Middle East should be provided from water allocated to agriculture.	+
16	Better quality water is a goal that should not be relinquished even for the peace process.	-
17	Without a solution to the water shortage there can be no peace in the region.	-
18	Vital water pumping areas in Israel should not be relinquished to another country.	++
19	The Israeli water is an essential requirement and social treasure which should not be traded for any price.	-
20	Preferably every country should manage its own sources of water.	-

<sup>a</sup> Numbers used for reference in the text; their ID number in the student teachers' questionnaire was different.

++ = strongly increased agreement with the belief item; + = increased agreement; - = decreased agreement.

evident that both groups, especially the Jewish group, perceive water as less territorial and most agree that water sources should be shared (4, 9).

Another similarity in Jewish and Arab student teachers' responses appears in their expressed willingness to act for the sake of peace on issues related to water management (items 4-13). While both sides are willing to act, the Jewish student teachers seem more eager than the Arab student teachers to reduce their private consumption of water, to develop alternative water sources, to reallocate water from agriculture to other sectors and to recycle and re-use polluted water (items 6, 13, 15; item on re-use not in Table 2). The Arab students are less willing to change their daily habits and seem to agree more than the Jewish students on the item that for the sake of peace, the consumption gap between Jewish and Palestine should be closed by reducing Jewish consumption only.

Analysing the different patterns of change in responses of the two ethnic groups in Israel regarding the water dispute between Israel and Palestine reveals the following trends:

1. The weakening of ethnocentric and separatist views, especially amongst Jewish student teachers. According to such views, water is a territorial asset: rain falling on Palestinian territory belongs only to the Palestinians and *vice-versa*. After the educational intervention, this perception becomes weaker in both groups, especially among the Jewish student teachers. Along the same line, the belief that water belongs to the two peoples is strengthened, especially among Arab student teachers.
2. Weakening of the agreement with most items related to the opinion that better quality water should not be relinquished or traded. This trend also points to the weakening of ethnocentric views.
3. Israeli Jewish student teachers are more willing than Israeli Arab student teachers to act radically as regards solving the water problem. Israeli-Arab student teachers are more inclined than their Jewish colleagues to say that this action should be taken unilaterally by the Israelis.
4. There is a similarity between the two ethnic groups with regard to the approved criteria for water allocation. Both sides agree that this allocation should be based on population size, rainfall quota and the needs of each population group. Israeli Jewish student teachers agree, however, more than their Israeli Arab counterparts that water should be allocated according to present and future needs, standards of living, international law and the agricultural nature of the country's economy.

### *II.1.3 Changes in the attitudes of Israeli student teachers: aggregated item level findings*

A factor analysis of the aggregate data set of pre and post intervention responses resulted in three factors (all with Eigen values of at least .35), representing three groups of attitudes:

1. Attitudes in favour of peace (9 items).
2. Attitudes in favour of separatism (the opposite of cooperation – 7 items).
3. Beliefs in the efficiency of technological and other solutions to the water problem (9 items).

These attitudes explained 11.4%, 8.2% and 7.4% (27%) of the variance in student teacher responses, respectively. Table 3 presents the items of the three indices.

We compared the scores of Israeli student teachers (aggregated and for each of the ethnic groups separately) at the beginning and the end of the programme. This generated the following picture:

1. The major change in both ethnic groups was an increase in the readiness to give up water and make compromises for the sake of peace.
2. Less significant is the decrease in separatist views (increase in favour of cooperation).
3. No significant change occurred in the respondents' faith in the power of technological and behavioural solutions to solve the water problem.

The first two findings reflect the desired changes the educational intervention was hoped to bring about.

In general, the mean scores of student teachers on the attitudinal scales were high, ranging from 3.1 to 3.8 on a 1-5 scale. The opening and ending positions of the Israeli-Arab student teachers on both the peace and separation scale were higher than those of the Israeli Jewish student teachers. Israeli-Arab students seem to be more in favour of peace and more ethnocentric and they did change more than the Jewish students on the separation scale. The Jewish student teachers seem to be more confident in technological solutions than the Israeli-Arab group: their opening and closing positions on the scale of faith in technological solutions were higher than those of the Arab student teachers. In both groups, however, the changes on this scale were small.

## **II.2 Beliefs and attitudes of Israeli Junior High School pupils**

The definitive version of the beliefs questionnaire, which was administered to pupils in Israel, contained a selection of 35 items out of the 71 items in the student teachers' questionnaire. It contained items on beliefs regarding

Table 3 Results of the factor analysis on combined pre and post intervention responses of Israeli student teachers

<b>Factors and items</b>
<b>Factor I: attitudes towards peace</b>
<p>For the sake of peace, developing alternative sources of water will help close this gap.</p> <p>For the sake of peace, the gap in water consumption between Israel and Palestine should be closed by reducing Israeli consumption.</p> <p>Water consumption in Israel is twice that of the West Bank, for the sake of peace, this gap should be closed.</p> <p>In order to implement the peace process we should share the water sources available to us.</p> <p>For the sake of peace, allocation of water to tourism should be curtailed.</p> <p>For the sake of peace, sectors consuming very large amounts of water should be curtailed.</p> <p>Finding a solution to the water problem is very important to the peace process negotiations.</p> <p>Countries whose economy is based mainly on agriculture should have priority in regional water distribution.</p> <p>Israel should use desalinated water as an alternative to the mountain aquifer water.</p>
<b>Factor II: attitudes in favour of separatism</b>
<p>Water in the Palestinian territories belongs to the Palestinians alone and no other party has any right whatsoever to use it.</p> <p>Water in Israeli territories belongs to the Israelis alone and no other party has any right whatsoever to use it.</p> <p>Israeli water is an essential requirement and social treasure which should not be traded for any price. The preferred situation would be for every country to manage its own water sources.</p> <p>Palestinian water is an essential requirement and social treasure which should not be traded for any price.</p> <p>Every country/authority should treat its own drainage water.</p> <p>Water belongs to the country where it is pumped or produced.</p>
<b>Factor III: beliefs in the efficiency of technological and other solutions to the water problem</b>
<p>Regional water research and development projects, such as new technological solutions and their application will solve water problems in the region and enhance peace.</p> <p>To what extent do you agree to allocate water according to the future needs in each country?</p> <p>Rainwater which falls and flows on the West Bank should be distributed between Palestinians and Israelis according to international legal judgements.</p> <p>Rainwater which falls and flows on the West Bank should be distributed between Palestinians and Israelis according to the extent of its use in agriculture on both sides.</p> <p>To what extent do you agree to allocate water according to international laws?</p> <p>To what extent do you agree to allocate water according to annual rainfall in each country?</p> <p>Water is important to the economic development of a country.</p> <p>To what extent do you agree to allocate water according to agricultural needs in each country?</p> <p>Treated waste water should be considered as an important supplementary water resource.</p>

the peace process, willingness to cooperate and faith in technological and/or behavioural solutions to the water problem. In this section, we will present findings related to the Israeli pupils. In Part IV of this booklet we will

compare the Israeli and Palestinian pupils on the 9 items both questionnaires had in common. We will not compare responses by Israeli student teachers and Palestinian pupils as the two age groups are not comparable.

### *II.2.1 Change in beliefs and attitude of the entire Israeli sample: item level findings*

In 20 out of the 35 belief items, a statistically significant change occurred as a result of the programme. Table 4 presents the list of items revealing such changes in the entire Israeli sample. Most of the significant changes occurred among the Israeli Jewish pupils (on 18 items). On only 9 items did such changes occur among the Israeli Arab pupils.

The most important findings at item level are:

1. An increase in pupils' willingness to act for the sake of peace by sharing water, reducing consumption and realistic water pricing.
2. There is a mixed tendency regarding separatist beliefs. On the one hand there is a decline in the view that water is a national resource which is not to be given up (6). On the other hand there is an increase in agreement with items that claim that giving water to the Palestinians is a disaster (9).
3. A similar ambiguity exists regarding some ethical and religious beliefs. There seems to be an increasing level of recognition among pupils that rainwater falling in one territory and running into another belongs to the two neighbouring countries (8) and that it is not ethical to take the water for one's own use at the expense of the other (19). At the same time, however, they also agree to an increasing extent with an item that permits water to be taken from anywhere for the welfare of their own country (18).
4. Another clear tendency is the strengthening of economic and pragmatic views regarding acceptable solutions: there is growing agreement in favour of using desalinated water instead of mountain aquifer water (14) and an increase in agreement on reducing water for agricultural consumption and importing food rather than growing it (2, 15, 16).
5. In all items dealing with the joint management of water resources vs. autonomous management (not in the table), pupils expressed considerable agreement on both alternatives and no changes were noted. It would seem that pupils do not have a clear opinion of (or maybe they do not fully understand) the pros and cons related to the options in this regard.

Table 4 List of items showing change (entire Israeli pupil sample)

No. item <sup>a</sup>	Content	Direction of change
1	Without a solution to the water shortage there can be no peace in the region.	+
2	For the sake of peace, sectors consuming very large amounts of water should be curtailed.	+
3	For the sake of peace, we should share the mountain aquifer with our neighbours.	+
4	For the sake of peace, water should be made expensive.	+
5	In order to implement the peace process we should share the water sources available to us.	+
6	Vital areas in Israel for pumping water should not be relinquished to another country.	-
7	Rainfall that enters the soil in one country and is pumped or flows in a neighbouring country belongs to the country to which the water is pumped or flows.	+
8	Rainfall that enters the soil in one country and is pumped or flows in a neighbouring country belongs to both countries equally.	+
9	Transferring the mountain aquifer water to the Palestinians can bring about a hydrological disaster for Israel.	+
10	Water in the Palestinian territories belongs to the Palestinians alone and no other party has any right whatsoever to use it.	-
11	A country whose people used water resources in the past have the right to use the water both at the present time and in the future.	-
12	Water is a national resource and should not be relinquished at any price.	-
13	It is worthwhile for the Palestinians to give up the mountain aquifer should they receive desalinated water.	+
14	Israel should use desalinated water as an alternative to the mountain aquifer water.	+
15	Food should be imported if growing it requires a great quantity of water.	+
16	Additional water for other purposes in the countries of the Middle East should be provided from water allocated to agriculture.	+
17	Water is a gift from God and should be provided to everyone.	-
18	For the sake of economy, welfare water can be taken from anywhere.	+
19	It is not ethical to take water to advance one country's economy at the expense of another country.	+
20	In order to conserve water, agricultural products should be imported instead of grown.	+

<sup>a</sup> Number used for reference in this text only; not equal to the ID number in the questionnaires.

### II.2.2 Comparing changes in the beliefs of Israeli Jewish and Arabic pupils

Both Jewish and Arabic pupils from Israel believe that attaining peace will depend on solving the water problem. In both groups there is an increase in the willingness to act for the sake of peace in this matter: water from the mountain aquifer should be shared, sectors consuming very large amounts of water should be curtailed and water should be more realistically priced. It seems that Jewish pupils' beliefs changed more in this direction than those of the Israeli-Arabic pupils, but the patterns of change are similar. Jewish pupils consider transferring the mountain aquifer water to the Palestinians to be more of a hydrological disaster (item 9) than the Israeli-Arab pupils, whose views in this regard did not change in the course of the educational programme. Jewish pupils thus hold two contradictory beliefs: willingness to compromise and take action with regard to water for the sake of peace and a growing fear of giving up essential water. These pupils have not changed their view that past use of water gives people the right to use it in the present and future (11). Nor have they changed their already favourable stance towards the claim that it is not ethical to take water to advance one's own country at the expense of another. In contrast with the high scores and no-change trend among the Jewish pupils, Israeli-Arab pupils' beliefs have changed more towards perceiving the take-over of water resources as unethical and they believe less in the rights to water based on past use. It seems that in the matter of water rights the differences between Jewish and Arab Israeli pupils have been sharpened as a result of the educational intervention.

In order to clarify the distinction between the beliefs of Israeli Jewish and Israeli Arab groups further at the end of the programme, two discriminating analyses were carried out on the responses to the belief items by student teachers and their pupils respectively. This type of analysis selects the best "set" of discriminating beliefs between the two ethnic groups. The first analysis was carried out on student teacher responses. Out of the 23 items that constitute the three factors, four items were selected as significant discriminating items. These items produced a high degree of discrimination, explaining 42% of the variability between Jews and Arabs. Together, they produce one discriminating function (Table 5). This function mainly represents the Israeli Arab views and reflects the delicate position they hold. On the one hand this function reflects support of Palestinian interests (item 1), but on all the other items it represents an Israeli point of view regarding the claims to rainwater falling in Israeli territory and that the *status quo* prioritising Israeli interests regarding water rights should not be altered. Arabs in Israel seem

to affiliate themselves with Israeli interests. Israeli Arab students were rated higher as regards this function than Israeli Jewish students. The classification of individuals into the two groups according to the delineated function is high and reaches 83.5% of the cases.

Table 5 Discriminant items in Jewish and Arab Israeli student teachers' responses

No.	Function items	Standardised canonical coefficient <sup>a</sup>
1	Water consumption in Israel is twice that of the West Bank. For the sake of peace, this gap should be closed.	.71
2	Water in the Israeli territories belongs to the Israelis alone and no other party has any right whatsoever to use it.	.74
3	Water should be allocated according to future needs in each country.	-.70
4	Water is important for the economic development of a country.	-.38

<sup>a</sup> The standardised canonical coefficients can be interpreted as weightings. The larger the standardised coefficient, the greater is the contribution of the respective variable to the discrimination between groups. This link can be positive as well as negative.

The second discriminant analysis was carried out at the end of the programme on the pupils' responses to 16 belief items. This too resulted in four discriminating items that produced the discriminant functions (Table 6). These items produced a very low degree of discrimination, corresponding with only about 16% of the variance between the two ethnic groups of pupils. The similarity between the beliefs of pupils belonging to the two ethnic groups is evident. The function represents a mainly Israeli, territorial point of view: preference for separate management of water, keeping vital areas (regarding water sources) in Israeli hands and advocating Palestinians to give up the mountain aquifer water should they receive desalinated water. Jewish pupils rate higher than Arab pupils on this discriminant function,

Table 6 Discriminant items in Jewish and Arab Israeli pupils' responses

No.	Function items <sup>a</sup>
1	Regional water should be allocated according to the needs of the neighbouring countries.
2	Preferably each country should manage its own sources of water.
3	Vital areas in Israel for pumping water should not be relinquished to another country.
4	It is worthwhile for the Palestinians to give up the mountain aquifer should they receive desalinated water.

<sup>a</sup> All function items have positive coefficients.

which explains 70% of the variance between the two groups. Even in this age group, Israeli Arabs identify themselves with Israeli interests.

### *II.2.3 Changes in Israeli pupils' attitudes*

A factor analysis carried out separately on pupils' responses to the beliefs questionnaire at the beginning and at the end of the programme resulted in only two factors at the beginning of the programme and three factors at the end. The extracted factors were similar in their content to those identified in analysing student teachers' responses (Table 3), with the 'belief in technological solutions' factor appearing only at the end of the programme. Another difference with the student teacher sample is that the three factors derived from pupil responses had a lower explanatory power than those derived from the student teacher responses. The factors derived from analysing pre-responses explained 14% of the total variance in them (5.9%, 5.6% and 2.6%). At the end of the programme, the items yielded by the analysis of the post-responses explained only 13% of the total variance (5.7%, 4.3% and 3%, respectively).

We compared the mean scores for the factors representing the three attitudes discussed above of students, teachers and pupils before and after the educational intervention. This comparison revealed that, in general, pupils score lower than the student teachers on these scales and that the changes they went through are different from those that occurred in the student teacher sample. The only similar change in the two age groups is the drop in separatism. However, while student teachers' attitudes towards peace strengthened during the programme, the marked change that occurred in the pupil sample was the strengthening of beliefs in the power of technological solutions.

## **II.3 Conclusions to the Israeli case study**

The educational programme brought about changes in beliefs and attitudes among both student teachers and pupils. After the educational intervention, both groups were more willing to act for the sake of peace through sharing water or reducing its use. The pattern of change in beliefs appeared to be fairly similar for the two ethnic groups (Jews and Israeli Arabs).

Ethnocentric and separatist views declined among student teachers, but this picture was more diffuse among pupils. In contrast to student teachers, there was a clear tendency among pupils towards increased pragmatism and belief in the power of technological solutions. In Section IV.4, which compares the results of the Israeli and Palestinian samples, more detailed conclusions regarding the changing beliefs and attitudes will be presented.

## Part B: The Palestinian case study<sup>8</sup>

### II.4 Present water resource status and supply trends in Palestine

In Palestine today, which has a total population of 2.7 million, only major urban centres have access to potable water and sanitation services. Two thirds of the rural areas and refugee camps are partially supplied with potable water and still about one third has no access to water supply services. When the average total annual per capita water use in Palestine is compared with that of Israel or Jordan, four and twofold differences are found respectively.

Table 7 presents some features of water supply and consumption in Palestine. The estimated total water supply in Palestine is 295.5 mcm/yr, 235.5 mcm/yr of which for Palestinians and 60.0 mcm/yr for Israeli colonies. Groundwater constitutes the major source of water for Palestine. The only surface water source in the West Bank is the Jordan river and its tributaries. Since the 1967 war with Israel, the Israeli army prohibited the Palestinians from using this water. It is worth mentioning that the difference between present water consumption and average water balance in Palestine is either regulated or fully controlled by Israeli authorities.

There are 370 water wells now in operation in the West Bank with an output of 64.7 mcm/yr. Twenty-five of these wells with a total capacity of 37.45 mcm/yr are used for domestic and industrial purposes, while the rest (90 mcm/yr) is used in agriculture. Although there are over 300 springs in the West Bank, only 60 of them are reliable and in use offering a total capacity of 56.6 mcm/yr. (Awartani, 1991; WESC, 1995).

In the Gaza Strip there are 87 wells used for domestic and industrial purposes with a total capacity of 48.0 mcm/yr. The total number of wells used for irrigation in the Gaza Strip is not known because of the large

Table 7 Water supply and consumption in Palestine

Location	Palestinian water supply, mcm/yr				Water consumption, mcm/yr			
	Wells	Springs	Imported	Total	Domestic + industrial	Agriculture	Israeli colonies	Total
West Bank	64.7	56.6	6.1	127.4	37.45	90.0	50.0	177.45
Gaza Strip	103.0	-	5.0	108.0	48.00	60.0	10.0	118.00
Total	167.7	56.6	11.1	235.4	85.45	150.0	60.0	295.45

Source: WESC, 1995.

<sup>8</sup> This section is based on the writings of Haddad (1999) and Haddad and Bakir (1998).

number of illegal wells drilled by farmers at shallow depths. However, the estimated amount of water withdrawn for irrigation was estimated at 60.0 mcm/yr.

Some Palestinian water utilities and individual villages in the West Bank and Gaza Strip import water from Israel. The total imported water was estimated at 11.1 mcm/yr.

The Palestinian Water Authority (PWA) is the main official reference for all water supply-related activities in Palestine. The institutions responsible for the operation and maintenance of water supply for domestic and industrial purposes are municipal water departments, independent water utilities, local committees and village councils, and departments connected with the Israeli civil administration. They represent the direct link with consumers. The UN Relief and Works Agency for the Palestinian Refugees in the Near East (UNRWA) operates and manages water supply systems in Palestinian Refugee camps since 1948.

Systems for supplying water for agricultural purposes are operated privately by individual farmers, family farmers and cooperative and collective management associations associated with water projects. The PWA, through the West Bank Water Department or the Hydrology and Water Department of the Ministry of Agriculture in the Gaza Strip regularly check the water quality and allocated quotas for the agricultural water sector.

The position and performance of the Palestinian institutions responsible for management and operation of water supply services urgently require institutional and infrastructure building in order to create a solid foundation for water and waste management in Palestine. In addition to Israeli control of water management, these institutions face several problems, such as:

- a lack of sufficient water supply;
- a lack of inadequate financing and financial accounting and auditing systems;
- an ineffective fee collection and follow-up practices;
- an inconsistent pricing and negative cost recovery;
- a poor, old and segregated water infrastructure, both technical and institutional;
- high rates of water unaccounted for;
- poor human resources development;
- over-employment and improper placement of employees by position;

- a lack of coordination and cooperation between various water institutions; and
- inconsistent technical specifications and standards for materials and equipment used.

## **II.5 Results of a newspaper survey about water management concerns in the Palestinian Authority**

Haddad and Bakir (1998) evaluated the extent of public concerns regarding water management in the Palestinian Authority by means of a survey of the main Palestinian newspapers over the last thirteen years. This period was divided into a pre (1984-87), during (1988-91) and post national uprising period (1992-96). The public concern in the Palestinian Authority regarding various water management aspects was influenced by the prevailing political conditions, indicating:

- a low level of concern in the first and second period when full Israeli military control of the Palestinian Authority and harsh practices prevailed with relatively more emphasis on regional water issues;
- extensive-strong concerns in the third period when the peace process started and a partial lift of some of the Israeli water practices took place, along with the increased freedom in expressing public concerns, with more emphasis on local issues and problems.

A lack and the limitations of water available to Palestinians, alternative solutions and water quality and pollution control constituted the overwhelming majority of topics of public concern in all the three periods studied. The analysis also revealed that Palestinian concerns were greater than regional ones for all the three periods and all of the topics considered. Public concern in the Palestinian Authority regarding all other water management aspects was poor and negligible. The analysis of the survey indicated a low level of public understanding of the role of public education and training in water management and a low level of interest in water conservation and economic and socio-cultural aspects of water management, especially in the first two periods.

A massive increase in public concern was observed in the third period in which the public expressed their concern regarding most water management aspects. This indicates a possible change in public attitude towards water and water management. It also reflects the change of the political status by the start of the peace process and the signing of peace agreements.

## II.6 Knowledge gains on issues of water and water management among Palestinian pupils

As said before, an achievement test was conducted as an indicator of knowledge gain among 245 Palestinian pupils (Table 8).

Table 8 Summary of achievement test results (Palestinian case)

Sex	Number	Mean		
		Overall	Pre-test	Post-test
Males	140	5.57	4.6	8.3
Females	105	4.65	5.5	9.3

The main conclusion from the achievement test among Palestinian pupils is that there has been a change in pupil knowledge as a result of a new curriculum being introduced. No large differences were found between the sexes regarding their level of knowledge. Girls gained better grades, meaning a relatively better knowledge gain than boys. Girls also showed slightly more positive attitudes towards water issues and had extra improvement scores in the post test, compared with boys. These findings correspond with our observation that female pupils were much more serious about the issue of water management than boys.

## II.7 Beliefs and attitudes of Palestinian pupils

Results from the pilot phase indicate that there is an improvement in pupils' attitudes towards most of the water management issues as a response to their increase of knowledge. This indicates the importance and influence of public knowledge and education level regarding their attitudes. After the educational intervention, pupils weighted two of the water management issues presented to them more heavily, namely peace and regional cooperation and efficiency of water use and conservation. This indicated pupils' recognition of the main water problems facing them, that is water availability and political stability.

The analysis of the Palestinian sample differentiated between boys and girls. It appeared that the girls' attitudes towards most of the water management issues showed a higher increase than those of boys. This finding, together with the in-class observations, leads to the conclusion that female pupils were much more serious towards the subject matter than male pupils. The same applies to rural pupils as compared to pupils from urban schools.

Most of the responses to water management issues were quite neutral, indicating uncertain and insecure feelings about these issues and services. Pupils' responses were only at the disagree level with regard to water quality and allocation, wastewater treatment and pollution control.

The results of the pre and post attitude test conducted during the main phase can be summarised as follows:

1. After the educational intervention, pupils attached less emphasis to water allocation according to rainfall origin, while more emphasis was given to water needs.
2. The pupils expressed a high degree of willingness to reduce personal water use and allocation to some economic sectors for the sake of enhancing regional peace and economic growth.
3. Pupils expressed a negative attitude towards imposing high water prices as a means for water conservation and enhancing peace.
4. Attitudes towards national water rights were strengthened.
5. Interestingly, pupils' attitudes towards developing new and additional water sources to alleviate regional water shortages were made conditional to being tied with water resources redistribution in the region.

Based on a series of factor analyses conducted on the Palestinian participants' responses at the beginning and end of the programme, three similar factors were identified which represented three distinct groups of attitudinal structures:

1. *Regional water sharing and peaceful solutions attitude.* Readiness to share water resources, to reduce consumption for the sake of regional peace and awareness of the necessity to solve the water problem as a key to peace.
2. *Water rights and allocation.* This attitude emphasised a core issue related to who owns and controls the regional water resources: water should not be attained by military means and needs to be allocated according to just and fair approaches to fulfil the various needs of the people in each country involved.
3. *Regional cooperation and water shortages solution.* People with this attitude believe in the power of regional cooperation as a means of finding and making realistic solutions to water shortages in the region.

The loading changes from pre to post test observed in the pupils concerned the following water issues, listed in order by weight:

1. Regional cooperation in the case of emergency.
2. Regional water allocation should consider the needs of neighbouring countries.
3. Israel should pay for using and withdrawing Palestinian water.
4. The need to take control of water resources from Israel.
5. Sharing of water based on various reasons, including enhancing peace and stability.

## **II.8 Conclusions to the Palestinian case study**

Prior knowledge about water management issues was low for all groups participating in the programme. Introducing a new curriculum to them resulted in a change in their knowledge. There appeared to be little difference between the two sexes regarding their level of knowledge at the start of the programme, but girls gained more knowledge than boys and also exhibited a slightly more positive attitude towards water issues in comparison with boys. All pupils showed a positive development regarding their attitudes towards water management, resulting in a greater willingness to cooperate, to consider the needs of neighbouring countries, to share water resources and to conserve water for personal use.

### III. Comparing the Israeli and Palestinian results<sup>9</sup>

#### III.1 Comparing the belief system of Israeli and Palestinian pupils on the water dispute

As mentioned in Section I.4, data on the belief system was obtained from 508 Israeli pupils (329 Jewish and 179 Arab) and 106 Palestinian pupils. Israeli and Palestinian researchers collaborated in developing the parallel curricula and in constructing the beliefs questionnaires. A core of 23 common items touching on the salient beliefs related to the target attitude in this study appeared in the questionnaires of both countries. These items dealt with the same issues: peace, separation or cooperation and beliefs in the power of technological and behavioural solutions to the water problem. We will first compare the change in beliefs that occurred in the Israeli group as a whole to the one that occurred in the Palestinian group. Later we will refine the comparison to changes in the three ethnic groups: Israeli Jewish pupils, Israeli Arab pupils, and Palestinian Arab pupils.

##### *III.1.1 Change in beliefs: Israelis and Palestinians compared*

In general, the changes that occurred in the beliefs of the Palestinian pupils are more profound than the change in beliefs of the Israeli pupils. From these results it seems that the Palestinian curriculum has been more effective in reaching its attitudinal goals than the Israeli curriculum. The similar patterns point towards an increase in willingness to share water and take action such as reducing excessive water consumption, making water more expensive, favouring joint management, etc. The items in which the trend of responses in both groups is similar are listed in Table 9. In all of these, with the exception of one, the trend is an increase in the mean score. There was only one item with regard to which no change was observed.

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<sup>9</sup> Written by Ruth Zuzovsky and Ruth Yakir, making use of data of both the Israeli and Palestinian cases.

Table 9 Items with similar trends in responses in both groups (Israelis and Palestinians)

No. item	Content	Direction of change <sup>a</sup>
1	Rainfall that enters the soil in one country and is pumped or flows in a neighbouring country belongs to both countries equally.	+/+
2	For the sake of peace, sectors consuming very large amounts of water should be curtailed.	+/>+
3	For the sake of peace, we should share the mountain aquifer with our neighbours.	+/>+
4	For the sake of peace, water should be made expensive.	+/++
5	For the sake of economy and welfare water can be taken from anywhere	+/>+
6	It is not ethical to take water to advance one country's economy at the expense of another country.	+/>+
7	In order to implement the peace process we should share the water sources available to us.	+/>+
8	Israel should have to pay the Palestinians for withdrawing water from the Palestinian water resources.	=/=
9	Additional water for other purposes in the countries of the Middle East should be provided from water allocated to agriculture.	+/+

<sup>a</sup> + increase; ++ big increase; = no change.

The increased agreement given by both groups to items 5 and 6 (Table 9), which are actually contradictory, reveals an ethical dilemma. On the one hand pupils think that, for the benefit of their country, it is legitimate to take water from a neighbouring country, while on the other they agree that doing this would not be ethical. While Jewish pupils seem to be more sensitive to the ethical aspect of water rights, Palestinians changed more on the item that legitimates the taking of water for the sake of economic welfare.

For the remaining items that the questionnaires had in common, the patterns of change of Palestinian and Israeli pupils differ. While Israelis who scored high on the item scales did not change their beliefs from the early stage of the programme to its end, Palestinians changed theirs a great deal.

By the end of the programme, their scores on these scales were even higher than those of the Israelis. Such is the case, for example, with regard to items dealing with autonomous vs. joint water management projects: Israelis favoured joint management from the beginning and did not change their views, while Palestinians who did not favour cooperation moved significantly towards this view.

In other cases, in spite of the different trends of change in the two groups, the end result shows a convergence in the beliefs held by Israeli

and Palestinian young people. One such change refers to the territorial nature of rainwater and the non-territorial nature of water from rivers. As far as the Israelis were concerned, the view that without solving the water problems peace will not stabilise became firmer, while the opposite was true in the case of the Palestinians.

At the end of the educational programme, the views of Israeli and Palestinian pupils were similar. Both were in favour of cooperation in the management of water resources, but they still considered them territorial goods.

In an additional analysis<sup>10</sup>, three distinct groups were compared: Israeli Jewish pupils (n = 329); Israeli Arab pupils (n = 179) and Palestinian pupils (n = 106). The results of this analysis show again that among the three groups, the Palestinian pupils went through the most marked change. As far as the Israeli pupils were concerned, there was more of a change in the beliefs of Jewish pupils than those of Arab pupils. The major changes that occurred can be summarised as follows:

- Among all pupils, especially the Palestinian ones, the view that water sources belong to the two countries and must therefore be shared and allocated equally, was strengthened as a result of the educational intervention. There is also a decline among Palestinians in the belief that rainwater belongs either to the country in which it falls or to the country to which it is pumped.
- A set of items dealt with the level of readiness to take action in the management of water resources for the sake of peace. Pupils in all three groups, and especially the Palestinians, were willing, for the sake of peace, to share the mountain aquifer, to price water realistically and to reduce excessive water consumption.
- Major changes occurred in beliefs that favour joint management of water resources and are against one-sided handling of water and drainage water. This trend appeared mostly among the Palestinians. It would seem that as regards this issue, the educational programme was more influential on the Palestinian side.
- Pupils of all groups tend to be more aware that water allocation agreements should take into consideration the needs of all countries involved and should re-orient themselves from agriculture into other directions. However, especially in Palestine, agriculture still prevails and with it the belief among Palestinians that countries whose economy

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<sup>10</sup> A paired *t*-test for dependent samples.

is based mainly on agriculture should have priority in regional water distribution.

- In all groups, but especially among the Palestinians, the religious belief prevails that water is a gift from God for all. While this ideology is high and constant in the Israeli groups, it is on the increase in the Palestinian group.

As regards other items, the differences were mainly between the Palestinian pupils on the one hand, and the Israeli Jewish pupils on the other.

The results show that towards the end of the programme, Palestinians held beliefs that mostly served their own interests. For example, Palestinians believed more than Israelis that, for the sake of peace, the gap in water consumption between Israelis and Palestinians should be closed by reducing Israeli consumption and also that Israelis should pay Palestinians for the water they consume. Fewer Palestinians than Israelis believe that rainwater falling in one country and being pumped into the other belongs to the country to which it is being pumped, but fewer also believe that this water belongs only to the country in which it fell.

The general impression is that at the end of the project, readiness to act for the sake of peace is highest among the Palestinian pupils. They are more willing to share the mountain aquifer, to price water realistically and to reduce high consumption, which shows the success of the Palestinian programme.

### *III.1.2 Discriminant analysis of the responses of pupils of the three ethnic groups*

In order to detail the distinction between the Israeli-Jewish, Israeli-Arabic and Palestinian pupils, a discriminant analysis was carried out on their responses to the 23 common items at the end of the programme. This resulted in 15 discriminating items that were selected for producing two sets of discriminating variables: the discriminant functions.

The first function represents a mainly Israeli, territorial point of view: rainwater belongs either to the country in which it falls or to the country to which it is pumped; Israel should not reduce its water consumption in order to close the gap between itself and the Palestinians and neither should it be asked to pay the Palestinians for the water it uses. The classification of individuals into three groups according to the first discriminant function is high and reaches 74.9% of the cases.

In the second function, several issues play a role, such as favouring independent water management and prioritising ethical considerations. The

first function mostly discriminates Palestinians from Israelis – Israelis are higher on this function than Palestinians. The second function discriminates between the two Israeli groups. The Jewish group is high on the function scale while the Arab group is low.

### **III.2 Knowledge gains on issues of water and water management**

The knowledge questionnaires assessed knowledge and understanding of the main topics in the curriculum by means of 28 test questions of different types: multiple choice (11), short answers (count, mention, draw, give an example, sort, describe) (9), and extended response items (8). The questionnaire was administered to 120 student teachers and teachers (50 Jewish and 70 Arabs) and 472 Israeli pupils (356 Jewish and 116 Arab). Complete data (pre and post testing data) was obtained from 96 (student) teachers and 424 Israeli pupils (308 Jewish and 116 Arab). An achievement test was conducted as an indicator of knowledge gain among 245 Palestinian pupils.

Even though the issue of water scarcity in the region is extensively mentioned in the media and in schools, the responses of the student and practising teachers to the knowledge questionnaire at the first meeting of the programme revealed an astonishing lack of knowledge. Israeli Jewish student teachers initially scored a little higher than the Arab student teachers and the scores of the former improved dramatically during the learning and teaching period. Arab student teachers knew less at the beginning and did not progress as much as the Jewish student teachers as a result of the programme.

We also found some gender differences here. Boys outscored girls during initial testing, but girls progressed more than boys during the programme. In order to express the improvement in participants' knowledge, "gain scores" were calculated (post minus pre scores). The gain score of boys was only 24 while that of the girls was 35.

The knowledge questionnaire administered to Israeli pupils contained only 17 items. Here too, the questions dealt with the main topics of the curriculum. Both initial and end scores were very low. Although change did occur, pupils' knowledge at the end of the programme was still very low. Jewish pupils did better than Arabic pupils. The results for boys and girls were similar as was the progress. The gain scores of both Jewish gender groups were equal.

The main conclusion from the achievement test among Palestinian pupils is that there has been a change in pupil knowledge as a result of the introduction of a new curriculum. No large differences were found between

the sexes regarding their level of knowledge. Girls gained better grades, meaning a relatively better knowledge gain than boys. Girls also showed a slightly higher level of positive attitudes towards water issues and had higher improvement scores in the post test than boys. These findings correspond with our observation that female pupils were much more serious about the issue of water management than boys.

### **III.3 Relationship between changes in knowledge vs. attitudes related to issues of peace, water and regional cooperation in water management**

The basic assumption of this project was that new persuasive information can support the construction and modification of beliefs in favour of peace and cooperation. This information was supposed to cause a systematic elaboration or the “unfreezing” of conflict schemes, which then leads to attitudinal change. To test this claim, we only used Israeli data.

Changes in knowledge (mean scores on knowledge questionnaires) and in attitudes (mean scores on the three index scales)<sup>11</sup> can be expressed as “gain scores”. The relationship between knowledge gain scores and attitude gain scores was estimated using Pearson correlation coefficients. With the exception of the correlation between knowledge gain and attitudes in favour of technological changes among pupils, all other correlations are small and statistically not significant.<sup>12</sup>

A somewhat clearer picture emerges from correlating knowledge gain scores with attitudinal scores after the educational intervention. In the adult group, there is a clear negative association between knowledge gains and attitudes in favour of peace and a positive association between knowledge gains and beliefs in technological solutions. This can be interpreted in several ways:

- The scores result from an educational programme that focused on solutions and not on peace; or
- The scores result from conflicting messages regarding the role of water in the peace process and a clear message regarding the role of technological and behavioural solutions.

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<sup>11</sup> The three index scales are: attitudes in favour of peace, attitudes in favour of separatism and attitudes in favour of technological and behavioural solutions.

<sup>12</sup> Among student teachers, the correlation between the knowledge gain scores and attitudes in favour of peace was  $r = -0.02$ ; with attitudes in favour of separatism  $r = 0.06$ ; and with the belief in the power of technological and behavioural solutions to the water problem  $r = 0.15$ . Among pupils, these correlation coefficients were: with attitudes in favour of peace –  $r = 0.02$ , with attitudes in favour of separation  $r = 0.02$  and with attitudes in favour of technological, behavioural solutions  $r = 0.13^{***}$ .

The correlation coefficient for the pupils' sample is smaller, pointing towards the weaker impact of the curriculum on this age group. A partial correlation between pre and post attitudinal scores for knowledge gain also shows that knowledge gain had only a small effect on the change that occurred in students' attitudes in favour of peace or in favour of technological solutions.

There was a negative correlation between knowledge gain scores and final scores on the peace scale among the Jewish student teachers' group. Since this is also the group with the largest knowledge gain score, it is clear that gain in knowledge does not necessarily lead to attitudes in favour of peace. Other factors, probably psychological in nature, can interfere and prevent the assumed logical implications of the knowledge gains.

In both age groups, the impact of the curriculum is evident mainly as regards knowledge gains. Here, an interaction effect between curriculum and ethnic origin occurs as well. The knowledge gain is larger in the Jewish group than in the Arab group.

The effect of the curriculum on attitudinal change is different in the two age groups. Among student teachers, the curriculum negatively affected attitudes in favour of peace or separation, while among pupils it positively affected separatist views and mainly the pragmatic views of a technological solution. Here, there was no interaction effect.

Lastly, in a series of multiple regression analyses on post-attitudinal scores, pre-attitudinal scores and knowledge gain scores served as predictors. It was found that these two predictors explain one-third of the variance in student teacher responses on the peace scale and a quarter of the variance on the "solutions" scale.

The explained variance in pupils' responses is very low. The  $R^2$  change as a result of knowledge is relatively high only with regard to the solution attitude and it seems that this was the main effect of the educational programme. Attitudes in favour of peace and against separatism are much harder to achieve since such change involves risk-taking.

### **III.4 Conclusions**

With respect to knowledge gain, the educational intervention was found to be very effective for adult participants. In spite of the astonishing lack of initial knowledge related to water issues and the water conflict in the

Middle East, all participants were much more knowledgeable at the end of the programme.

Regarding the question of whether the change in knowledge does relate to the change in beliefs and attitudes, there seems to be a relationship between the two, mainly in the responses of student teachers. There was a clear positive association between growth in knowledge and attitudes in favour of technological and behavioural solutions, which is a neutral position that is easy to agree upon. However, in the case of the attitude towards peace (which is more risky) the knowledge gain was found to be negatively correlated with willingness to act for the sake of peace among Jewish student teachers.

Based on factor analysis carried out on the responses regarding attitude change, three similar factors were identified:

- *Peace* – Willingness to act for the sake of peace.
- *Separation* – A separatist-territorial view of water.
- *Solution* – Faith in technological solutions to solve the water problem.

Since the structure of the factors delineated at the beginning and at the end of the programme did not change, these factors served the construction of indices representing three attitudes. The following trends were revealed regarding the changes that occurred in these attitudinal scales. The adult participants' responses revealed a weakening of a territorial perception of water (such as: water belongs to the country where rain falls or to the country where the river emerges) and a strengthening of the belief (especially among the Israeli Arab students) that water is a communal resource that belongs equally to the two countries. There was increased recognition that without a solution to the water problem, there will be no peace. This led both Jewish and Arab students in Israel to be more willing to act for the sake of peace, e.g. to share water resources (including high quality water from the mountain aquifer), to reduce consumption, to allocate less water to agriculture, to import food instead of growing it, to develop alternative sources of water and to price water realistically.

In spite of these trends (weakening of territorial perception of water and strengthening of the pragmatic approach) issues of debate remain. For instance, both Jewish and Arab students agreed more at the end of the programme that vital areas of high quality water should not be given up. Palestinians' attitudes towards national water rights were also strengthened. They expressed a negative attitude towards imposing high water prices as a means for water conservation and enhancing peace.

These changes were found to occur amongst pupils as well. A

revealed that the beliefs of Israeli Jewish pupils and Israeli Arab pupils were quite similar (perhaps because these groups were exposed to the same curriculum). The changes that occurred in the beliefs of Palestinian pupils, however, were more profound than the change in beliefs of the Israeli pupils. The similar patterns found were:

- a weakening of the beliefs related to the perception of water as a territorial asset;
- an increase in willingness to share water; and
- action being taken, such as reducing personal water use, reducing the allocation of water to high consuming sectors, pricing water at a higher rate, favouring joint management, etc.

All groups recognised that the success of the peace process depends on solving the water problem in the region. At the end of the programme, however, the Israeli participants were less favourable than the Palestinians towards regional cooperation. The willingness to act for the sake of peace grew very significantly among the Palestinian pupils. They agreed, more than Israelis, to share the mountain aquifer, to save on personal water use and to reduce allocation of water to high consuming sectors. Reducing water supply to agriculture (a within-country policy) and prioritising water allocation to countries whose economy is based on agriculture, were very acceptable solutions for the Palestinians. The solutions were acceptable to a smaller extent for the Israelis. It seems that the curriculum had a different effect, both on the age groups and on the ethnic groups. This might be attributed to already existing differences in their prior knowledge or to different ways of information processing. In any event, the Palestinian curriculum seemed to be more effective in reaching its attitudinal goals than the Israeli curriculum.

Results from a discriminant analysis delineated a set of items that significantly discriminate between the beliefs held towards the end of the programme by Palestinians and Israelis – Jewish and Arab. This discriminant function explains almost 76% of the variance in pupil responses and it represents mainly separatist views (rainwater belongs to each country separately) and Israeli interests (Israel should not be solely responsible for closing the consumption gap between Israel and the Palestinians). Israeli Arabs and Jewish students seem to share the same interest and they score high on this function while Palestinians score low. This similarity between Jews and Arabs in Israel points to the fact that, in spite of their national identity and in contrast to the rhetoric they use, Israeli Arabs share common interests with Israeli Jews and perceive themselves, at least on issues related to water resources, as Israeli citizens.

Pupils' responses also revealed contradictory trends. For example, they tend to agree, to the same extent, with two opposing beliefs: for the sake of economic welfare, water can be taken from anywhere and it is not ethical to take water to advance one country's economy at the expense of another country. This may be attributed to the failure of the curriculum in conveying the dilemma to pupils at this age, or perhaps the whole programme was too complex for them. Another interpretation can reside in the phrasing of the questionnaire items that was not clear enough for the pupils.

We may conclude that the short educational intervention (6-8 weeks of learning the curriculum in schools and a period of twice that length in the case of student teachers), which focused on providing comprehensive information regarding a wide spectrum of topics related to the water dispute, brought change in both knowledge and attitudes. Although the changes were small, they were in the desired direction, *i.e.* weaker separatist views, as well as attitudes favouring regional cooperation in managing regional water resources and favouring peace.

Student teachers and pupils' awareness of the vast amount of information provided by the media on water issues grew. We think that the development and changing of beliefs triggered by the educational intervention programme will also continue in the future. We learned that beliefs and attitudes, although dependent on ethnic and religious affiliation, are not rigid and subject to change.

## IV. Scientific and practical relevance<sup>13</sup>

### IV.1 Scientific relevance

This study was designed to evaluate the effects of an educational programme on water resources. This programme was aimed at changing young people's prevailing beliefs and attitudes towards peaceful solutions, cooperation and compromise with regard to the water conflict between Israel and Palestine. When initiating this study, we believed that without the preparation of a certain attitudinal climate in favour of cooperation and compromise regarding the water dispute, peace treaties and water arrangements would not last. In addition, the study served the purpose of exploring the value of the approaches in which the educational intervention was rooted, *i.e.* cognitive theories related to attitude change and conflict termination.

The findings from this study show that the short educational intervention, which was oriented around providing information on a wide spectrum of topics related to the water dispute, brought change. There was an impressive growth in the knowledge acquired by the adult participants. However, these knowledge gains resulted in only slight changes in the attitudes in all age and ethnic groups. The most significant changes were a decline in separatist views and an increase in attitudes in favour of regional cooperation and in favour of using technological and behavioural solutions.

The second aim of the study – validating some of the assumptions at the basis of a cognitive approach to attitudinal change and conflict termination – was only partially achieved. Some empirical evidence from this study supports a cognitive approach. However, it has become clear that other factors such as ideological value-laden and emotional barriers play a role in preventing attitudinal change. This means incorporating these factors in a new model of attitudinal change and in a new educational intervention, and studying their impact requires another study, more experimental in nature than the one that was used in this case.

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<sup>13</sup> Written by Ruth Zuzovsky.

In spite of the encouraging signs of effectiveness of the educational programme, it became clear that attitudinal change cannot be achieved through work on cognitive mechanisms alone. Other more affective factors, such as cognitive motivations (Kruglanski, 1989), emotional factors, such as trust and fear (Singer, 1958; Deutsch, 1973), and ideological values (Rokeach, 1973; Schwarz, Roccas, and Sagiv, 1992; Homer, and Kahle, 1988; Tetlock, 1986; Billig, Condor, Gane, Middleton, and Radley, 1988) are very important elements in shaping beliefs and attitudes. For the sake of peaceful coexistence in the region, these elements must also be incorporated in the attempt to educate and change public opinion and intentional behaviour regarding this aim. A more comprehensive model of attitudinal change, which will incorporate these factors, will be further elaborated as part of Miri Levinger-Dressler's PhD thesis (see Appendix II).

#### **IV.2 Recommendations for further research<sup>14</sup>**

Two types of extended projects are recommended, the first building on the successes of the experimental project and the second drawing from its observed limitations. The encouraging results and the need to sustain the project in schools and in higher education institutes leads us to recommend the dissemination and implementation of the programme for a wider audience. The target audience here should be practising teachers and the programme should be run at teaching centres as part of in-service training courses.

The second recommendation is an academic one. Further research and development are needed in order to study the effects of existing values and political ideologies on belief and attitudinal formation. New variables should be studied, new research instruments need to be developed and new educational approaches applied.

#### **IV.3 Practical applicability**

The present study reports on an attempt to affect a change in public opinion in favour of peaceful coexistence. The view on which this project is based regards the public as rational in the sense that its aggregated political opinions are meaningful, stable and coherent with underlying values and available information (Page and Shapiro, 1992). The project reported on offered a curriculum that provided essential information. We were amazed to find how little information young Israeli citizens possess with regard to water – an issue of debate at the heart of the conflict

between Israelis, Palestinians and the other neighbouring countries. Withdrawal from the Golan Heights, where most of the water resources of the Jordan River are located, allowing the Jordanians to pump water from the sea of Galilee, sharing the mountain aquifer with the Palestinians and withdrawal from critical zones above these aquifers, are all political decisions that require an atmosphere of public support. If people lack information and knowledge about the meaning of such steps, they will tend to build their opinions on ideological, value-laden world views that are ruled by emotion rather than by reason.

The findings indicate a significant growth in knowledge among all participants and their continuing awareness and active interest in water issues long after the conclusion of the educational intervention. These results are the major successes of the programme. Although changes in attitudes following this knowledge gain were small, as can be expected from such a short intervention, they touched on a crucial issue – namely that of territorial perceptions. The fact that water is being viewed less as a territorial asset and the increased tendency towards cooperation and joint water management that occurred in all participating ethnic and age groups point to a decline in general separatist views on both sides. Knowledge gains were also found to be quite effective with regard to building faith in technological and behavioural solutions to water scarcity. These beliefs are a necessary prerequisite for taking action, even on a very personal level in line with the desired objectives of the intervention.

In Israel, the study resulted in the design of two curricula: one suitable for the adult population and one for younger pupils in the middle school. A published reader was recognised by the main water professionals in Israel as a very high quality source-book and is used by scholars from different universities' geography departments. The curriculum was applied in a small sample of teacher colleges and schools in Israel. However, as a result of the ongoing work of the Israeli PhD student, many more schools joined in the project. The project could indeed be adopted by most of the country's junior high schools as it is in line with the new science and technology curriculum and with the current emphasis given to peace education programmes. In order to disseminate and implement the programme in many more schools, additional resources and personnel are needed (Zuzovsky, 2000).

In the Palestinian Authority, an up-to-date curriculum was developed after an extensive survey and put on trial in a small sample of classes. This curriculum was found to be very effective and should therefore be published and implemented in a wider population (Zuzovsky, 2000).



## **V. Recommendations**

### **V.1 Recommendations proposed by the Israeli team<sup>15</sup>**

Peaceful solutions to water resource conflicts demand a willingness to compromise and cooperate. In the existing psychological atmosphere in the region, this willingness is weak. Ideological factors, such as those of a nationalistic and religious nature, only add to the existing barriers of mistrust and fear, making compromise negotiations difficult to attain. In such cases of conflict, education is required to promote public understanding and opinions on the problem. The findings of this study have shown that such educational intervention can bring about considerable gains in knowledge. In spite of limited a impact on attitudinal changes, it is recommended that support be given to the dissemination of this educational programme, in order to extend its audience and to sustain its impact.

It is also recommended that this educational programme be adopted by education officials and formally presented in junior high schools. The introduction of the new curriculum should be phased and not, as was the case in this project, be implemented as a single dose in one semester.

It has become clear that factors such as ideological value-laden and emotional barriers play a role in preventing attitudinal change. Incorporating these factors into a new model of attitudinal change and into a new educational intervention, as well as studying their impact requires another study – one that is more experimental in nature.

### **V.2 Recommendations proposed by the Palestinian team<sup>16</sup>**

It is recommended that the curriculum prepared for this study be finalised, published and officially adopted and introduced into junior high schools in Palestine. The introduction of the new curriculum should be phased and not be done in one go during a single semester.

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<sup>15</sup> Based on Zuzovsky (2000)

<sup>16</sup> Based on Haddad (1999).

Furthermore, it is recommended that this research project be extended to include student teachers from Palestine, who could not be covered in this study due to reservations on the part of the authorities.

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# Appendix I

## Participating researchers and institutions

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2. Persons providing assistance or advice during the implementation of research activities:

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Usama Khalili, research assistant, Nablus, Palestinian Authority  
Dr. Abdel Nasser Al Qadoumi, statistical analysis expert, Nablus,  
Palestinian Authority

## Appendix II

### Follow-up of the project: capacity building and project-related publications

Parallel to the work in this study, Mrs. Miri Levinger-Dressler from the Kibbutzim College of Education started the conceptualisation of her PhD thesis. Her dissertation is a branch of the main study in a direction we feel is missing in our original study. She will focus on the value-laden aspect of belief formation and this will enrich the cognitive model of attitudinal change with some affective elements. Miri Levinger-Dressler developed additional parts to the already existing curriculum that centres on value-laden dilemmas in managing water resources and on decision-making in situations that involve such dilemmas. Her PhD is in progress under close supervision of the Netherlands scholars.

Another product of the study is the introduction of the curriculum into six teacher colleges in Israel and into at least 20 schools. In colleges, this curriculum was taught as part of science lessons, geography lessons and as an integral part of the student teaching period. In-service training is provided to teachers in all schools that launch the programme. Ongoing supervision while teaching the programme is carried out by Miri Levinger-Dressler.

Moreover, one of the Palestinian researchers was proposed as a PhD candidate to IVLOS, the Netherlands. She travelled to the Netherlands twice for training, supervision and support. In the course of the main phase, however, the results of her work were such that continuation in the IVLOS PhD programme was no longer possible.

#### **Publications:**

Baker, A. (1999). 'The role of information in changing attitudes towards water management in the Middle East: the Palestinian Territory as a case study'. Paper presented at the 7<sup>th</sup> International Conference of the Israel Society for Ecology and Environmental Quality, '*Environmental challenges for the next millennium*', Jerusalem, June 1999.

- Berger, Y. (1998). 'A future look at the water problems of Israel with a brief look on the Israeli-Palestinian water issue'. Paper presented at the 'Open to the public' Conference at the Kibbutzim College of Education on 1 July 1998.
- Gvartzman, H. (1998). 'Problems of water supply in the West Bank'. Paper presented at the 'Open to the public' Conference at the Kibbutzim College of Education on 1 July 1998.
- Haddad, M. (1999). 'The importance of using a cognitive approach in changing attitudes towards water management in the Middle East: the Palestinian Territory as a case'. Paper presented at the 7<sup>th</sup> International Conference of the Israel Society for Ecology and Environmental Quality, *'Environmental challenges for the next millennium'*, Jerusalem, June 1999.
- Haddad, M. and Bakir, A. (1998). 'An evaluation of public concerns about water management in the Palestinian Territory, pre, during and post the National Uprising', *International Journal of Water Resources Management* 12: 359-374.
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- Haddad, M. and Bakir, A. (1999). 'A cognitive approach in changing attitudes towards cooperative water management in the Middle East: the Palestinian Territory as a case'. Paper presented at the 3<sup>rd</sup> International Conference on Teachers Education *'Almost 2000: crises and challenges in teachers education'*, Beit Berl, June 1999.
- Zuzovsky, R. (1992). 'Symposium organiser. Teaching for regional cooperation in a multicultural setting'. Paper presented at the 7<sup>th</sup> International Conference of the Israel Society for Ecology and Environmental Quality Sciences on Environmental Challenges for the Next Millennium and the Regional Conference of the International Water Resources Association IWRA on Water and Environmental Cooperation, Jerusalem, Israel, June 13-18.
- Zuzovsky, R. (1992). 'Teacher education toward peace and regional cooperation. The case of the Israeli-Palestinian dispute over water'. Paper presented at the 3<sup>rd</sup> International Conference on Teacher Education – Almost 2000: Crises and challenges in teacher education. June 27-July 1, Beit Berl, College of Education, Israel.

- Zuzovsky, R. and Yakir, R. (1995). 'Political changes in the Middle East and their impact on teacher education'. Paper presented at the International Conference on teacher education: innovative alternative for the 21<sup>st</sup> century. Bangkok, Thailand, July 11-14.
- Zuzovsky, R. and Yakir, R. (1998). 'Teaching for social change – a Palestinian-Israeli case of peace education'. Paper presented at the AERA Annual Meeting, April 1998, San Diego, USA.
- Zuzovsky, R. and Yakir, R. (1999). 'Science education in the service of bridging the Israeli-Palestinian dispute over shared water resources. Paper presented at the 2<sup>nd</sup> International Conference of the European Science Education Research Association (ESERA), Kiel, Germany (August 31-September, 4, 1999).
- Zuzovsky, R. and Yakir, R. (1999). 'Teaching for social change: a Palestinian-Israeli case study of peace education', *Mediterranean Journal of Educational Studies* 4(1): 67-81.

#### **Learning materials:**

Hebrew:

Water in an era of peace – Source Book, Kibbutzim College of Education, 1998.

Water in an era of peace – Activity Book, Kibbutzim College of Education, 1999.

Arabic:

Water in an era of peace – Activity Book, Kibbutzim College of Education.

#### **Meetings:**

In addition to the in-service and research meetings, three annual closing session meetings took place:

- at the end of the first academic year on 11 July 1996 at the Kibbutzim College of Education;
- at the end of the second academic year on 5 June 1997 at the Arabic College in Haifa; and
- at the 'Open to the public' Conference at the Kibbutzim College of Education on 1 July 1998. This meeting aimed to celebrate the end of the project in the schools and presented the project and its curricular products to the public. Presentations on project purpose, methodology and results were given by Dr. Ruth Yakir, Ruth Zuzovsky, Miri Levenger, Marwan Haddad and Aidah Bakir.



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13. Schwartz, M., Hare, A.P., Saasa, O.S., Nwana, I.E., Devkota, K. and Peperkamp, B. (2002). Israeli settlement assistance to Zambia, Nigeria and Nepal. ISBN 90 6832 675 9.
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