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Survey Finding of Young People's Knowledge Attitudes & Behaviors: Gaps in Environmental Education Curricula & Teachers' Competencies

Formal Sector

Public Action for Water, Energy and Environment Project

Prosperity, Livelihoods and Conserving Ecosystems (PLACE) IQC Task Order #5

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PREFACE

The Public Action for Water, Energy and Environment Project (PAP) is a public education and behavior change communication program developed to support USAID's technical and policy investments in the Jordanian water and energy sectors, and to support specific initiatives in the environment, in particular with regard to solid waste. The project has been awarded to ECODIT, a US small business holding the Prosperity, Livelihoods and Conserving Ecosystems, or PLACE, Indefinite Quantity Contract with USAID.

PAP is a five years program that has been designed in three phases:

1. Data collection and assessment phase of 9 months ending July 31, 2010;
2. Participatory strategic planning phase of 3 months that will include dialogue with the relevant stakeholders; and
3. Implementation phase lasting about 4 years.

The first phase of the project (Assessment and Baseline Phase) is to be completed by the summer of 2010. As part of this phase, ECODIT is conducting numerous surveys, including 12 or more research efforts, and it is from the totality of these efforts that the project will determine its direction and focus for behavioral change. ECODIT has divided this phase into the several rapid assessments.

The research essentially set out to learn about young people's knowledge, attitudes, and behaviors with regards to water conservation, energy conservation, and waste management; and to assess these against the learning objectives of the curriculum. It was found that students' knowledge was sufficient and at times more sophisticated than that found in the curriculum; however attitudes and behaviors remain largely unchanged.

The objectives of the project as relevant to this survey and outlined by the Public Action for Water, Energy and Environment Project are to develop young people's knowledge around the scarcity and limitations of resources; instill positive ethical-based environmental values and attitudes within schools for both children and educators; encourage individual action that can contribute to conservation of these resources; and educate young people on how science and technology can provide alternatives to improve consumption patterns. To address these objectives this survey has focused on assessing young people's current awareness of water and energy resources and waste reduction, and evaluating formal curriculum resources; and teachers' knowledge, skills and role in impacting young people's learning. The survey inquiry can be summarized in the following key components:

- Youth's (aged 6-15) Knowledge, attitudes, and behaviors as compared to the curriculum learning objectives - for the subjects of Science and Geography since they carry the largest weight of concepts.
- Environmental programs and curricula available to young people through formal educational settings
- Teacher's Assessments: examining teacher's roles, their skills, attitudes and ethics, and assess their training needs
- Looking at gaps, in both environmental curricula and teacher's competencies

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EXECUTIVE SUMMARY

Within Jordan's formal education system, environmental education is still considered a relatively new subject that has been addressed only modestly. It was introduced to the curriculum in 2003 as part of the Water Efficiency for Public Information and Action project which was a USAID funded project implemented by the Royal Society for the Conservation of Nature. However because of a lack of suitable resources, teaching materials and trained educators within the academic system as a whole, learning remains largely theoretical and young people find it difficult to associate concepts with real life situations. Teachers still pay little systematic attention to the relation between the subject matter taught and its embedded environmental ethics dimensions. Teachers' opinions may also play a role in the socialization of children's attitudes, though as of yet little is known about to what extent.

The research essentially set out to learn about young people's knowledge, attitudes, and behaviors with regards to water conservation, energy conservation, and waste management; and to assess these against the learning objectives of the curriculum. It was found that students' knowledge was sufficient and at times more sophisticated than that found in the curriculum; however attitudes and behaviors remain largely unchanged.

Since our group is homogeneous in the sense that they are all young learners enrolled in formal educational institutions, this then raises questions about the validity and effectiveness of academic curricula used, and the knowledge, skills, and values of teachers disseminating the information to students.

We can say that the two key variant academic curricula used in the Kingdom are mainly the Ministry of Education's national curriculum, used by the MOE's public schools and some private schools; and a variety of other International curricula used by different private schools. Some private schools taught a combination of both, which also interestingly presented very different results.

Most students attending public schools and learning through national curricula shared similar knowledge, with attitudes varying with age, and environmentally appropriate behavior remaining somewhat low. There was also no variation found between students attending regular public schools and those attending Madrasati schools. The emphasis in Madrasati schools was mostly on developing infrastructure and yet this was still not linked to environmental sustainability, i.e. green buildings.

In some schools incorporating strong RSCN Nature Clubs, there was some emphasis given to environmental behaviors, and young people attending the clubs seemed to have a higher degree of participation at a school level, and carry some more positive attitudes about the role of individuals. Though still this was not necessarily found to be significant, and was mostly related to RSCN's mandate -conservation of biodiversity. However these clubs could serve as an excellent venue through which to operate more pressing and relevant environmental programs.

On the other hand, we also find that students attending some private schools with relatively targeted environmental programs developed a more holistic perception of the environment, its value, and their role in protecting it. The environment was no longer an abstract concept to these students. They could meaningfully engage on a theoretical, social, political, and emotional level while providing real examples of experiences and learning.

This then raises questions around pedagogical approaches used in learning generally, and methodologies used to implement environmental programs more specifically, and to what extent either can have a real impact. It was generally found that the curriculum itself, its concepts, presentation, and flexibility or lack thereof may hinder learning and the contextualizing of knowledge. What further hinders the process is lack of resources

available in Arabic to serve as supplemental materials and enhance the practical dimensions of the learning process, which leads to higher participation levels and therefore practices.

Another important factor is the role of educators facilitating such programs, and to what extent their own knowledge or lack of it, is disseminated to the student. This can also apply to attitudes, values and behaviors Since teachers received little in the way of training, support, incentives and mentoring, this reflected largely on their own attitudes towards programs external to the curriculum.

To learn how all these factors tied in to one another, and impacted one another, various methods of inquiry were used. While the methodology used was mostly qualitative, some results with common variables were quantified to highlight trends found.

To survey knowledge, attitudes and behaviors of students, appropriate questionnaires were developed in line with the curriculum learning outcomes and as suited to each age-group, which consisted of several grades. Some variation in responses was expected, and questionnaires were developed to ensure respondents had an opportunity to reflect their knowledge attitudes and behaviors, in more ways than one.

Inquiries were also carried out with teachers in focus group settings. The questionnaires were developed to learn of teachers' current knowledge, skills, and prevalent pedagogical approaches, and to gauge how these may impact student learning. Training needs were also assessed based on teachers' self-assessments and the inquiry results.

Finally Interviews were held at a variety of formal institutions and organizations working in environmental education to explore existing opportunities, assess current approaches to learning, gauge the effectiveness of such programs; as well as explore opportunities for growth, development and expansion of initiatives.

It was evident that results varied considerably, when taking academic systems, curricula and teacher's roles into account. This is where most gaps were really found. Although students' knowledge was reasonably high, attitudes and behaviors were not in line with that knowledge, and at times even opposing it. Curricula and teachers had succeeded in disseminating factual knowledge, however insufficient in modifying attitudes and behaviors

This sends out a clear message that introducing concepts to the curriculum without fully employing a systematic holistic approach of interdisciplinary linkages may result in fragmented learning. Additionally, with a lack of teachers' training programs and limited use of valid resources to support the curriculum, young people's practices will remain the same.

Through our findings we have found that if students do not acquire their knowledge in more ways than one, and if learning processes are not contextualized, it is highly unlikely that they will develop attitudes based on real understanding, or behaviors based on real concern for the environment.

1.0 INTRODUCTION

1.1 Project Background and Objectives

The objectives of the project as relevant to this survey and outlined by the Public Action for Water, Energy and Environment Project are to develop young people's knowledge around the scarcity and limitations of resources; instill positive ethical-based environmental values and attitudes within schools for both children and educators; encourage individual action that can contribute to conservation of these resources; and educate young people on how science and technology can provide alternatives to improve consumption patterns. To address these objectives this survey has focused on assessing young people's current awareness of water and energy resources and waste reduction, and evaluating formal curriculum resources; and teachers' knowledge, skills and role in impacting young people's learning. The survey inquiry can be summarized in the following key components:

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The inquiry of the above components also gives birth to a number of recommendations which would focus on models of best practices, effective and innovative methodologies, and teachers' training programs, building on current resources and opportunities, and outlining and promoting potentially successful ventures.

The report findings will also be presented through the inquiry components, using a narrative style as well including graphs, charts, and other illustrations to exemplify trends, similarities and comparisons in results.

Due to its broad experience in developing interactive Arabic curricula and environmental education materials, the World of Letters (WoL) was contracted to implement this survey and provide an informed overview of current resources and young people's knowledge. WoL Team has also contributed to the development of the WEPIA curriculum project and produced the first e-learning material for the Ministry of Education.

In light of this, the World of Letters has provided technical support in designing and revising all survey instruments relevant to the Formal education sector survey; conducting pre-testing of questionnaires to ensure their reliability; and implementing all survey instruments with young people, staff and educators as outlined by the Public Action for Water, Energy and Environment Project. This report will provide a thorough perspective of the findings, and outline recommendations to inform the important stages of project implementation.

1.2 Research Methodology

Sampling Note

The sample of the survey was chosen through purposive sampling techniques focusing on a select small student sample and representing the key constituents in the intended population. The student sample was drawn from three types of different types of schools and stratified and segregated by age, gender, urban or rural population. Ajloun was chosen as representative of a rural area with a varied population; one that is

affected by nearby conservation sites and another in the outskirts of the town in remote areas. This would reveal the impact conservation and nature sites may have on the local population versus those who are not within reasonable proximity to these sites.

The size of the student sample is 412 students, recruited from the following schools :

5. Four Madrasati schools - divided by gender, and urban and rural location (Amman and Ajloun)
6. Four public schools- divided by gender, and urban and rural location (Amman and Ajloun). These schools were also selected to incorporate RSCN's Nature Clubs.
7. Four private schools- located in Amman with mixed gender populations resulting in 50% females and 50% males.

Three focus group discussions were held at each school with 10 participants per age-group. At the four public schools incorporating Nature Clubs, an additional focus group session was held with nature club student members separately.

The survey also included a sample of 40 teachers and 12 principals from relevant schools and academic fields, including sciences, geography and civic education.

Additionally, in-depth interviews were held with three relevant staff at the Ministry of Education Training Division and Queen Rania Teacher Academy to explore training and orientation programs for new teachers and pedagogical approaches used.

Finally, four staff interviews were held with key persons at various organizations (like the RSCN) either developing environmental educational curricula, or environmental initiatives within the formal education sector.

Methodological Note

The field survey was conducted between January 15th 2010 and March 18th 2010. The survey responses were retrieved through the use of student focus groups (divided by age groups); Teacher focus groups representing teachers of relevant subjects; and in-depth interviews with school principals and heads of relevant organizations developing teacher's training, formal educational curricula and relevant environmental activities.

Student focus groups were held in both Amman and Ajloun at four Madrasati schools, four public schools incorporating RSCN's nature clubs, and four private schools. Each focus group session consisted of 10 participants for each of the age groups: grades 1-4; grades 5-7; and grades 8-10. Additionally focus groups sessions were carried out separately with nature club student members at relevant schools.

Focus group sessions were facilitated using the relevant questionnaire for each age-band. These were developed to assess general and specific knowledge of water, energy and solid waste concepts as appropriate to the learning outcomes for each grade, as well as learn of currently practiced appropriate behaviors. An accompanying scale was developed to assess the quality of responses to the questionnaire and accordingly assess student's knowledge, attitudes, behaviors and participation level. In order to quantify the data and validate the results an interval scale was set. This is a common scale used to measure changes in behavior and opinions. The scale was set from 1 to 5 and there was no absolute zero. The numbers only indicate the magnitude of change between responses. The rating was based on two variables; number of students who gave the correct answer and the accuracy of the answer related to the behavior variable. For example if most students recognized that the problem of water in Jordan is both demand driven and supply driven as well as related to natural climatic factors they would receive a 5. However, if only one person gave these three answers and the remaining students disagreed on a crucial variable such as "demand driven challenges" then

the answer would rank 3. The questionnaire was ranked and each question had a predicted set of answers, with an identified crucial answer that would raise the grade to 5.

Three teams worked used the questionnaires in the 12 schools surveyed. The teams for grade 1-4,5-7 and 8-10 were trained on using the questionnaire with the accompanied rating system to ensure consistency across grade levels. The teams remained the same for each group to ensure consistency of results over grade level.

This scale was later used to create graphs and charts to decipher similarities, differences and comparisons.

Each session was carried out by a facilitator who consistently implemented all other sessions for the same age-group. This was crucial for the analysis phase as it added an element of continuity and clarity. Facilitators were also assisted by documenters to ensure all student responses were recorded in detail for subsequent analysis.

Data on each student, school, age group, gender, and urban/rural location of schools was recorded and compiled. These were used to draw quantitative similarities, differences and comparisons during the analysis phase and informed the qualitative analysis and reporting. Complete information on survey participants is included in **Appendix 1**.

Six focus groups were also held with 40 teachers of relevant subject areas to learn of their environmental knowledge, skills, and training needs, and assess gaps that need to be addressed to ensure the effectiveness of environmental education taught to students. Interviews with principals of each school were also carried out to identify gaps and validate information.

The sample also included in-depth interviews with relevant persons and key interviewees, such as staff and program director at the Queen Rania Teacher Academy and Training Division at MOE to explore the scope and effectiveness of teachers' training programs.

Four interviews were also held at private schools with environmental coordinators to compare programs and document best practices. Finally interviews were carried out with other organizations developing environmental curriculum materials and extracurricular programs, such as RSCN, to explore how these resources are being used, to assess their effectiveness, and explore if they can be utilized in the future to contribute to more holistic Jordanian environmental education.

A summary of the survey field work is as following:

- 40 focus groups with students from 12 schools.
- 194 males and 218 females participated in the survey.
- 261 urban students and 151 students participated in the survey.
- 40 students from Nature Club students participated in the survey.
- 6 focus groups with science, geography and civic education teachers.
- 7 in-depth one on one interviews were carried out with staff, educators and program directors at various institutions.

*Note: **Appendix 1** presents a summary and breakdown of the field work sessions.*

2.0 YOUNG PEOPLE'S KNOWLEDGE, ATTITUDES, AND BEHAVIORS

This chapter will present a full review of the findings of the school surveys. The chapter will be divided into two sections that present the findings at public schools and provide an analysis of the various curricula at private schools.

The first section is divided into two parts with the first part presenting general trends of the public schools surveys, focusing on young people's knowledge of water, energy and solid waste concepts, as compared with the expected national curriculum learning outcomes. This will give way to examining gaps and possible reasons creating these, which will be explored in further detail in chapter 7. The next part is a comparative analysis of key variables which may help shed light on differences in knowledge, attitudes, and behaviors for the varied student populations surveyed. Urban and rural population differences will be explored, as well as variations in knowledge, attitudes, and practices between the genders; age; and parental influence and its impact on behaviors Another component included is a study of the impact of RSCN's Nature Club activities on students attending the club's activities. A comparison will also be drawn between these students and their peers in non-nature club activities or schools.

The second section will present the findings of private school surveys, however focusing on curricula approaches and how these approaches impact the knowledge, attitudes and behaviors of their student's differently. As curricula used at these different institutions were not a constant variable, it was a more worthwhile discussion presenting the systems used, and exploring the how students' learning was affected by each.

2.1 Madrasati and Public Schools

This following is a presentation of the results of surveys carried out at both Madrasati and regular Public schools which were selected to incorporate RSCN's Nature Clubs. The schools were selected this way to ensure the sample of students is somewhat uniform in terms of exposure to some extracurricular program, whether such activities were environmental or otherwise. Additionally the findings for Madrasati as well as public schools with Nature Clubs were similar and showed no real difference in terms of student's knowledge. Madrasati's focus is on rehabilitation of school facilities which did not have any impact on students' environmental behavior Furthermore these rehabilitation activities did not consider green infrastructure approaches. For this reason they will be explored in this section together.

Three focus group sessions were divided into the relevant age-bands with students of the 1st-4th grade in one session; 5th -7th grade students in another, and finally 8-10th grade in a session. This structure was carried out at each school surveyed; however an additional focus group was carried out with students who are current members of RSCN's Nature Club activities.

As expected, knowledge, attitudes and behaviors varied considerably across the three grade groups surveyed, and the following section will reveal general trends for each of the groups on water, energy and solid waste concepts. Variations between Nature Club students and non-Nature Club students will be explored in the latter part of this section.

Grades 1-4

The following section describes the findings for students in grades one, two, three, and four. Initially students in grade one were included in focus group discussions with older students, but because of their very basic knowledge level the first graders were subsequently separated from grades one to four, yet still had little to contribute. Moreover, fourth graders tended to know disproportionately more than the second or third graders, and also participated most in discussions. The young students had a significant amount of awareness of water issues, yet seemed more influenced by their parents. However, they lacked specific knowledge about other environmental issues (see Fig. 1).

Water

Like the other age groups, the younger students had more knowledge of water issues than of energy or solid waste issues. The curriculum covered vast concepts regarding water, though their knowledge did not meet the curriculum learning objectives. For example the learning objectives of the curriculum as set for the subject of science requires that the child is able to know sources of water, uses, water bodies and flow systems, importance of water, ways of conservation, and the importance of water for healthier living. As with water pollution there are concepts such water pollutants, impact of humans on water resources, and gray water systems. The above concepts are covered in grades 1 and 3. The students identified different sources of water, like rain and dams. Their answers were superficial however and lacked the required details. Many mistakenly named the Gulf of Aqaba and the Dead Sea, being major sources of water in Jordan. Students were however able to differentiate between groundwater sources and surface water sources.

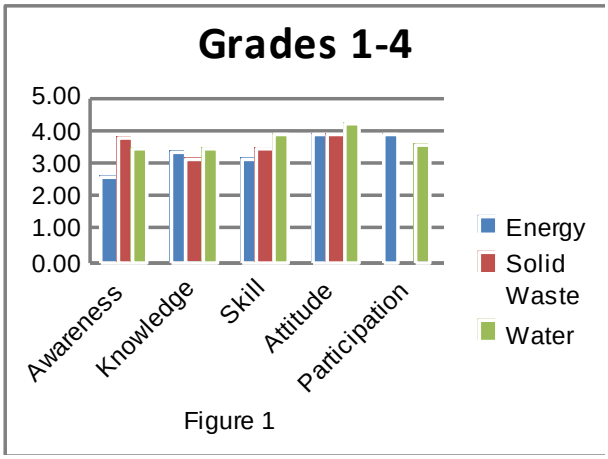


Figure 1

Most students did not understand the nature of Jordan's water problems, if they thought Jordan had a water problem at all. For many, the water problem in Jordan was related to pollution of supplies rather than a lack of resources or mismanagement of resources. Students discussed things such as running out of water at home, but did not have further knowledge about Jordan's water supply nor did they relate this to a broader scarcity of water resources in the country. However, several students indicated that running out of water, or the issue with availability of water, was somehow connected to using too much water, yet they did not understand this on a national scale.

Figure 1: Grades 1-4

The fourth graders were more capable and were able to synthesize their learning and link it to real life situation. They could identify unsanitary water based on color, smell, and other visible indicators that would mean their water was polluted by external factors which they were taught in the Science curriculum. Many students claimed that water at school exhibited some of these qualities, which caused the students to bring their own water to school. The students discussed using water for washing, drinking, and agriculture, but did not mention industrial use. Similarly, the young students could not identify the sector that used the most water.

The limited understanding of Jordan's water scarcity problems was again illustrated in responses to a question about the impact of a long-term water shortage. The students generally discussed household consequences or the impact on water uses most familiar to them. Rather than imagine a long-term shortage, the students seemed to feel water was always going to be available elsewhere, e.g. the water shop, or their grandparents home; indicating that they did not view such a scenario in expansive, resource driven terms. Instead, their views reveal only a very limited understanding of water scarcity on a household level for a limited amount of time.

The students were aware of several conservation methods, with their primary knowledge coming from the curriculum (mainly grades 1 and 3) and the home. Students discussed turning off the tap when not in use, not playing water games, and using a bucket for car washing rather than a hose pipe. Few students knew about water saving devices. In an exercise which measures attitudes of children towards water conservation, students were shown several illustrations, and asked to identify positive versus negative water practices, the students successfully identified these correctly. Finally, the students knew not to step on water pipes or destroy them, which they understood would cause damage and water waste. As shown in the graph, students showed by far the highest attitudes towards water conservation by identifying all the positive behaviors that they could do to conserve water. However, positive attitude did not necessarily mean that it is was reflected in their behavior.
Furthermore, the result may be unrealistic specifically that when interviewing older students and teachers, they mentioned that lower elementary school student play with water and may leave water taps open for the entire weekend

as a form of destruction and vandalism. Meanwhile, in the curriculum of grade 3 Science there is a mention of regularly making sure that drinking water faucets are closed properly, yet students still vandalize them.

In general, the students' attitudes toward conserving water lacked a sense of the individual's role. For many, responsibility for conservation and water usage rested with their elders. There was very little identification with the environmental reasons behind conservation, most likely because of their limited understanding of the environmental problems Jordan faces in regards to its water supply. For many, the conservation methods learned from the curriculum meant more in terms of concept recitation, yet were most likely employed at the direction of their parents, because of financial pressure or to prevent running out of the household's supply too soon.

In conclusion, although the curriculum guide has tackled the concept of water comprehensively, this only moderately reflected in the students' knowledge. And while attitudes towards water conservation were expressed as high, with students listing many conservation techniques; real practices were actually destructive.

Energy

As evident in the graph, students in this age group knew much less about energy issues than they did about water and solid waste issues. Though here again fourth graders demonstrated a more significant level of understanding than the second or third graders. At first students struggled to understand the topic of discussion, requiring more prompting from the discussion group facilitators than other age groups to begin discussing energy as an environmental issue. As well, energy was only related to electricity and not to other aspects of energy issues in Jordan. This reflects what they learn in 4th grade curriculum, in the unit on energy in science class, which is linked to electricity and its different forms. Energy has not been introduced in earlier grades, and thus students in lower grades revealed a lower level of knowledge related to this concept. Unlike water concepts which start in grade 1, the introduction of energy does not start until the child reaches his 4th grade.

When asked if Jordan had an energy problem, about 60 percent of students acknowledged only electricity supply as a possible issue rather than scarcity of resources much like they did with water. This was not seen as much of a problem though, or anything to be concerned about in their perception, for only few experienced electricity outages. The students also did not have significant knowledge on the sources of Jordan's energy; with few students able to identify the way electricity is generated in Jordan beyond the fact that the 'electricity company' is the supplier.

Only fourth grade students had the ability to differentiate between renewable and nonrenewable energy, which is reflected in what they learn in their curriculum in grade 4 geography. However, students were unable to link their learning in Science to that in Geography, so the holistic approach toward energy was missing. The other grades were unable to identify renewable and non-renewable sources, which is also a reflection of the knowledge they acquire in their curriculum. Of the few students able to identify sources of energy for electricity generation, they mostly tended to believe it was generated through wind and solar power. The suggestion that solar power is the main electricity source was connected to the use of solar power water heaters at homes rather than to larger solar arrays models that could supply an entire home with electricity. Furthermore, the concepts tackled in the curriculum have not been contextualized to reflect the realities of Jordan's primary sources of energy.

Students had little understanding of energy sources and the importance of energy in Jordan and they could not engage in higher thinking skills of elaborating on the problem and recommending solutions based on facts. As a result, students were unable to comprehend the impact a prolonged electricity outage would have on their lives. The children could not provide many details and the few that were able spoke about immediate consequences in their household.

Despite this understanding, the children listed several ways to conserve electricity, like turning off lights when exiting a room, and adequately identified illustrations of behaviors as environmentally friendly and environmentally unfriendly. For example, the children understood that the picture of a man using a lamp in a sunny room was not conserving electricity. This is evident in the graph, where practices of energy conservation were higher than water conservation practices although the knowledge acquired for water was vaster than that for energy.

The underlying factor in the children's' knowledge of conservation practices seems to be parental or household influence that stems from financial pressure to reduce the electricity bill. It is not related to understanding of environmental degradation nor is it related to an individual sense of responsibility. The children have not demonstrated an understanding of environmental degradation and the more often assume conservation to be a responsibility of their elders. However, in grade 4, there is some mention of energy conservation methods that children should be practicing.

In conclusion: there are very few concepts of energy covered in grades 1-3. Most concepts are covered in grade 4 in Geography and Science. The concepts are presented in a fragmented manner so children were unable to link energy sources to drive turbines to generate electricity. Although there was little knowledge and children could not engage in discussion, most knew and practiced positive behaviors enforced by their parents. When asked about the motivation it was evident that it stemmed from financial pressures. Knowledge and skills were not found to be factors that promoted positive energy conservation behaviors

Solid Waste

As seen in the graph, this age group knew more about solid waste issues than energy issues but less than water issues. Students in these grades did not understand biodegradability or other aspects of decomposition, but had sufficient knowledge of where waste goes and what would happen if it were to just accumulate in their neighborhoods. The students in this age group were also able to identify and describe some appropriate conservation practices.

The students were more engaged in the discussion of solid waste than energy. It was felt as though most of the discussion was related to experiential learning. The students were able to identify items of waste better than the types of waste, such as paper, metal, and plastic. The fourth graders fared better, listing groups of solid waste, but none of the grades knew much about the decomposition rates of various items or types of waste. The bulk of students also did not know the term "organic waste" nor did they identify food as waste. Thus, the students were unable to really say which items decomposed first or last. The concepts have been introduced in grade 3 as types of litter; sorting of litter; followed by the concept of keeping ones country, home and school environments clean.

The students were familiar with disposing of waste at landfills, through burning, and through recycling. Only students in Ajloun mentioned landfills. Students also described how scavengers collect waste for recycling. The most common disposal method employed by the government was thought by the students to be burning.

When asked what would happen if waste simply accumulated in neighborhoods and no one came to collect it, the students provided surprisingly sufficient responses. They described how waste piles would invite rodents and insects, produce odor, and contribute to the spread of diseases. These facts could be related to them experiencing such a sight. Students also noted solid wastes' negative impact on the attractiveness of the community and its effect on their visitors. Rarely did students mention water and soil pollution, excepting students in Ajloun who said significant waste would hurt their crops and a few students who said this accumulation would generally pollute. A very small number of students in Ajloun said waste would enrich the soil.

Following discussion around the above scenario, students began to list ways households or others could conserve and prevent throwing away so much waste. At first, the students discussed solutions to preventing accumulation, such as simply taking the waste far away, calling the municipality, creating a hole for it, burning it, or otherwise removing it from their neighborhoods. The students then moved to discussing conservation methods more generally, saying that waste could be reused sometimes, including for crafts. This was in response to a question about ways waste can be beneficial. Furthermore, students were able to accurately distinguish between appropriate and inappropriate behavior, saying throwing trash from a car was inappropriate behavior for instance.

However, as with water and energy conservation, these younger students did not feel they had a significant role to play and looked to their elders as the party responsible for conserving. In the home, reuse was discussed as a way to conserve but this was related to parental responsibility and to saving money.

In conclusion: The discussion on solid waste was more engaging to students, although it was covered least in the textbooks. Most of their knowledge was behavior-oriented rather than concept-related. Students had positive attitudes towards solid waste disposal. However, it is not clear if this is reflected in their practices since most schools we visited, had visible problems with littering.

Real facts about Solid waste are missing and need to be tackled in the curriculum in the form of experiential learning through projects making schools and homes their labs.

The municipality needs to observe more closely, the negative behaviors in waste disposals.

General Conclusion: The concept most covered was water followed by energy and then solid waste. Distorted facts were found in energy and solid waste concepts. Behavior was also not instigated by knowledge, with most positive behaviors found in relation to energy.

Generally, lower elementary grade students are the most destructive to their school environment as sited by their teachers. They would leave taps open and lights on, and littering in general was found to be a problem amongst this age group.

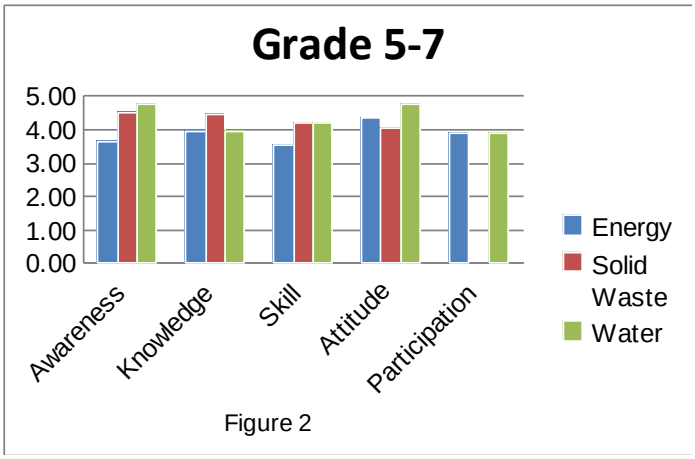
Grades 5-7

Generally for students of this age group, environmental problems were perceived to be a global phenomenon more so than associated with local challenges. This is reflected in the knowledge that they acquire in Grade 7 Geography as sited in the curriculum guide for this subject. Most students in this age group identified air pollution as Jordan's greatest environmental challenge. However some variations were found and these will be in the following comparative analysis. Most knowledge around the three themes was derived from the curriculum and was found to be very relevant to the curriculum learning objectives.

Evidence for this can also be seen in the learning objectives framework for grade five Science which focused mainly on energy, its shapes and sources and conservation methods. There was mention of recycling, reusing and reducing in the grade 5 science curriculum guides. While in sixth grade science, there was a focus on both energy and water to a larger extent, discussing sources of energy and exploring both renewable and non-renewable sources and ways of conserving energy. Their knowledge compared to what is expected of them in these grades was a little fragmented in terms of environmental concepts. This was observed in sessions, as sixth graders seemed to have some gaps in their understanding of environmental issues raised in the focus group discussion. However, fifth grade students were also much weaker although concepts have been covered in abundance in both grades, with grade 6 specifically being overloaded with concepts that may result in a more negative approach towards environment rather than positive.

Interestingly, concepts of water, energy and solid waste are minimally covered in Geography in this group of grades.

Figure 2: Grade 5-7



The curriculum guide for this group shows that both water concepts and energy are addressed adequately while solid waste concepts are covered minimally. Interestingly though, our findings show students in this age group seemed to have a lot more knowledge on solid waste issues than they do energy concepts and water concepts (see Fig. 2). Yet this knowledge was found to be obtained from television and, in some cases, personal experiences through community practices.

The following section will reveal general trends in the findings of the focus group sessions with grades five to seven, focusing on knowledge of the three concepts as related to the curriculum learning objectives for this age group.

Water

This group has wide knowledge of water sources generally and more specifically, water resources in Jordan. However, they had limited knowledge of the main water resources that Jordan depends on. They also had very little knowledge of which sectors used water the least, and which of those was the largest consumer. Most young people believed the municipal or domestic sector had the largest demand for water.

Their knowledge of local water problems was varied, and although many were aware of water scarcity as a major problem for Jordan, this was only associated with minimal seasonal rains. Water pollution was perceived to be a greater local water problem than scarcity; however they did not seem to connect the two issues together. This also affected their perception of the impact of water scarcity which was only understood superficially, and in turn, when asked what

solutions were needed to address local water problems, this age group focused mainly on raising awareness of water issues, rather than personally practicing conservation.

In both instances their awareness seemed to stem from both theoretical knowledge as well as personal experience of intermittent supply and decreased water quality, depending on geographical location.

When challenged further, it was apparent that awareness of the impact of water scarcity on their lives was relatively high (see Fig. 2). This may have been influenced by their experiencing of intermittent supply in many cases, whilst in other cases religious beliefs were also connected to conservation. To conserve water and minimize problems resulting from water scarcity, the students suggested using only what was needed, harvesting water, building dams, and carrying out campaigns that would raise the knowledge of people in local communities. About half of the students knew about water-saving devices, which were covered in their curriculum. Students also said that industry should stop dumping waste into water systems.

Focus group facilitators asked about water quality in schools towards the end of the sessions. Many students described poor water systems in schools, expressing that more work should be done to maintain and clean the schools' water tanks.

Overall, their knowledge was generally reflective of the curriculum learning outcomes, in which these concepts are explored in abundance.

Energy

Knowledge around energy sources was sufficient and relevant to the curriculum learning objectives. Respondents had vast knowledge of energy sources, and could identify renewable and non renewable sources, however in some rare cases; there was also some confusion between sources and uses in this age group. There was little knowledge around the main sources of energy for Jordan, and knowledge was mainly theoretical but rarely related to local issues. There was a misconception that solar or wind energies are the main sources of energy in Jordan. In this age group fossil fuels were not identified as a scarce resource for Jordan.

This confusion may be connected to their textbooks, which uses pictures and maps to show the locations of these types of energy sources for fifth and sixth graders. In textbooks where oil is mentioned it is not mentioned in relation to uses in Jordan nor is it in any other way linked to local demand. The students in Ajloun, where wind turbines are located, actually see these sources in action, which also increases this tendency to assume Jordan relies on renewable energy sources.

When asked if they believed Jordan was facing any energy problem, most believed that if there was a problem that it was minimal, but they could not truly identify what the problem was. When challenged further the problem was linked to electricity, and in this case it was generally connected to experiencing some problems at home with electric outages. Their understanding of the problem therefore was superficial and was not linked to scarcity of resources. This also presented them with difficulty in imagining any impact on their lives, related to the problem.

Although their knowledge of the energy problems was not very deep, their recommendations for solutions were vast. They could identify many ways of conserving electricity ranging from turning off appliances that were not in use to using energy-saving light bulbs, though it was not apparent whether they made any connection between these and the real problem. This awareness of conservation methods seemed to be mostly influenced by parental practices they observed at home, possibly due to pressures linked to economizing on bills

In conclusion: water and energy concepts are covered vastly in this group of grades but their learning is not contextualized to real life situations. Their positive attitude is linked to what they learn in the curriculum but this does still not necessarily impact what they practice.

Solid Waste

Knowledge around solid waste concepts was surprisingly high in this group as compared with energy. Students could successfully identify different types of waste including medical and electronic waste, which were mentioned several times. This is a reflection of the concepts that they learn in Grade 6 Science. However, the concept of biodegradability

was understood to a lesser degree. Only around 50% of the respondents in this age-band could identify that organic waste decomposed first, and around 50% of students had a misconception that plastic was the most biodegradable of all waste. This also affected their understanding of the environmental impact of solid waste.

When asked how waste is discarded in Jordan, students in this age band were able to identify many practices, including both environmentally positive and negative practices. Most students mentioned recycling, but held the misconception that recycling was routinely practiced in Jordan. The textbook for this age group talks in depth about recycling, which may have misled the students to believe it was practiced quite often. Many also mentioned that waste was removed and burned, a practice that the students did not approve of. Burning seemed to be the most convenient solution however when they discussed how they would respond to the accumulation of waste in their neighborhoods.

Most students in this age group perceived littering to be the greatest solid waste problem in Jordan, with water pollution due to industrial waste coming in second. For this reason their perception of the impact of solid waste was also limited and mostly connected to impact on their own neighborhoods, as littering was expressed by many to be a visible phenomenon in their own personal experiences. Their understanding of its impact on the environment and more specifically underground water resources was very minimal compared to their knowledge of its impact on their own lives. Males, however, identified solid waste impact on water resources more readily. This will be expressed further in variations in knowledge, attitudes and behaviors between the genders.

Knowledge of solid waste concepts and issues were much greater than is found in the curriculum. This may be due to respondents being surrounded by local environmental issues and/or experiencing some waste management projects in their communities, as was prevalent in some cases. Although recycling concepts were widely understood, concepts of reducing and re-using were understood to a much lesser degree although tackled in the curriculum guide. While re-use practices were prevalent at homes to a big degree, this was practiced for economical reasons, rather than connected to any understanding of the impact of waste on the environment. Reducing was never mentioned in this age group.

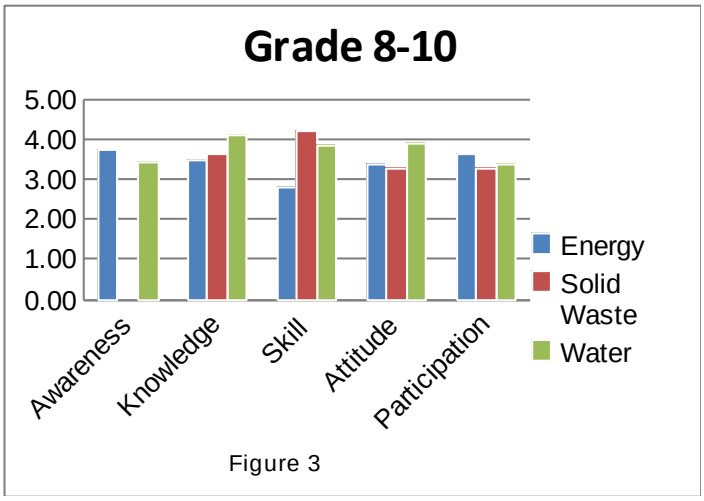
In some rare cases separating waste was also practiced, as waste materials when separated would be sold to scavengers, and profiting from this process was the main incentive for this behavior.

In conclusion: a more in-depth understanding of solid waste concepts need to included through project based learning in the geography textbook, as supplemental material rather than change in curricula. This way learning is contextualized to real life experiences.

Grades 8-10

Figure 3: Grade 8-10

Students in this age group demonstrated knowledge of a variety of environmental problems in Jordan, including water scarcity, littering, air and water pollution, aridity, deforestation, unregulated hunting and desertification. However, students were less able to identify the most pressing environmental concerns for Jordan, with approximately only a fifth of the students citing water scarcity and pollution as the greatest problem. Much of the students' knowledge came from textbooks, yet conservation methods also seemed to stem from some personal experiences, especially regarding water and energy conservation methods. For many in this age group, conservation was more related to saving money however, and less a result of environmental knowledge and awareness since most males were aware of their energy and water bills as they were the ones who paid them.



Based on the curriculum framework, water concepts appear to be covered the most, with energy and solid waste covered to a similar degree yet with little relation to Jordan's challenges. This was also quite reflective of this group's knowledge (see Fig. 3).

Water

Following the students' prioritization of environmental problems in Jordan, students were prompted to discuss water scarcity, especially after few students listed it as the top environmental problem in Jordan. Students expressed the reasons for Jordan's lack of water and came up with an extensive list including a lack of dams, rain, and ground water, as well as more demand oriented challenges like overuse or misuse of available water resources.

The primary sources of Jordan's water, like ground water and dams, were readily identified by this age group, though only a minority was aware of mega-projects like the Disi Aquifer and Red-Dead Canal both of which are covered in the school curriculum and currently provide a significant amount of water or may in the future. Students that had heard of the Red-Dead Canal knew the intention of the canal was to raise the level of the Dead Sea but were unaware of the canals use for energy generation.

About half of the students correctly noted that the agricultural sector consumed the greatest amount of water, whereas the rest believed either the industrial or domestic sectors utilized the most water. In some groups, students incorrectly stated that most water consumption in Jordan was domestic.

The consequences of not having enough water as discussed by the students related primarily to domestic concerns, like hygiene and washing clothes; biological concerns, like the survival of plants and people; and industrial concerns, like water in factories. For many students, this knowledge came from personal experiences beyond what is taught in the school curriculum.

Generally, students demonstrated expansive and creative solutions for cutting water usage and protecting current resources on an individual level and above. To protect current water resources, students listed individual conservation practices, like turning off the tap when brushing teeth, as well as conservation practices in agriculture, like using "gray water" in irrigation. The students also suggested the greater use of water saving devices among individuals and businesses.

Energy

When discussing energy sources in Jordan, students were able to list a wide variety, but were unable to identify the main sources of Jordan's energy. Many noted that power in Jordan was generated through renewable sources like wind or solar, and very few students understood that Jordan's power was generated through the use of fossil fuels. A small number of students had heard of plans to build a nuclear power plant but were unable to provide further details about the project, and very few realized that the Red-Dead Canal would also be used to generate power.

A large majority of students agreed that there was an energy problem in Jordan, yet specifying the problem most often as a lack of fossil fuel for consumption by industry and individuals. To these students, this issue was made worse by a lack of economical means to invest in the extraction of nonrenewable resources, like oil shale, or to invest in technology to exploit renewable resources.

Contemplating the impact that lack of electricity would create, many students mentioned there would be more accidents, increased boredom, decreased studying, reduced industrial development, and a more complicated domestic life. Many also mentioned that going without electricity would impair medical treatment in hospitals. In some sense students' responses showed a sufficient understanding of the impact of electric outage on advancement of society, however most failed to connect this to a lack of resources.

When asked to provide solutions to address such a problem in the future, many students successfully focused on ways individuals can reduce the amount of electricity they use. Students suggested turning off lights and other electronics when not in use and using more energy efficient appliances and fixtures. A small number mentioned using solar power to heat water, while others thought carrying out a public awareness campaign would help increase conservation efforts.

For many students these conservation efforts were important because they would reduce monthly electricity bills and not necessarily because the efforts are better for the environment. For the most part, students did not connect energy problems to any sort of environmental degradation or other environmental consequences without being prompted. For

example, throughout the students' discussion of energy issues, little connection was made between electricity generation with the burning of fossil fuels; and increased air pollution. The fact that many students thought Jordan's primary energy sources were renewable and were unable to correctly identify Jordan's primary energy generating resources compounds this gap in knowledge.

Solid Waste

The students primarily exhibited knowledge around solid waste issues and management that stemmed from personal experience or television programs rather than formal education sources. Many held misconceptions about the way solid waste is disposed of in Jordan. As when discussing energy, the students believed the system of disposing waste was more environmentally friendly than it is in reality. This misconception that waste is sorted and recycled is also indicative of the students' lack of awareness around conservation efforts –such as reducing and reusing, which is discussed further below.

The students began by identifying types of solid waste, like plastics, metals, glass, paper, organic waste, also mentioned medical and industrial waste and leachate. They did this quite successfully.

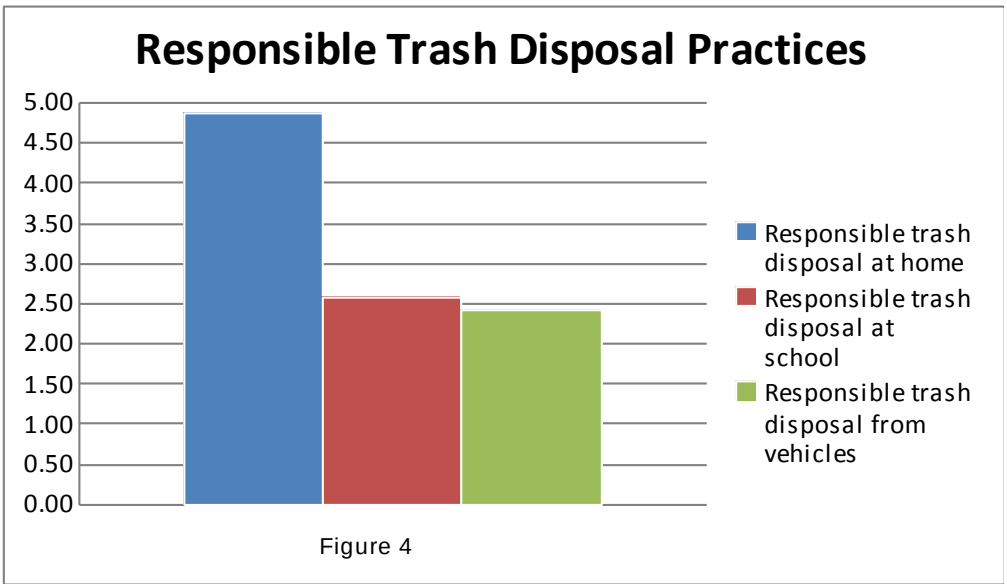
The majority of students, however, inaccurately believed that much of the solid waste was sent to landfills where it was sorted upon arrival for recycling, though it is not in actuality. Students also mentioned the use of sanitary landfills and regular landfills, with several student groups adding that solid waste was also disposed of through burning and dumping in oceans and other water sources. Only one group noted that methane gas could be harvested from decomposing organic material.

When students were asked to discuss the consequences and impact of accumulated solid wastes, many described the spread of disease and vermin, uglier neighborhoods, ground water pollution, air pollution, and soil pollution. There was a better understanding of the impact on ground water sources than for younger grades.

When asked to provide solutions that would prevent the accumulation of waste, resulting pollution and the likely impact, students mostly recommended putting out more trash bins for people to use rather than littering, and advised that we should use recycling methods. This was also mostly perceived as the government's role and so few students initially mentioned individual behaviors that could address such challenges. Rural youths did mention composting however. When prompted further it was evident that many students actually practiced reuse, though not out of concern for the environment, but rather to save costs by reusing food containers over again instead of purchasing plastic 'Tupperware'.

Only one group discussed reducing the amount of trash households dispose of. All other groups were very unaware of this concept and did not practice it in their households. The discussions focused mostly on what happens to trash after it is generated, like recycling or providing more trashcans, but little was mentioned of what role individuals really have in producing waste, let alone less of it.

Figure 4: Responsible Trash disposal Practices



Despite the students' knowledge of how litter can affect the environment, many in this age group admitted to poor disposal practices. Many littered in public and, to a lesser extent, many littered at school (see Fig. 4). In particular, the majority of students said they littered from vehicles, giving excuses about car cleanliness and lack of trash bins.

2.2 Comparative Analysis

Generally most young people in our public schools survey had vast knowledge of water and identified with conservation to a large degree, however concepts of solid waste were understood to a lesser degree, with recycling taking precedence over re-using and reducing. Energy was still found to be the least understood of all three concepts, which was true for all age groups. There was very little understanding of how energy is even related to the environment.

Furthermore, although students' knowledge as compared with expected learning outcomes of the national curriculum may be regarded as sufficient, this knowledge was not always translated into actual behavior This may be because, for all age-groups, the national curriculum did not relate environmental concepts to real life situations; therefore impact of local environmental challenges was not fully understood. Attitudes and behaviors were rather impacted by a number of other variables such as geographical location, gender, age and other influences such as parents and the community.

So for example students in Ajloun practiced behaviors as a result of their own local knowledge, while attitudes towards the role of the government varied considerably between urban and rural populations, as well as between male and female respondents. In the following discussion these differences will be highlighted and analyzed. The most striking differences occurred between urban and rural, and male and female populations. These will also be discussed in detail. One other theme studied was the impact of Nature Club activities on participating students, or students in those schools. This will also be elaborated in more detail in this section.

Urban vs. Rural

In part this project sought to identify the difference in knowledge and practices between students living in urban and rural parts of Jordan. The discussion below highlights the differences between student groups that can be primarily attributed to differences between living in urban and rural environments.

The overall environmental awareness of students differed significantly between urban and rural areas. The differences were most visible in the older age groups where students had more education and experience. A student's awareness seemed to be determined predominantly by experiences in their respective communities. Thus, students living in Marka, for example, discussed problems like air pollution and littering. Students from Ajloun mentioned problems like overhunting and deforestation, with their initial assessment stemming from the close proximity of RSCN's nature reserve and projects.

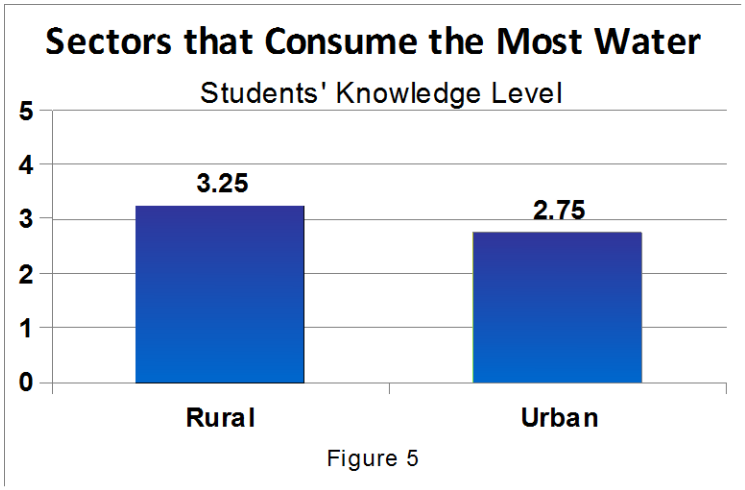
Across the three themes of this report, the students demonstrated sufficient knowledge of conservation practices, though students in urban areas tended to exhibit greater general knowledge about the environment. This difference in knowledge levels was not reflected in the practices of each group. Students in rural areas participated more in conservation, implementing more practices than their urban peers. This difference did not stem from the relative knowledge levels of each group, but rather from the environments in which the groups live. Specifically, students in rural areas tend to face much different availability of services and resources than students in urban areas.

In many cases, students exhibited a divide not only because of the differences in their communities, but also because of differences in gender. Depending on where the students lived, the females and males tended to have different experiences and subsequent awareness levels about the environment. For example, rural males were more knowledgeable than their urban counterparts. However, rural females were less able to think critically about the topics in this survey than female students in urban areas. Where necessary, these differences will also be discussed below or in the next segment on the differences between genders.

Water

Both groups of students were knowledgeable about water scarcity and pollution in Jordan. Each knew this was an environmental issue for Jordan, but each experienced this matter differently and subsequently discussed different aspects of the issue. The urban students exhibited knowledge that came primarily from the curriculum. Their only other connection to water issues in Jordan tended to be through their only source of water, the municipality.

Figure 5: sectors that consume the most water



The rural students were better informed about water issues in Jordan, with the bulk of their knowledge coming from community and household experience rather than just the curriculum. The rural students could also identify more successfully which sector used the most water (see Fig. 5). Unlike their urban peers who could rely on regular water deliveries every one or two weeks, rural students and their families received water less often. Because of this, rural students described other sources of water they could use in order to conserve the delivered water, including wells, harvested water, and local springs. Thus, water scarcity was a more tangible issue for rural students because they had to piece together different water sources, and because the amount of water that rural households received had to be used for a greater period of time than the equivalent delivered to urban households.

The different experiences of rural and urban students have also informed their discussion on the impact of a large-scale water shortage on Jordan. Urban students initially identified impact on their domestic lives, but then began to discuss the impact such a water shortage would have on industry and manufacturing. The rural students spoke primarily about the impact on households and tended to not expand their discussion to other aspects of society. Particularly, the rural students spoke about changes in daily habit that would occur, whereas urban students did not discuss adaptations to a water shortage. Rural students also pondered the numerous other sources of water that could be put to domestic use, like harvested water or streams, with which urban students were less familiar.

Following this discussion on the impact of not having any water, the students discussed ways to conserve and to manage Jordan's scarce water resources. The urban students, which tend to get only government subsidized water, offered several basic personal habits to conserve water like turning the tap off when brushing teeth and using a bucket to wash a car rather than a hose. These students also discussed what the government could do in order to encourage conservation, to secure more water resources, or to improve its delivery infrastructure. The urban students also felt less willing to compromise on their personal habits than those in rural areas, which is in line with their insistence that the government should play a more active role in alleviating Jordan's water problems.

Rural students were skilled in proposing daily conservation practices beyond personal behavior changes. For example, they suggested harvesting more water and other advanced practices. Having more access to alternative sources of water, the rural students contemplated how they would adjust to relying on these different sources, in addition to more careful conservation. The households in which the rural students lived implemented many of the practices already since they frequently experienced intermittent water supply. Religious convictions also served as an impetus for water conservation, in addition to the intermittent water supply.

The two student groups differed significantly in their attitude towards the government and its role in water distribution. Urban students, who rely on municipal water deliveries that come at more regular intervals than in rural areas, tended to be more cynical about the government. Their suggestions for solving Jordan's water problem tended to critique current governmental practices and infrastructure. Alternatively, the rural students tended to place less blame on the government despite experiencing a more intermittent supply as a result of the government's distribution methods.

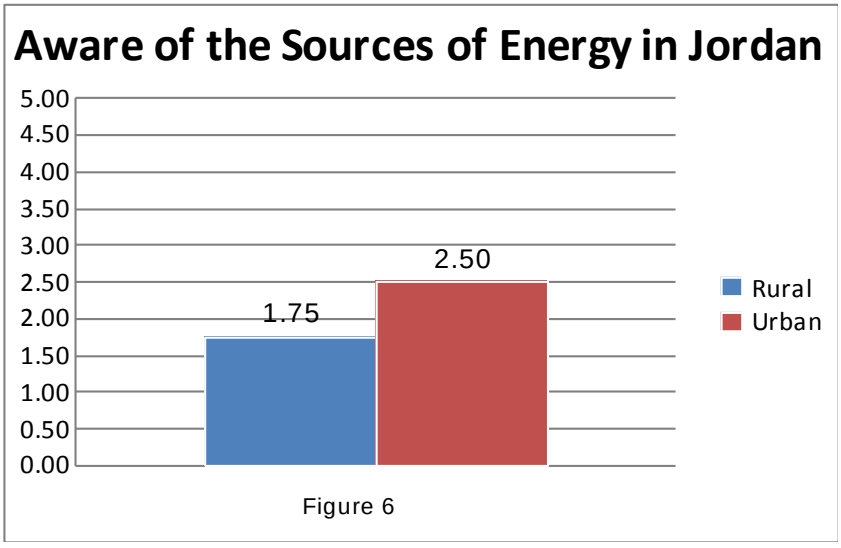
In part, this may be because inequality in water distribution also exists between East Amman and West Amman and is highly visible for the urban students. For students that have one water source, it is more obvious when wealthier households are able to command greater resources, which may be seen in a negative light. The rural students were more self-sufficient so the effects of unequal water distribution by the government were less visible to them. The rural students also saw inequality between what they were able to access through governmental sources and what people in Amman could access. However, rural students placed more responsibility on the individuals in Amman rather than the government. Thus, many rural males suggested more people in Amman try to conserve water in order to alleviate Jordan's water scarcity issues.

Energy

Both urban and rural students exhibited confusion throughout the focus group discussions on energy, albeit in different ways and on different individual subjects. Moreover, the rural and urban students differed in their willingness to participate in conservation and their opinions on the government's responsibility for energy problems as was seen with in the above section on water.

The first discussion around energy issues concerns the major sources of energy in Jordan and the students' thoughts on which is the most important. Both groups could identify a variety of sources and describe which of these are renewable and which are nonrenewable. Notably, rural students referred to wood and olive oil pomace as energy sources, which they use in their daily life. The majority of students in both groups, however, failed to identify the primary energy sources in Jordan. Many thought Jordan relied on renewable resources, like wind and solar energy, particularly students in rural areas. Even among younger rural students, wind was closely tied to their responses in this discussion because of their living near some of Jordan's few wind turbines. Urban students were only slightly better able to identify Jordan's primary source of energy: fossil fuels (see Fig. 6).

Figure 6: Aware of the sources of energy in Jordan



The students were asked if there was an energy problem in Jordan and, if so, what could be done to address it. Rural students did not conceive of the energy problem as a lack of resources. Instead, the students suggested that current resources, Jordan's renewable resources, were being used inefficiently or relied on outdated technology. The solution to Jordan's energy problem then was greater investment to update and improve these resources. Rural students provided other, similar responses that would improve the electricity infrastructure, which has been unreliable for them as they

commonly experience electrical outages. Rural students also attributed electrical problems to poor weather conditions in addition to underdeveloped infrastructure. Although the conversation primarily covered electricity, a number of students in rural areas said they used wood as well for various uses and that this contributed to the relatively minor problem of deforestation.

Conversely, urban students that were less familiar with temporary electricity outages spoke about a general lack of resources, like not having enough fossil fuel, and about increasing those resources. They did not talk as much about Jordan's electrical infrastructure. Interestingly, urban students identified Jordan's energy problem as a lack of fossil fuels, despite saying most of Jordan's energy was renewable. Further pressed, the students said factories and cars relied on fossil fuels but did not mention electricity generation.

When asked about the impact of not having electricity for more than a few days, the urban students spoke more often about the impact on hospitals, factories, and traffic. Generally, their responses dealt more with what the students have been exposed to in Amman. In addition to speaking about the impact on hospitals, factories, and traffic, the urban students said crime would increase, while rural students mentioned this much less. The rural students spoke most about the impact of electricity loss on their domestic life. Both groups discussed the boredom that would ensue.

Students next discussed what could be done in Jordan to reduce energy consumption. Solutions that would yield this reduction tended to fall into one of three categories: technology-based solutions, policy-based solutions, and household-based solutions. The urban students focused most on technological and policy-based solutions though students in rural areas concentrated on households-based solutions.

The technological solutions proposed by the students were quite varied. Although both student groups talked about using energy efficient light bulbs, the urban students went a bit further. They suggested using more energy efficient appliances and electronics. On a bigger scale, the urban students said that investing in more renewable technologies would help Jordan reduce its dependency on imported fossil fuels and therefore reduce its economic burdens. Policy-based solutions proposed by the urban students relied on improved prevention of electricity theft and the imposition of limits on electricity usage. The students' suggestion to invest more in renewable energy sources did not just involve the private sector, but involved greater focus by the government on such an initiative.

Students from rural areas focused on solutions that individuals could carry out in their homes. These household-based solutions concentrated on practices, not just the use of more efficient technologies. Although urban students proposed solutions like this, including cutting off lights when not in use and limiting the amount of items plugged in, the rural students focused on these solutions more and also put them into practice more often. Other examples of domestic conservation practices that rural students identified include unplugging appliances when not in use and washing only full loads of laundry. Furthermore, the rural students recommended making an effort to somehow increase the awareness of household members on how they use energy.

When it came to practicing conservation, the rural students were more active and engaged. They tended to implement the household-based solutions that they focused on and that the urban students only mentioned. Despite their knowledge of varying solutions, the urban students did not seem to practice them. They did not use energy efficient light bulbs as much, some expressing the perception that the energy efficient bulbs are not as bright as regular incandescent bulbs. The urban students were also less willing to cut down on electronics use, unless told to do so by their parents. This difference is partly due to the inconsistent reliability of the power grid in rural areas – urban areas experience a much more stable supply of electricity.

For both sets of students however, the impetus for conservation was primarily economic rather than a perceived need to protect the environment. Generally, the students failed to demonstrate significant understanding of the connection between energy and the environment. For example, rural students saw Jordan's energy problem as weak infrastructure while urban students spoke about lack of technology to generate renewable energy and some students spoke about lack of fossil fuel resources. Students did not articulate how using fossil fuels, for any use, would pollute the environment nor did they articulate other environmental reasons as the reason for conservation.

Throughout the conversation on energy, the urban students showed a clear cynicism of the government. The rural students did not view very negatively the government and its role in managing Jordan's energy supply. This sentiment was particularly evident when the students in urban areas discussed policy-based solutions, which focused on current inadequacies at the municipal and national levels. The rural students, while generally worse off in terms of the reliability

of electricity in their area, shifted some blame for less reliable electricity to poor weather, and generally held better overall views of the government.

Solid Waste

Both urban and rural groups had extensive knowledge of types of waste and disposal methods. They listed the various domestic wastes, organic waste, and electronic waste, medical and even nuclear waste. The majority of students in both groups also knew that organic waste decomposed first. Interestingly, the rural students said that food waste was reused to feed cattle and did not include it in their conceptualization of organic waste. Both groups also said that metals took the longest to decompose of any solid waste product, though glass and plastics usually take longer.

Knowledge of disposal methods differed slightly between the two groups though both had a significant amount of knowledge. Both groups identified three primary disposal methods: landfills, burning, and recycling. Urban students, however, thought that most of the trash collected by the municipality was sorted for recycling once it was gathered. The rural students had a better understanding of how waste was disposed of in Jordan. These students knew that recycling only took place prior to disposal and only by private companies. Sorting practices were more prevalent among the rural students as they could sell the sorted materials to scavengers. Although urban students were familiar with landfills and burning, the rural students had more firsthand knowledge of both methods, having physically seen landfills and burned their trash.

The students' knowledge of the impact solid waste accumulation would have on the environment pertained mostly to societal implications. For example, both groups readily identified the aesthetic consequences of poor waste disposal in neighborhoods and described the spread of disease and vermin that would also result from solid waste accumulation. However, the rural students were able to describe the negative impact waste accumulation would have on ground water and soil resources. The rural students also discussed things like the formation of leachate, which is a contaminated liquid that drains from landfills and can pollute ground water and soil.

To improve how the public disposes of solid waste, the students came up with a number of solutions, though again differing in perspective on the government's role. Initially, both students talked about things the government could do to prevent littering and to prevent a hypothetical buildup of solid waste. They suggested putting out more garbage bins to provide a place to put garbage rather than littering, and suggested adding more sanitation workers, or increasing the trash pickup schedule.

The urban students concentrated on this vein of solutions, focusing on what the government could do to help alleviate pollution from solid waste. Some talked about household level solutions, such as reusing waste materials, like empty food containers. However, they mentioned solutions like this after talking about government approaches to curbing pollution. Rural students on the other hand elaborated further, focusing on things the household could do, including sorting their waste for recycling. Both groups also mentioned increasing awareness of solid waste pollution and how to prevent it.

Figure 7: Responsible trash disposal practices

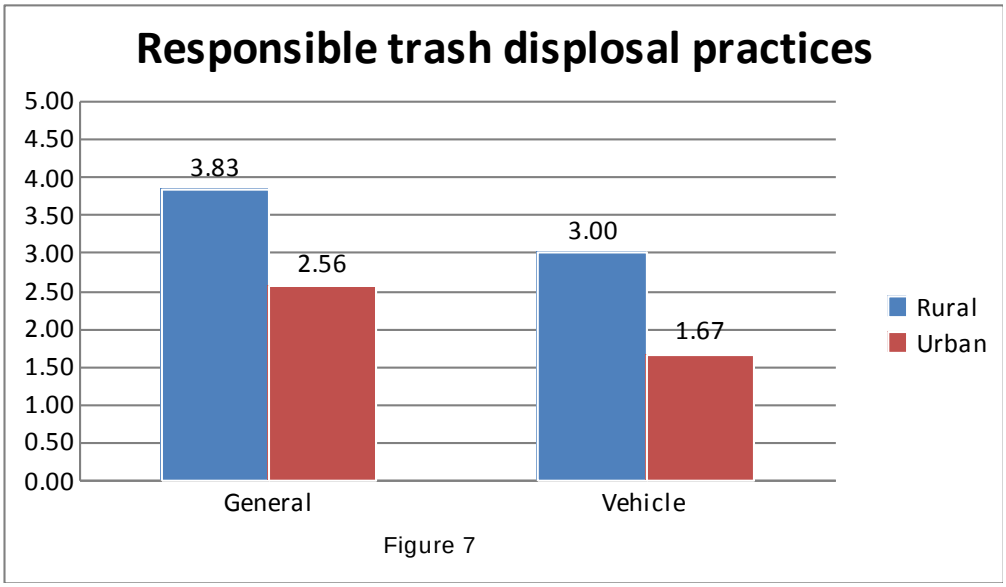


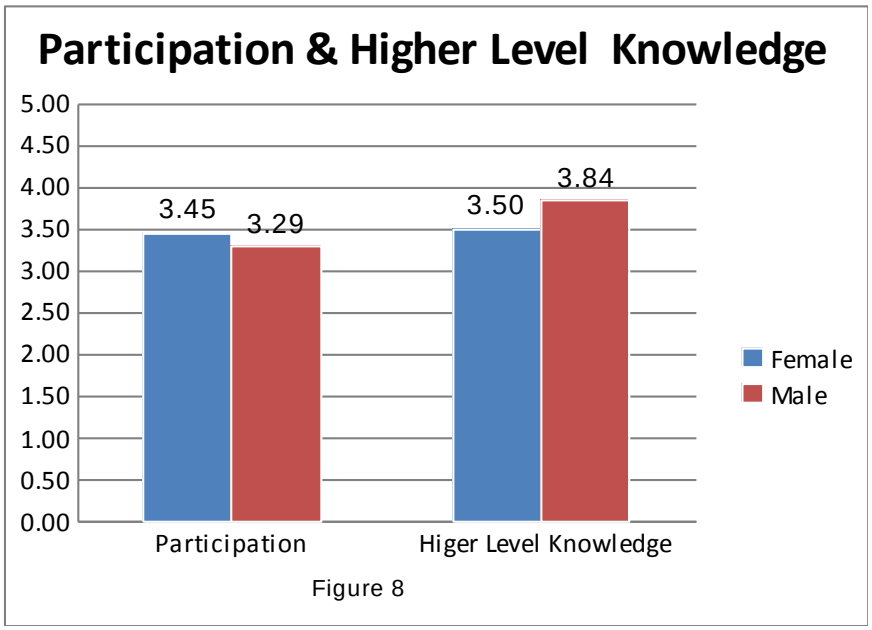
Figure 7

Interestingly, both groups littered frequently from the car despite their knowledge of the impact pollution has on the environment and despite the urban students' ardent anti-littering stance. The urban students, who expressed significant opposition to littering since they could see the consequences of frequent littering in their neighborhoods, tended to litter more at school as well (see Fig. 7). Rural students suggested that littering would ruin the image of Ajloun as an environmental center. In other words, the rural students littered less out of a sense of community pride. They also littered less at school, but this can be attributed to more stringent rules against littering, including the presence of a secret prefect or student officer who reports students who litter. Overall however, there seemed to be some disconnect in both groups between their knowledge of solid waste issues and their practicing of environmentally friendly habits, like not littering.

Gender

The following section contrasts the responses of males and females, describing the dominant strains of thought for each as they concern water, energy, and solid waste. Males demonstrated more critical and knowledgeable views concerning each of the three environmental themes, including how problems in each theme impact the environment and society. However, females were more likely to participate in efforts to alleviate pollution and promote ways that others can get involved (see Fig. 8).

Figure 8: Participation and higher level knowledge



Males tended to practice conservation more with energy whereas females practiced greater water conservation. One reason for this is that males, more often than females, knew the amount of the water and electricity bills, with the bill for electricity tending to be much higher than the bill for water. Males were therefore more conscious of their role in using electricity and felt more responsibility for moderating their use of this costly utility. As well, males tend to play less of a role in the daily activities that use the most water while females tend to spend more time on domestic duties, like washing clothes or dishes. In rural areas, where water is available less often, males have alternate bathing sites as well, like local streams, though females must be careful to conserve water as they may only bathe at home.

Across each theme, there is a divide between the males and females that follows the roles that each plays in the household and the ability of each to get outside the home. Furthermore, females also related more information that was relevant to schools than did males, who tended to be less involved at school. Thus, females tended to propose solutions to environmental problems that could be practiced at the household level or at the school level while males would suggest government solutions more often. Similarly, males would talk about the impact of environmental problems on industry and broader society while females tended to discuss more consequences that would affect the household directly.

Water

Males and females had about the same amount of knowledge regarding water issues in Jordan. Females, though, tended to get most of their knowledge from textbooks and in-home experiences. Males had a broader perspective generally due to their greater mobility in their communities.

A greater portion of females were able to identify water scarcity as Jordan's most pressing environmental problem. Females were also better able to identify the sector that consumed the most water in Jordan. Males were more likely to say the domestic sector consumed the most water instead of the agricultural sector. Males knew more than females about the sources of water in Jordan, especially local sources, due to their mobility and spending more time outside the home.

Males also knew more about mega-projects and could discuss them in more detail than females. Very rarely did females mention the Red-Dead Canal or the Disi aquifer much less discuss them in detail. Males were also better able to discuss the political aspects of the mega-projects and how the projects would affect various socioeconomic groups in Jordan. For example, some males would discuss the involvement of Israel in the Red-Dead Canal project and the relationship between Saudi Arabia and Jordan concerning the Disi aquifer. The males also could describe the resources that the Red-Dead Canal would provide, saying the mega-project would provide water and electricity.

Females and males had a reasonable understanding of the impact water scarcity has on their life and were able to discuss in depth the ways a prolonged absence of water would affect their life and the environment. The primary difference between the groups' responses, again, reflected traditional gender roles in society. Females spoke about consequences on home life, about the impact on personal hygiene and clothes washing for example. Males would talk about the water shortage hampering economic and industrial development.

The same distinction between males and females is evident in their proposed ways to conserve water. Females focused on ways individuals and households could conserve water. Females described using gray water for household plants and gardens, for instance. Males spoke about government policies and technologies that could increase conservation. For example, males were more aware of water theft and poor infrastructure that caused water loss in the system, the prevention of which by, municipalities would prevent water waste. Both groups however were aware of water saving devices and both suggested using these more often to save on water use.

Females made a greater effort than males to conserve water. The females implemented the methods they proposed, most of which were actions that individuals could take. Alternatively, males, having suggested conservation methods that were less able to be carried out by an individual, did not practice water conservation as often. In fact, males would rarely admit to compromising on their use of water though females often did. For example, in some rural communities males would take showers, while females in similar households would bathe with buckets, a process that uses less water.

This difference was most salient in rural areas where males often had alternative sources of water for bathing, and where they played little role in the management of household water resources. Females had to more carefully manage water usage for household needs, including bathing which they could only do at home. Consequently, females felt much more pressure to conserve and monitor water use. For the males and females who conserved, religion was a common factor in their motivations.

Perhaps reflecting on their own lack of conservation, males answered that primary responsibility for conservation lay in the hands of individuals, despite their suggested policy-based and technology-based conservation methods. Females said that responsibility for water conservation should be shared between the government and individuals. Already conserving significantly at home, females felt that further efforts at conservation would also have to take place outside of the home.

Energy

Compared to water knowledge, males and females had considerably less knowledge of energy issues. Both said there was an energy problem in Jordan, but did not to relate this problem to finite resources, or air and water pollution. Both females and males could differentiate between renewable and nonrenewable energy sources, though males were better able to identify which Jordan relied on for energy generation. Males more often said Jordan relied on fossil fuels for energy, though most still said renewable were Jordan's main energy sources.

Females, instead of saying Jordan relied on fossil fuels to generate electricity and for other uses, suggested renewable sources like sun and wind were Jordan's primary energy resources. Although females said that Jordan relied on renewable sources to supply its energy needs, they said Jordan's primary energy problem was a lack of nonrenewable energy sources. When females discussed fossil fuels, they considered only the use of fossil fuels in factories and cars rather than that its use in large-scale power generation. As well, very few females were aware of Jordan's plans to build a nuclear power facility, which was more frequently cited and known by males.

Similarly, when asked about the impact of a severe, long-term energy shortage, males were able to provide a more expansive analysis of the impact on industry and society. Males discussed the impact such an energy shortage would have on households as well, but elaborated on the shortage's effects on society and industry more broadly. They talked about the energy shortage hindering technological development, for example, and about the inability of factories to operate.

Both groups also discussed the boredom that would ensue following power outages, in particular those students in urban areas. Both groups mentioned dire consequences for hospitals and patients, but females stuck mainly to describing the impact on home life. Additionally, females were more likely to say that they would not be able to study, which continues the theme exhibited in the other environmental issues that show females' responses to be in line with their experiences in the home and greater involvement at school.

Moving from a discussion on energy shortage to one on conservation and solutions, the students differed in their levels of concern and practice. Males expressed more concern for conservation and were more aware of their electricity

consumption. The males also demonstrated greater knowledge of conservation methods (see Fig. X). This correlates to a greater awareness among males of how much the household is spending on electricity. Thus, the economic impetus for conservation that parents feel, may be more easily passed on to males who may be sent to pay the bill or generally have greater access to the bill. Importantly, more males tended to know their water bills than females, though the bill for water is usually much less than the amount owed for electricity. With greater access to alternative water sources and less responsibility for managing the household water supply, males felt more strongly about their role in electricity usage.

Both males and females suggested common household conservation methods, including turning off lights when exiting a room and utilizing more energy efficient light bulbs and appliances. Not turning on all appliances at once was a solution more commonly proposed by females. Males further offered ways to increase energy conservation specifically among all Jordanians.

Solid Waste

Unlike with energy and solid waste issues, males and females tended to have about the same amount of knowledge around solid waste issues. The primary difference between males and females, which was only visible in rural populations, is that males knew more about recycling. The difference between knowledge levels of urban and rural populations is discussed above, but the difference is also along gender lines. The role that males play in rural households includes sorting waste, which is a practice motivated by financial concerns rather than out of care for the environment. Therefore, rural males knew most about recycling and its place in Jordan's solid waste disposal system. Urban females and males both lacked understanding of how recycling fit into waste disposal, thinking the government sorted and recycled once trash was picked up.

Generally, males were better able to identify the effect improper waste accumulation can have on soil and water supplies. Males were able to connect the issue of water shortage and pollution to solid waste issues, noting that improper disposal and accumulation can negatively impact water supplies and amplify Jordan's water problems. Females were less able to make these connections, especially in rural locations.

Male attitudes towards trash and other solid waste showed a lack of environmental concern for how waste was disposed. It was less socially acceptable for males to join environmental clubs or participate in other positive environmental activities. Also, males felt little responsibility for disposing of trash, which they saw as a responsibility for girls.

This view parallels a view amongst females, expressed when discussing why female schools seem cleaner than predominantly male schools, that females were responsible for cleaning and should therefore be cleaner. In fact, more males admitted to littering at school than females though a significant portion of both groups admitted to littering out of the car. Of course, female schools more often had a secret prefect or student monitor that could enforce anti-littering rules amongst students, which also played a role in their actual cleanliness at school. Further, female schools generally had more rules on cleanliness that reinforced this attitude whereas male schools lacked as much enforcement and relied more on janitorial assistance to maintain a clean campus.

Females had other positive behaviors as well. Girls spoke more often about reusing waste products than males and were more willing to participate in and develop environmental awareness programs. In general, females were seen to be greater contributors in this regard and more motivated to make others aware of good environmental practices.

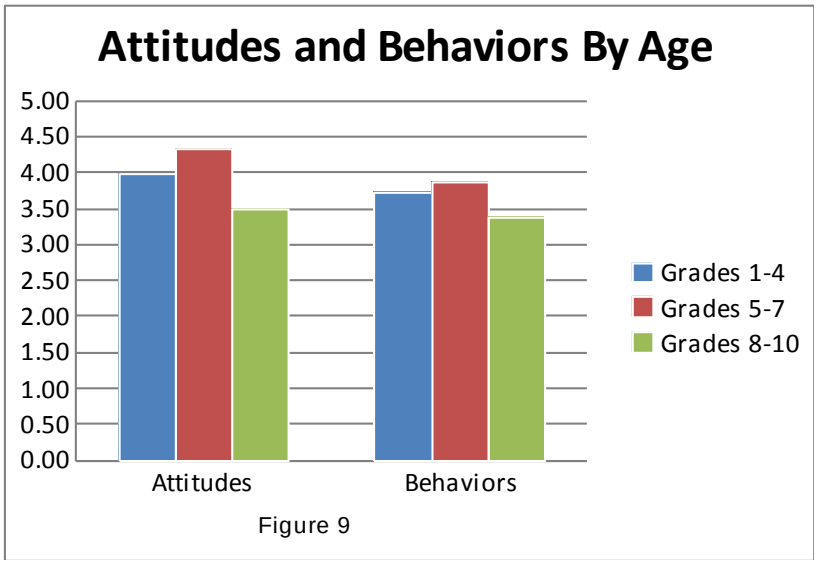
Age

Although it is obvious that knowledge would increase with age, it is also true that age is a crucial variable when discussing attitudes and behaviors, whether these are positive or negative. In some instances behaviors also differed within the same age group yet for different themes, revealing an inconsistency that suggests other factors come into play as well.

Younger students obtained knowledge that was mostly curriculum-related and behaviors were largely shaped by parental influences. For younger children it was also difficult to determine their attitudes or real practices as they were mostly agreeable when questioned. Yet when the research team investigated further with 1st to 4th graders it was also clear that some of their behaviors were actually destructive, for example using water for play, which reveals their lack of connection between knowledge acquired and real life situations. It would be crucial to develop relevant environmental education that can somehow reflect appropriate attitudes and behaviors at the school level, to serve as a foundation for developing environmentally aware and conscientious students.

For the middle grades 5-7 knowledge became suddenly vaster and more detailed, and attitudes and behaviors slowly began to emerge. This, we perceived, is the most crucial time to affect young people's attitudes and behaviors For at this stage young people began to think somewhat independently of their parental or familial influences, and were open to suggestions. Attitudes were still influenced by parents, yet also found to be quite flexible in this age group. Behaviors on the other hand, were found to be more positive in this age group as compared with the younger and older groups. In this age group, students seemed to be transforming. To some degree they were not old enough to assume bigger responsibilities, yet old enough to demand new experiences. This may have had an impact on their scoring higher in attitudes and behaviors (see Fig. 9).

Figure 9: Attitudes and behaviors by age



Naturally students that were older obviously obtained an accumulated knowledge, and a greater awareness of the concepts, therefore the breakdown and analysis of problems was more in-depth. It was also easier to determine their attitudes as they expressed notions of government and tied environmental concepts to political issues. However, attitudes seemed to take a negative turn with age, and a certain nonchalance towards environmental problems seemed to develop. This was true especially for 10th graders, and mostly amongst males, who believed for example that they had 'bigger things' to worry about, and showed strong attitudes towards the role of government in resolving issues. In some instances, and as a result of this, they practiced more negative behaviors (i.e. throwing litter out of car windows more frequently than younger or middle school students). Yet they also developed behaviors that were more consistent with positive environmental practices, such as energy conservation, though this was found to be motivated by an awareness of its economical impact on their families rather than an inherent concern for the environment. They seemed to acquire this knowledge through being sent to pay family bills. Ways to engage these youth in environmental education would be to promote their learning at a community level, and provide programs that are project-based, hands-on and where learning is a democratic process. This would prove most effective in modifying attitudes and behaviors with this age-group.

In conclusion, it can be said that while knowledge was obviously enhanced with age, this was not necessarily true for attitudes and behaviors Attitudes at times took a more negative turn the older students were; and the more they tied issues to culture and politics. Attitudes were undetectable in young children who mostly relied on their parents' perceptions, ideas and directions. While middle school students appeared to have certain attitudes, these were still mostly positive and easily swayed by the group. Best positive behaviors were found in the middle school group, these seemed to show the most genuine concern for the environment as a living thing. It seemed the younger the students; the more their behaviors were influenced by external factors or simply acted out, out of lack of awareness. Whilst the older they got, the more there was a tendency to act negatively out of choice. It was as though older students acted out of bitterness for assuming more responsibility, and felt as though the environment was just an extra burden to worry about.

Environmental curricula need to be age-relevant. This could mean promoting critical thinking with older students and providing them with opportunities to join debate clubs and forums where such issues can be discussed. For younger grades it is important to focus on hands-on learning which facilitates easier understanding and connecting of concepts to the real world, therefore translating knowledge, attitudes and behaviors to real life.

Parental and Other Influences

As is common knowledge, parental influences are a key cultural component of Jordanian society and its make-up. Parents' opinions and practices transmit the most potent messages to their children and shape much of their attitudes, and behaviors, especially at a younger age. But even with older students parents still had a profound impact on their teenagers' decisions. Where parents practiced conservation it was evident that young people were influenced by these domestic practices, and where such practices were not evident, this also reflected on young people. For example one 9th grader, a male, living in a male-dominant household, believed it was not his role to worry about where his waste goes, that it was a female's role to ensure the house was clean and waste was discarded.

At times we found religion to also be a motivating factor, having an impact on people's behaviors Many students, especially in rural areas, cited sayings by the prophet Muhammad (pbuh) referencing the prophet's teachings on conservation of resources and shunning wastefulness. One recurrent example of this was the prophet's saying "Do not waste water, even if you live by a flowing river". This seemed to move their emotions at times more notably than, say, facts about the detrimental consequences of their behaviors However, we found that a misunderstanding of the messages and teachings of Islamic religion, at times promoted more negative behaviors One example of this is when students referred to energy theft as being a right, considering the country's financial constraints. This was related to a story they narrated about a time of famine in Islamic history when the individual was not punished as harshly for committing theft. Yet, their understanding of the story almost seemed to encourage theft.

Television seems to have been another significant influence on young people's knowledge and attitudes towards the environment, especially amongst the older grades 8-10 who seemed to also derive enjoyment in learning about the environment through television programs and channels such as National Geographic Abu Dhabi.

Nature Club Impact

RSCN's clubs were included in the research to assess any differences in knowledge, attitudes, and practices of young people who had participated in environmental activities of the club versus their peers that did not attend the club, and peers that did not attend nature club schools.

To ensure we collected data that was relevant and could produce comparable findings we felt it more appropriate to only include nature clubs that were known to be active. Four Nature Club schools were selected for the study, two of those in Amman and two in Ajloun, separated by gender. The clubs' scope of activities may have been different due to the school's availability of resources, but the impact these programs had on participating students is what is of value to the study. The Nature Club's operation will also be explored in more detail in chapter 4 which includes a review of RSCN's extracurricular and curricular activities with the Ministry of Education.

Our research findings indicate that student participants exposed to RSCN's nature club activities did not necessarily have more knowledge regarding our research themes than their peers in non-nature club schools. Their knowledge on biodiversity and wildlife protection was definitely more refined, and this reflects RSCN's vision and focus on such topics. However, interestingly, to some degree we felt (our charts confirm) their knowledge of our research themes may have been lower than that of their peers not attending said clubs or Nature Club schools.

However, a marked difference was found in the environmental practices of those attending Nature Clubs versus those who did not. Nature Club students felt a more pronounced concern for environmental issues, and a stronger sense of responsibility towards the environment, which naturally impacted their behaviors Yet even here, females practiced a lot more environmentally positive behavior than did males. This will be discussed later.

Water

Nature Club students were just as aware as other students of the unique water challenges in Jordan, in fact knowledge around water issues was high amongst all students, clearly revealing this topic had been exhausted whether through curricular or extracurricular activities. Although knowledge amongst both Nature Club and non-Nature Club students could be said to have been similar, club members seemed to carry stronger attitudes towards water conservation, and practice better conservation methods.

In all schools there seemed to be a complete disconnect between knowledge and practices, and only in the case of some active Nature Clubs did members' knowledge and practices meet. Non-members and non-member schools revealed a high level of knowledge, and knowledge around solutions to addressing the problem, however in actuality they practiced

very little of what they know to be positive solutions to the water problem. Male club members practiced less water conservation than did female club members; in urban areas male club members were also more casual about their environmental practices than those in rural areas. This was not necessarily true for females.

This could possibly be due to females spending much more time at home using water for a variety of domestic activities and therefore assuming a greater conservation responsibility.

Energy

Although club members versus non-member students and non-member schools had similar knowledge around the various energy resources, it seemed Nature Club students surprisingly found it very difficult to relate energy issues to the environment at all. Club members would check with us several times to verify that we were questioning them regarding environmental issues, and almost finding the whole topic of energy strangely out of context. This was very true particularly for females This is significant, and could reveal the impact RSCN's vision has on members' understanding of what the environment constitutes.

Male club members appeared to be more concerned about energy than female club members. However their concern was not related to energy resources and the environment, but rather to personal and familial financial pressures.

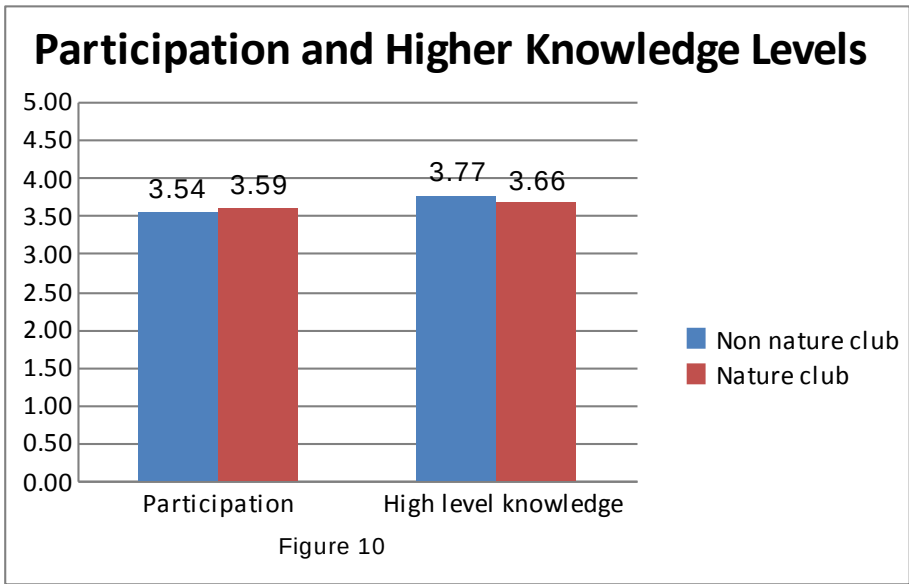
Solid Waste

In some sense Nature Club students had greater awareness of solid waste issues as a holistic concept than did non-members. They could successfully identify different types of waste, and also tie this in with the impact waste accumulation would have on the environment and its resources. They demonstrated a stronger attitude against littering than other students and a pronounced participation in initiating waste separation and cleaning activities at school. This is quite interesting considering it is not within RSCN's mandate to tackle solid waste issues. This also revealed that although the club may have a vision geared towards protection of wildlife and nature, teachers and students have some freedom in exploring other environmental topics proactively simply by virtue of being part of the club.

The research findings generally conclude that Nature Club students did not appear more knowledgeable than their peers (non-members) in the three areas of this research (see Fig. 10).

In fact, in some cases (see Fig. 10) they were less knowledgeable, especially regarding energy and how it is related to the environment. RSCN's focus on protection of wildlife issues related to Jordan's natural environment may have distorted club members' understanding of what the environment is and what other valuable resources it holds.

Figure 10: Participation and higher knowledge levels



RSCN does not currently tackle issues related to the themes of this survey. In the past water concepts were tackled extensively, but as it was also addressed by many other organizations, this has not distinguished its club members from other students. A holistic approach to environmental education is yet to be explored for Jordanian youth.

Yet although Nature Club activities currently do not address water, energy, or solid waste concepts, it was evident that Nature Clubs had an influence on young people's participation levels in environmental activities to a big degree. The environmental education curriculum of the clubs focused mostly on biodiversity and preservation of wildlife, hunting laws, and natural reserves. However, club students initiated other environmental activities out of their own interest and equally through encouragement and support from their teachers supervising the club. These activities ranged from some waste management practices such as separation and forming cleaning committees, to holding events and inviting speakers to share knowledge with their peers. Teachers running the clubs were also clearly influential as they were mostly volunteers and so brought their own values into the club and developed programs relevant to these.

So although club members were not necessarily found to be more knowledgeable than their peers in non-nature schools; participation in club activities did seem to develop its' members awareness of and sense of responsibility towards the environment in a variety of ways, attitudinal and behavioral.

The club therefore, could be used as a venue to activate other environmental issues; however RSCN does not necessarily seem interested to sway from its current mandate.

Other key points to be considered, and which significantly impact the previous review, are whether clubs target males or females, and whether they are close to RSCN's nature conservation sites.

There is definitely a distinct difference in the activity levels of Nature Clubs at girls' versus boys' schools, and the participation of female versus male members. It is unclear as to why this is.

For example male members had more negative attitudes towards the environment than females generally. Cleaning committees were more active in female schools, with males carrying more negative attitudes about 'clean-up' days and believing they would not create much of a change in the school's environment in the long run. This was also quite obvious for example in the level of cleanliness of the school's playgrounds at boys versus girls' schools.

RSCN initially established clubs at equal numbers of boys' and girls' schools, and later opened membership to any other interested schools. Currently 2/3 of environmental clubs are active in female schools, whilst only 1/3 in male schools, revealing these clubs are not very popular with boys.

RSCN has tried to balance out this ratio annually; but stated that males have been more interested in sports and physical education activities, since enjoy socializing through games. Girls on the other hand, are not allowed culturally to socialize outside the realm of formal education, therefore are naturally encouraged to get involved in any available activities at school.

Also clubs in rural areas and within close proximity to RSCN nature conservation sites seemed to be more active, but also more engaged in biodiversity and protection issues, so these students' knowledge around our survey themes was to a large degrees distorted by the values instilled through programs related to the conservation sites. An example of this, when students were asked what the biggest environmental problems/challenges for Jordan were, most identified with unregulated hunting, deforestation, and forest fires

Spillover Effect on Non-Members

As with the result above, our findings do not reveal that non-member students attending Nature Club schools were influenced in any significant way by their club member peers. Some students did not even know they had Nature Clubs at their school. Some of the stronger clubs' activities around the school, such as any efforts at recycling, may have had an impact on students knowledge around this particular practice only. Yet results do not even reveal that non-members' attitudes or behaviors were influenced by the actions of their Nature Club peers. Both groups shared similar knowledge; however Nature Club members seemed to practice more positive environmental behaviors than their non-member peers, which were mostly practices regulated by projects in their schools.

In conclusion, although all students' knowledge across the board was similar, the nature club did seem to influence their own members' outlook, attitudes and behaviors towards the environment to some degree. Clubs, however, operate

mostly autonomously, and are not resourceful or active enough to incorporate other environmental themes successfully and meaningfully into their activity plans.

Yet they could serve as a venue from which to activate more creative and innovative environmental programs, encouraging both male and female participation, while focusing on Jordan's more pressing environmental concerns and challenges.

2.3 Private Schools: Findings of Field Surveys

Although we initially intended to present an assessment of the students' knowledge, attitudes, and practices by age group, as in the previous section for public schools students; we discovered through our inquiry that it would be difficult to convey the findings as educational systems and curricula did not present a constant variable. We found the chief influential factor impacting students' knowledge, attitudes, and behaviors in these schools to be based the educational system attended, whether this was national, international, or mixed.

For this reason also, we believed it would be unfair to provide a comparative analysis between young people attending these schools, and equally inapplicable to draw comparisons between them and those attending the MOE's schools. So instead this review will draw comparisons between curriculum systems and methodologies to assess best practices, and the consequential level of knowledge and participation amongst students attending these systems. Teachers' roles in enacting the curricula at these places will also be looked at briefly here, and it will also be discussed in further detail in chapter five. We will be using the 8th-10th grade at each of these schools as a stable variable from which to draw these comparisons.

Four private schools were included in the survey targeting different socioeconomic populations (see Fig. 11), those being upper socioeconomic class, upper-middle, and lower-middle socioeconomic classes.

On one end of the spectrum we have schools that represent a higher socioeconomic population, using only international curricula at their institutions, and assuming that these represent the highest consumers of resources in the domestic sector. Whilst on the other end is your top private school representing a lower middle socioeconomic population. The common factor between them is that both schools produce very high achievers; one on a global level and another on a national level. The latter also only uses the national public curriculum which is delivered in a private formal sector setting. The two schools in between represent an upper-middle population, use mixed systems of both national and international curricula, and produce moderate achievers.

Figure 11: Private schools targeting different socioeconomic populations

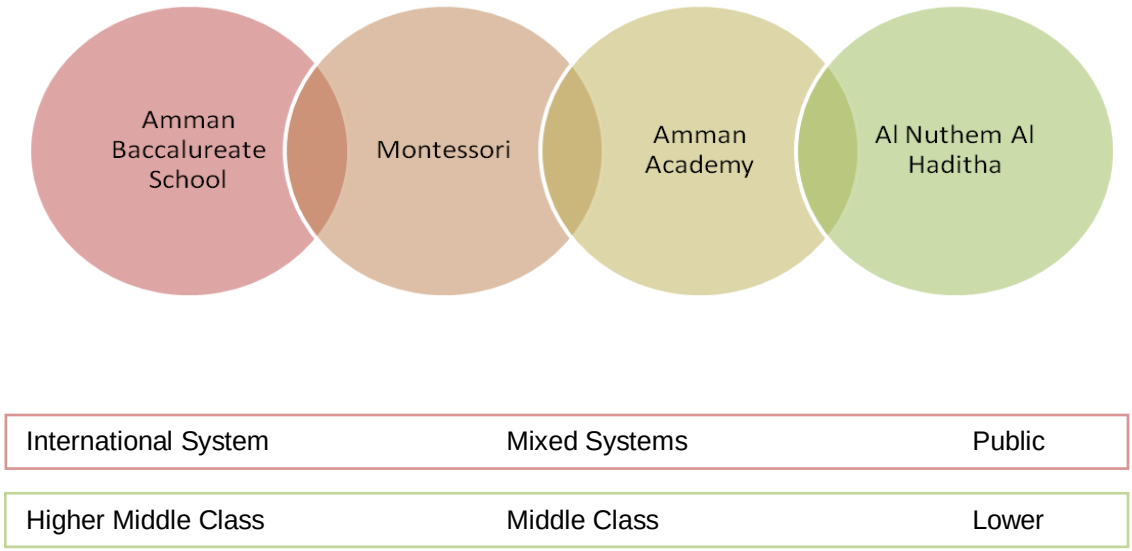


Figure 11

In the following discussion we will present a review of each of these academic systems, looking at their strengths and challenges, teachers' competencies, and consequential level of knowledge attitudes and practices of students attending each.

National Systems

Private schools enacting the public curriculum usually targeted a lower-middle socioeconomic population. However the methodology for activating the curriculum was vastly different from that of the Ministry's schools approach.

Teachers at these institutions are highly specialized, and know their subject matter well, and are trained professionals. In these schools they are also given leeway for creativity, and in fact encouraged to provide innovative implementation of the curriculum. Therefore educators have the freedom and feel comfortable to incorporate tools and supplemental material to enrich the curricula. This is also reflected in their students' vast knowledge, which was always referenced to curriculum lessons in exact textbook locations. Much of their student responses however were still based on route learning, which reflects on the national curriculum's design.

In these private schools teachers also have the space to complete the curriculum successfully in a timely fashion. This is due to longer school hours and the existing non-formal support systems which provide teachers with an opportunity to connect with one another, making the learning environment and institution more or less interdisciplinary in an informal way. Teachers also showed more job satisfaction, and perceived their success to be directly related to their students' achievements. Whilst their colleagues in regular public schools appear to be motivated by salaries or receiving credit to mobilize themselves within the hierarchy.

These schools also use hands-on approaches to enrich the public curriculum; however material is incorporated not as an add-on, but very specifically linked to the curriculum classroom lessons at the appropriate timing.

Environmental projects were present, however rarely did they take shape outside the schools grounds, and since they were designed to support the curriculum. They also did not necessarily grow in scope, and so oftentimes students understood concepts only within the school's system and found difficult to relate similar ideas and concepts to the reality outside their school. Learning, therefore, was somewhat process-oriented rather than impact-oriented, and was not contextualized into real life examples and experiences.

However these projects still appear to be more successful in initiating thought in students than projects at regular public schools, which are introduced as add-ons with no real connection to the curriculum. At MOE's public schools, teachers also often felt no real commitment, as external factors are usually enforcing them to implement this type of work, where as for teachers of private schools there was a willingness and interest in committing to such projects.

Due to these factors, it is quite visible that knowledge of students at private schools undergoing the national curriculum is much higher than that of their peers in regular public schools. For example all students at these schools understood clearly that oil generated electricity whilst in regular public schools there was a general confusion around the connection between resources and electricity generation, most believing Jordan's electricity was generated using renewable resources.

Yet this raises another issue: although knowledge at these private schools was quite vast, their understanding of concepts remained in the theoretical realm with no real connection made to reality, therefore practices outside the school also remained quite low.

Surprisingly, attitudes were quite positive, and this encouraged some positive behaviors at schools, yet it seemed more was needed to encourage such behaviors externally.

This was also validated by our teacher focus groups where teachers felt they could enrich the curriculum to encourage knowledge and understanding of concepts, yet they themselves still felt it was insufficient in modifying behaviors of students.

These schools could be considered a model for other public schools to follow in the delivery of the public curriculum, but perhaps our findings raise questions around the validity and appropriateness of environmental concepts within the public curriculum, and the general way that these are presented, rather than what can be done to enhance its delivery.

International Curriculum

In schools where only international curricula were implemented, these mostly targeted higher to upper-middle socioeconomic populations.

There are several international systems used in Jordan currently, the most popular being the IB and IGCSE. Other systems such as GCE, A-Levels and AP are also used widely. Schools running these system usually require prior approval from the MOE to ensure that the minimum requirements are met and to ensure Tawjihi equivalence, yet their flexible systems designed to meet the educational requirements of the National curriculum, achieve approval easily.

The systems themselves have undergone some reform since they started, such as the GCE-O level and GCE-A level which was more euro-centric focused, and has now become IGCSE, with a more international focus. Some schools using O-Level and A-Level systems have also moved towards incorporating the IB system which is a more internationally recognized system, and has continuously evolved. IB is also regarded highly by higher academic institutions and considered to be an esteemed program providing opportunities for students to attend top world universities.

The IB is considered the strongest academically amongst these, and preparatory programs are usually provided prior to it, such as the Middle Years Program (MYP) for grades 6-10. However although it is not mandatory to teach this program prior to IB, most international schools are currently moving towards incorporating this as their middle schools' academic program.

The focus of the MYP is based on a life-long learning process which teaches young people to relate the content of the classroom to real life, using a holistic approach to teaching and encouraging 5 key life themes which are also integrated within all subject matter taught. These are: Health and Social Education; Community and Service; Human Ingenuity; Approaches to Learning; and the Environment which is the focus of this report.

These key themes are also the basis towards contextual learning, where concepts are not learned as simply related to subject matter but rather connected to the inner person and his/her surroundings. So for example, community practice will be related to personal interests and will uncover personal passions, a calling for future paths. Another example related to environmental education is valuing water resources by learning about them through several subjects in an interlinked and interactive way, and by using project-based approaches on school grounds and in the field. This holistic approach therefore engages higher thinking skills of youth, and encourages them to be critical learners and decision makers making choices based on personal observation of factual reality. This is how attitudes and behaviors are changed- students can observe all variables, they are immersed in the experience, and are empowered enough to make decisions that come from within and not without.

Teachers in schools operating international systems receive regular highly specialized trainings whether in-house or internationally (e.g. Montessori system trainings), all of which focus on the newest pedagogies of teaching and student-centered approaches used in classrooms. These trainings are not linked to ranking; but rather teachers are genuinely interested in expanding their pedagogical style and professional development.

Resources are another important matter. Teachers at international system schools use curricula with clear and fixed objectives; however they also have the freedom to use their resource of interest to implement the learning. This encourages creativity and a need to excel, which reflects directly on students.

Other benefits of being part of such an academic environment is that teachers are encouraged to disseminate their thoughts and ideas to wider groups of networks, for example having the opportunity to write in IB journals which are used as teaching resources worldwide; and becoming certified IB trainers, as well as joining accreditation teams to other schools. These benefits provide teachers with relevant professional exposure and self-worth, therefore immense job satisfaction which is inevitably reflected in the classroom.

Environmental programs at these schools are project-based and experiential, most involving students in hands-on learning, and focusing on developing critical thinking and ethical responsibility through observation and experience. Yet project outcomes are still linked to curriculum objectives. Environmental concepts are therefore introduced in a contextual manner and timely fashion, and in line with classroom subjects, also ensuring many of the educational objectives in the curriculum are met. As a result, the amount of content covered may still double what is normally covered in public schools but the approach towards teaching and learning becomes more effective.

Students at these schools were found to be the most engaged in our discussion, connecting ideas to one another successfully, and expressing thoughts freely and comfortably, while also reflecting values and ethical feelings about the environment through their responses. Their knowledge was found to be most accurate across any of the groups included in this study. For example, they clearly understood that Jordan is reliant on fossil fuels which it needs to import, and could provide much more detail about the nuclear energy program for Jordan, citing political impact in relation to these as well. Knowledge for these students stemmed not only from textbooks but experiences such as participation in projects and research which they confidently acknowledge improved their understanding of concepts learned.

Mixed Curricula

Schools that practice mixed curricula seemed to pose the biggest problem for students' achievement levels. Offering both the MOE curriculum as well as an international program, these schools usually find it difficult to manage both in a way where they can implement either effectively. The problem becomes multifaceted ranging from recruiting appropriate teachers to manage both, to fully utilizing the depth of either curriculum.

These schools usually introduce the international curriculum in later middle school to senior school years. Students first undergo the national curriculum program in elementary school which focuses mainly on route learning, integrating little critical thinking processes. This offers a difficult base for teachers to work with when the student reaches later years where flexible programs such as MYP curriculum and others are introduced. While students in lower grades are not taught using this approach, in later grades they are suddenly empowered and encouraged to be critical thinkers, but without really having the tools and the basis to empowerment.

As with regards to teachers in mixed curriculum systems, those of them who teach elementary school are often conventional teachers relying mainly on chalk and talk and rarely engaging children interactively in the learning. Whilst in senior school, teachers become highly trained but remain unable to really engage the same graduates of the elementary school in the learning process, because of the mixed messages of combining both systems: one encourages critical thought, while the other inhibits it.

In general, teacher training programs at these schools are not as specialized as those in international curricula schools, and teachers do not have the opportunity to engage in a global learning community as do their colleagues. Much is demanded of them in terms of juggling both programs, and with students usually struggling to merge the learning from both, this provides little space for innovation and creativity, and ensures moving back to classical ways of teaching.

Also, being unable to really use the flexible international curricula effectively due to limited time for teacher training programs, and overwhelmed with the problem of learners having a poor base, teachers sense that flexibility is more of a problem than it is a solution in such an academic environment. This certainly presents a learning process which becomes a gray area to the student. With children mastering neither the international system, nor the national system, it is very much like creating a "jack of all trades, master of none".

Some private schools exacerbate this by beginning to exchange one international curriculum for another in the hope of finding a suitable middle ground. Unfortunately, those schools suffer most since mastering a newly introduced program within an old established system, requires several years of trial and error. Students at these schools showed a very inadequate level of knowledge, as compared with their peers in schools at either end of the private schools spectrum, and even as compared with students attending the MOE public schools. It was also difficult to gauge their attitudes or real practices as the discussion was at times difficult to resume, with students losing focus and finding it difficult to engage appropriately.

The Montessori school differs slightly in that they introduce the Montessori system in elementary school thus; young learners are engaged using their senses to learn about nature and themselves. Practical learning, problem solving, and critical thinking approaches are given early in the school years preparing children towards other international systems. Since the Montessori system does not target the higher grades however, the Montessori school has also encountered problems from experimentation with multiple systems including the required delivery of the national curricula. Results of the Montessori were better than those of mid-range schools but remained below those operating fully international systems, such as the Amman Baccalaureate School.

Mixed systems therefore present difficulty in really impacting students' knowledge, attitudes an behaviors in a meaningful way, since focus is scattered and approaches differ starkly.

Although environmental programs at these schools are encouraged and carried out, it remains visible that these are not directly connected to curriculum subjects and are almost seen as external activities, which again creates a sense that these programs are only temporary with no real life-long value attached to environmental concepts.

Comparing Systems and Conclusions

While resources connected to the national curriculum are limited and fixed, some effort can be done to enhance it through an exploration and use of additional resources to supplement the material, and with strong, well trained teachers, the curriculum can be given a boost to some successful degree. International curricula also have vast opportunities to employ an array of resources, formal and informal, and with an increased focus on one curriculum, again can utilize these effectively and creatively.

Mixed schools, while operating international curricula however, rely too much on the requirements of the national curricula and its resources, therefore integrating little in the way of creative learning approaches.

Teachers using only one curriculum were also found to be more satisfied and empowered to encourage greater achievement in their students, and use resources more innovatively to impact knowledge, attitudes, and behaviors Where hands-on approaches were limited this also limited the change in actual behaviors of students towards the environment.

From the discussion above it is clear that moving towards focusing on one curriculum would be an essential step towards successfully implementing environmental programs. If the choice of schools is to implement the national curriculum, then these steps should be considered if effective environmental programs are to be implemented:

Curriculum guidelines need to be developed comprehensively, so as to allow teachers the freedom to use other resources and move away from the one text-book approach.

Assessments of students' achievements, needs to depend on a variety of tools including the classical tests and exams, but also incorporating more diverse approaches, such as project based, hands-on and experiential learning, whether in the school or outside it.

Extending school hours so as to give space and time for the integration of creativity and innovative learning in the classroom, and contextualizing learning outside the classroom setting. With the limited time public school students actually spent at school, the teachers can hardly complete the condensed curriculum. For effective teaching and learning, teachers' school hours need to be expanded to cater for project based learning. Furthermore, more focused time needs to be allocated for teachers' professional development and collaborative planning.

3.0 CURRENT ENVIRONMENTAL ACTIVITIES AND INITIATIVES WITHIN FORMAL EDUCATION SETTING

This chapter will present a review of long established ongoing environmental education efforts, assessing their effectiveness and impact, and presenting a review of recent programs and ideas for environmental curricula within formal education settings. Some we found may have the potential to serve a greater number of students, and possibly become a model for best practices in this field in Jordan.

3.1 Baccalaureate School Environmental Curriculum MYP

The Amman Baccalaureate School provides an effective environmental education program, which can serve as a prime example of holistic environmental learning as well as a strong model of best practices. The wealth of knowledge that ABS students possess was clearly visible through their engagement in our focus group discussions. Students were more able than their peers in any other academic setting, to hold in-depth discussions on the environment, on multifaceted levels-social, cultural, political- while frequently referring to

real life experiences such as field trips and experiments. These students were not only impressively knowledgeable, but also held more positive environmental attitudes, and practiced more positive environmental behaviors out of genuine concern for the environment. The holistic understanding that these students have of the environment stems from their participation in a focused and targeted environmental curriculum. The program uses hands-on activities and a holistic approach to addressing environmental challenges, therefore making it truly effective in modifying attitudes and behaviors

The Amman Baccalaureate School follows an integrated program for the elementary school, following the national curricula in most subjects, supplemented by "stand alone topics," insuring the inclusion of all themes. Beyond elementary school, ABS uses the International Baccalaureate Program, which consists of the Middle Years Program (MYP) for middle school students, while high school students follow the International Baccalaureate Diploma (IBD) program. For the purpose of this study, we focused primarily on the elementary school and the MYP since grades 11 and 12 are not included in this survey. The International Baccalaureate Program does not focus solely on the dissemination of facts through textbook learning, but strives to develop skills and values such as critical thinking, principles, awareness, and a sense of responsibility. These skills are developed through hands-on activities, experiments, research reports, projects, and field trips. Moreover, IBP incorporates environmental concepts in all classroom subjects, providing a holistic view of the environment. MYP, targeting youth at an especially impressionable age, requires the inclusion of five key themes in each subject taught. These are: Approaches to Learning, Community Service, Human Ingenuity, Environments, and Health and Social Education (see Fig. 12). Teachers are required to incorporate each of the five areas into their lesson plans. This ensures the inclusion of environmental concepts in all areas of the students' education and learning process, therefore allowing students to understand the relevance of the environment on all aspects of life, rather than confining it to mere theoretical abstractions.

Figure 12: Approaches to Learning, Community Service, Human Ingenuity, Environments, and Health and Social Education

In addition to the comprehensive nature and design of the curriculum, students also have the opportunity to participate in extra-curricular environmental activities. Each of the elementary, middle, and high school divisions has a faculty member – a coordinator that is responsible for environment-related matters and environmental activities in school and outside it. The different coordinators can be contacted to cooperate with and initiate various school wide environmental activities as needed. This distribution proves effective in providing age-appropriate activities for students, while simultaneously allowing for more expansive school wide activities, fostering a school spirit and common environmental goal. For example, the elementary school implements a program called "Save Our Amazing Planet"

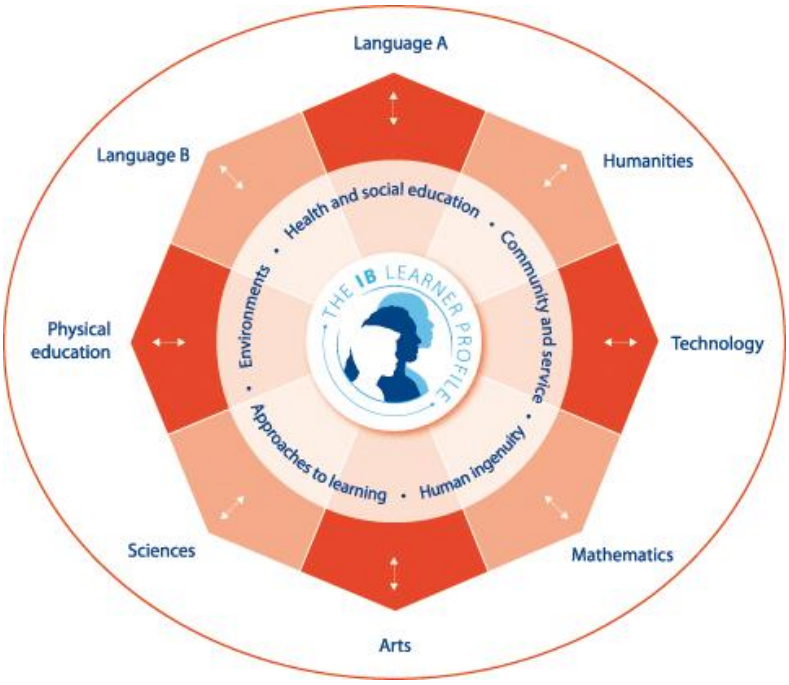


Figure 12

(SOAP), while the middle school is known for their active environmental club, and the high school operates an environmental committee. The above-mentioned extra-curricular environmental programs are quite popular with students and are in high demand, especially amongst middle school students, and receive much student participation. Participation in such programs is almost regarded as 'cool', contrary to the notions held towards environmental activities at male public schools for example.

During elementary school the environmental program, "SOAP," assigns a different theme to each class, involving all students in the environmental process. The first graders focus on recycling, learning firsthand how to recycle paper themselves, while the second graders concentrate on pollution. Grade three students learn about and advocate the dangers of plastics. Their latest activity involved an awareness campaign where students created posters on the damaging impact plastic materials have on the environment and encouraged their peers to reuse. Grade four students focus on themes related to conserving energy. One activity initiated and implemented by the fourth graders involved a drama skit on electricity use and conservation that was performed to all other elementary school. Fifth graders, concentrated on water conservation issues, using student-created awareness campaigns (through printed materials and creative arts) as a main approach. The SOAP program also has an aim to reach out to parents through their website, updating families on elementary school's most recent environmental activities and undertakings, as well providing recommendations and suggestions on actions families can take to support the program through home practices as well as reduce their own environmental footprint. Additionally, the school website contains links to websites where youth can learn other interesting facts about the environment, measure their impact on the environment, and adopt environmentally friendly behaviors.

The middle school's environmental club's main responsibility is collecting materials for recycling from bins around the school campus. The club conducts weekly meetings however, and is active in more ways than one. Members also publish and print a magazine containing information on recycling in Jordan, and other environmental topics that students research and write about. The magazine is published twice a year, per semester. Members also appoint prefects amongst themselves to monitor littering activity at school, and are currently in the process of implementing a project to ensure school offices are also held accountable for negative environmental behavior. The club has developed checklists to distribute providing tips on positive environmental behavior, and students will then carry out assessments and post results of these on the environmental bulletin board. The involvement of both students and faculty sends out a powerful message that all members of the school community are learners and can share environmental responsibility equally, whether young or old.

In addition to the extra-curricular activities, ABS practices recycling in all school buildings across campus. Recycling bins are distributed around the school for students' use, and parents are encouraged also to bring recyclable items to the school drop-off points. The environmental club is responsible for collecting the recycling from the entire school, and the sorted material is then sent to a private company for recycling.

It was challenging at first for students to sort material appropriately, but with time, practice and experience, students have learned to sort materials correctly and responsibly. ABS has also stopped selling bottled water on school grounds, and encourages students to bring reusable plastic bottles , which the school sells as well. These can be filled from coolers with purified water distributed around the school. This also instills a sense of responsibility towards the environment and therefore promotes positive environmental behaviors in students. Repeated acts of reuse and recycling practiced at school, eventually creates students who are conscientious of their consumption habits on an individual level.

ABS serves as a model of best practices in environmental education at formal settings, revealing that academic curricula alone cannot influence and affect attitudes and behaviors A holistic approach is vital- one that utilizes not only textbooks but also hands-on learning, and experimentation and community practice to meaningfully disseminate environmental messages. Faculty and staff involvement in environmental activity and student projects, also guarantees that these messages are not simply appreciated as abstract theories, but

also recognized as an actual part of living. Students therefore become aware of what actions they can take personally to address environmental challenges and reduce their impact as individuals.

3.2 Modern Montessori School: Science Research Center and Experiments Lab

The Modern Montessori School (MMS) is a private school located in West Amman, targeting mostly upper and upper middle populations and providing a complete educational continuum from kindergarten to the twelfth grade. The school offers both the national and an international curriculum to its pupils, which has been expressed by school staff and teachers to be somewhat of a challenge, at times hindering the successful implementation of other extracurricular activities.

Despite this, the Montessori has maintained efforts to teach students about the environment throughout their years of education at the school. Students are provided opportunities in the classroom and outside it to explore environmental issues, with additional opportunities to compete in science fairs, nationally and internationally. Although their environmental programs are not embedded in either curriculum used, however they still are integral to school life and the learning process at the Montessori. An environmental coordinator at each school level ensures all teachers integrate environmental concepts and learning into lesson plans as well as ensures participation in environmental activities outside the classroom. The environmental programs at Montessori tend to focus on project-based learning, critical thinking, experimentation and research.

In fact, the MMS has a positive track record in these activities, sending numerous students to compete in international science and environmental fairs. Examples of student project achievements at these fairs include decreasing the concentration of gases from exhausts, producing hydrogen from scrap metal, designing systems to treat gases from chimneys, and distilling water through utilizing solar energy. These examples are taken from award winning projects that MMS students have produced for science fairs between 2006 and 2009. Students at the Montessori are encouraged, and in fact, motivated themselves to achieve at high levels, applying concepts to real life and combining learning with inventive creations.

To share such experiences with others and in the hope of encouraging a sense of curiosity and interest in learning amongst Jordanian youth nation-wide, MMS has plans to open a national research and experimentation center that would expand the opportunities it currently offers its students and provide a location for students from other schools to also learn and develop their skills through using its facilities.

The center will include lab space where learning through experimentation will take place in all subject areas, as well as an outdoor agricultural space where natural and environmental concepts can be observed and learned firsthand.

The research center will target grades seven through eleven, and will focus on developing critical thinking in students, teach advanced research techniques, and relate scientific methods to real-life learning. By taking part in activities at the center, students will be more able to apply the theories taught in the classroom in the real world. The skills MMS students utilize to design and carry out their internationally renowned projects are indicative of the kinds of learning that the research center would allow students from all over the Kingdom to experience.

As part of the center's curriculum, the MMS has proposed a significant portion that will cover environmental issues, and the Montessori hopes the center would serve as a place for students across the Kingdom to learn about and experiment with up-to-date environmental technologies and concepts.

MMS has already designated land near its campus for the project but currently lacks sufficient funding to begin full scale establishment of the center. Moreover, the principal of the school expressed that further progress would require much more concrete planning, including the development of clearer objectives and more defined learning outcomes. However, the national research center presents a wonderful opportunity to

create an engaging space where students can explore environmental issues through a hands-on approach that is not widely practiced and mostly unavailable to Jordanian youth across the Kingdom.

It may be worthwhile to partner with the Montessori school to develop a concrete and comprehensive plan for the research center to bring this project into fruition. This would require forging strong partnerships, identifying clear learning themes and objectives for the venue, and exploring and adopting advanced educational methodologies that will also be in line with Jordan's vision for a knowledge economy.

3.3 Royal Society for the Conservation of Nature (RSCN) - Environmental Education Department

The Royal Society for the Conservation of Nature is a not-for-profit, non-governmental organization established in 1966 under the patronage of His Majesty the late King Hussein with a mandate to protect the Kingdom's natural heritage. Its chief aim is to develop awareness and promote community action towards the protection of Jordan's biodiversity, through conservation and education programs.

RSCN's educational activity most relevant to this research is implemented by the Environmental Education Department which operates a variety of projects focusing on three main issues: integrating bio-diversity concepts in the national curriculum, implementing educational programs in nature reserves, and activating nature conservation clubs at schools to increase young people's awareness around Jordan's natural environment and its protection. Operating the clubs' programs forms the chore work of the educational department at RSCN.

Since 1985, RSCN has developed a strong relationship with the Ministry of Education to begin raising awareness and instilling environmental values via the public school extracurricular activities. This relationship was initiated through the establishment of the Nature Clubs at schools. In the year 2000, the RSCN also created a strong partnership with the curriculum division at the MOE to integrate its environmental education vision in the formal education. This was enacted through the WEPIA project discussed further later.

Nature Clubs

Although the nature conservation clubs are set up within formal education settings, their efforts involve mostly extracurricular activities, which are not necessarily connected to the curriculum. Nature Clubs are established in each directorate, across 20% of the Kingdom's schools. Membership is also open to schools desiring to incorporate a club as part of their school's extracurricular activities.

RSCN appoints coordinators in the directorates to create databases of participating students and staff members, and provides them with detailed manuals and a yearly action plan. The Education Department also works with interested schools providing a work methodology on setting up the club, assigning members with different responsibilities, and operating and managing the club's yearly plans while making the best of available resources. Most programs at schools are developed and implemented based on the school's needs and the usually limited resources available to them.

Regional coordinators for school environmental clubs at the directorates are appointed to this role and act as a point of contact between RSCN and the schools to ensure clubs are set up appropriately and implementing successfully. Additionally, at the school level supervisors are appointed to carry out the club's activities on a daily/weekly/yearly basis. Supervisors are usually teachers who do not necessarily have to have an environmental or science background, but express a willingness and interest in supporting and running the club.

The Nature Clubs' educational activities mostly focus on protection of wildlife and biodiversity, looking at all facets of the topic, including what challenges affect the species, their habitat and the availability of resources.

Yet, because the clubs operate somewhat autonomously at the school level, individual clubs may choose to focus on issues relevant to their locale and geographical environmental issues. Individual schools have set up water clubs or animal protection clubs for example. Most club programs have employed campaigning approaches to raise awareness amongst student populations, which is usually done through handing out printed materials, through the school bulletin board, public announcements through school radio, and various events such as clean-up days, or competitions.

A relevant major project that RSCN has recently initiated in joint effort with the International Union for Conservation of Nature (IUCN), is a school-based project titled 'Water For Schools' funded by….

The project's aim is to raise awareness amongst students of the water scarcity and pollution problem in Jordan, and it's relation to biodiversity and species extinction. The project was initially piloted in four schools with nature club students to assess their knowledge and determine areas which may need further development. RSCN discovered that students already had ample knowledge about water issues and that the topic had been exhausted, save that behaviors remained mostly unchanged. Since then the project's focus has shifted from raising awareness to modifying behaviors and instilling in young people a sense of responsibility towards encouraging positive water conservation behaviors in others.

The methodology of the program will also employ a unique project-based and hands-on approach to assist students in learning through experience, which will also develop their skills in identifying problems and finding solutions to address these.

The project's pilot phase ended recently and plans to implement the project nationwide in the future are currently underway. Although this could provide an opportunity to work with RSCN to expand their vision for the project and relate it to energy and solid waste, we would need to ensure that messages disseminated to children focus on pressing issues related to their own well-being prior to addressing scarcity issues in the ecosystem.

Despite the continuous existence of Nature Clubs and ongoing activities, it is difficult to determine how successful these places of learning have been in disseminating environmental messages. Two reasons that seem to pose problems in the appropriate functionality of the clubs are lack of extensive follow-up and very little funding to support activities.

RSCN's follow-up strategy involves only 3rd person inquiries, where supervisors relay any progress and information back to RSCN through email or yearly meetings to assess achievements and plans for the upcoming year. Evaluative school visits do not normally take place. RSCN attributes this lack of follow-up on a field level to the large number of Nature Clubs and student members versus the lack of RSCN staff to conduct such evaluations. Measuring success and gauging attitudinal and behavioral impact, therefore, depends fully on the supervisor's verbal or written accounts of the club's activities and results.

This evaluative approach leaves a lot of questions unanswered as to the effectiveness of the clubs' activities and because clubs are not monitored or evaluated closely by RSCN members, it is uncertain how many are fully operational and what impact they have on students, if any, as seen in our above findings.

Funding has been another problem haunting Nature Clubs since the initiation of the program. Although some yearly activities are funded internationally, such as 'Animal Action Week', most of the club activities year-round rely mostly on what little resources the school may provide, and this is very modest considering public schools have many other priorities to invest in.

RSCN also operates seven nature reserves across the Kingdom where on-site environmental educational programs take place with visitors, whether children or adults from the local community or external to it.

Part of this program is implemented each year in liaison with the Ministry of Education where scheduled visits to reserves are held for students from various parts of the Kingdom. Students can use facilities; join in walking trails and other experimental activities to learn about the natural habitat of the reserve. Educational officers from the reserves also visit the schools to follow up and support the field programs. Each nature reserve also encompasses a unique Nature Club with activities focusing on that geographical area's unique environmental habitat and challenges. Visits are intended as a hands-on learning experience where a sense of ownership and responsibility towards protection can be encouraged.

Beyond these scattered activities, RSCN's current work is chiefly limited to protection and conservation of natural habitat and biodiversity, with little attention given to the protection and conservation of natural resources. This inevitably informs its future agenda also.

Yet to develop a holistic vision for environmental education, it was important for RSCN to develop some connection to formal curriculum that would support its extracurricular activities already ongoing through the Nature Clubs. This was hoped to be achieved through WEPIA.

WEPIA: Water Efficiency for Public Information and Action project

RSCN implemented the Water Efficiency for Public Information and Action (WEPIA) project which was funded by USAID with a mandate to review the appropriateness of the national curriculum textbooks and recommend further materials to be infused in the textbooks. Although it was intended for the project to start in 2000, it was delayed due to disagreements between the MOE curriculum division and RSCN's management around issues related to abidance with USAID regulations. When finally differences were cleared through the intervention of the Minister of Education and the head of USAID mission at the time, WEPIA officially commenced work in 2001, one year after its intended schedule, and was completed in 2004.

The subjects selected for the review were mathematics, science, social studies, vocational education and ICT. Almost 100 textbooks were reviewed and a total of 124 new concepts were introduced into the textbooks. As many as 13 lessons were digitized and were presented in CD format to the ministry.

Using an interdisciplinary approach in education, the WEPIA project intended to promote positive attitudes, citizen action skills, and participation related to water conservation concepts.

The WEPIA project preceded the ERfKE reform project which came into place at the MOE soon after. This meant a change in approach and presented some challenges in implementation and delivery of new concepts and WEPIA materials.

Although textbooks were changed and new materials were introduced, much of the water concepts existing previously remained. The changes introduced in the textbooks were mostly change in the methodology of delivery of these concepts rather than a change in the concepts themselves. So, although the style of the textbook have dramatically changed since 2004, the same water concepts remain in the curriculum

The WEPIA CD was also incompatible with the Edu-wave system which was installed as the Learning Management System at the Ministry of Education and where all e-learning material is hosted. Due to the lack of compatibility, WEPIA was unable to disseminate the CD to the schools. Much of the concepts tackled in the interactive CD remain up to date and could be readjusted and reformatted to be hosted on the current Edu-wave system. The CD was only used by the RSCN in nature reserves as an educational resource, and was introduced to supervisors during the early stages of the initiation of Nature Clubs, in the hope they would be used with their students.

The implementation of WEPIA materials, their effectiveness, and the impact the materials had on participating youths, was never evaluated by RCSN, since they felt that water concepts were not part of their mandate.

Finally, as many as 90 teachers from different subjects were trained on using student-centered teaching approaches. These teachers, however, were never given the opportunity to train others due to lack of resources and a lack of will of the Training Division to continue the program. The reason for this is that the WEPIA project was hosted and spearheaded by the curriculum division and thus, little ownership was given to the training division who felt that the project was not within its mandate at the time. These misunderstandings, however, resulted in trained teachers not practicing their learning, nor disseminating this knowledge to others.

It is recommended for future projects at the Ministry of Education that more than department is represented in a committee that is headed by the secretary general.

4.0 TEACHER'S TRAINING AND CAPACITY BUILDING PROGRAMS

This chapter will review currently ongoing training and capacity building projects available to teachers. The review will assess the methodologies used at MOE's Training Division as well as QRTA; look at the aims of each program, their effectiveness and how they are interlinked.

4.1 Training Division at the Ministry of Education- Assessing Teacher's Training Programs

An interview was conducted at the Training Division with the head of the Training and Capacity Building Department to assess available training programs for teachers and evaluate the effectiveness of these in promoting teacher skills in environmental education.

A follow up training was conducted at the Queen Rania Teacher Training Academy, which was initiated to assist the Ministry of Education in its educational reform efforts by developing networks with private universities and academies to spearhead best practices.

To date, the Training Department has been conducting annual in-service training to around 100,000 teachers across the Kingdom. Their methodology of training along the years followed the cascade style training which required the initial training of core trainers (mainly Ministry supervisors) followed by the training of coordinators from each directorate who would further train teachers. Although this model reached vast numbers of trainees and was a fast route to implementing programs, it also meant that content and appropriate modeling was at risk of being lost in the process.

Most trainings (about 80 percent) currently being implemented at the Ministry of Education involve preparing and orienting teachers on teaching the new curriculum. Some entry level training programs for new teachers are also provided on a regular basis. Additionally, other IT-related basic trainings programs, such as the INTEL and the ICDL are provided to all teachers regularly to ensure teachers acquire basic IT skills needed for a knowledge economy and to increase their proficiency in delivering e-content. In some cases specialized subject trainings are provided to teachers that work in specific fields, for example KG teachers receive early education training using the Wisconsin Curriculum which provides the basic theories of education and dealing with young learners.

With regards to training programs on environmental education, there has only been one such training for teachers up to date. This was carried out in 2003 through the WEPIA project. 90 teachers from different relevant subject areas, and some who have already participated in environmental activities through RSCN's Nature Club, were trained on the latest pedagogies in education such as project based learning, critical thinking, brain-storming techniques and mind-mapping strategies. The approach would use the arts, drama, critical thinking and problem solving approaches to deliver water concepts to youth aged 7-16. Teachers were also trained on working with water issues in an interdisciplinary manner, by learning how to map their curriculum and look for common themes between different subjects. The teachers then assigned one day a week to work collaboratively in preparing real-life projects that assist students in understanding concepts using a holistic approach.

The training provided under WEPIA was intended to create a team of core-trainers that would further train the remaining teachers in the Kingdom following the cascade methodology mentioned above. Unfortunately however, due to the lack of resources allocated for the project, these teachers were unable to train other teachers on the methodologies introduced. Furthermore, the training being provided did not have financial incentives nor was it linked to any rank systems and thus was not desirable. The training remained with the 90 original teacher participants. Although the concepts were eventually introduced in the curriculum textbooks, however, delivery of the content still depended highly on the teachers' experience and style.

Therefore, teachers, who are essentially considered role-models, currently have no training on environmental ethics and education and yet it is still left to the teachers' style, approach, personal values and beliefs to disseminate environmental information, build skills, positive attitudes and encourage appropriate behaviors towards nature. This is definitely an unfavorable situation for both teachers and students, and can even prove damaging at times.

The role that teacher trainings play is vital in providing educators with skills to disseminate environmental concepts to youth in a friendly manner. Hands-on and practical approaches need to be encouraged and used when introducing real life concepts, such as environmental concepts which focus on modifying behaviors rather than simply disseminating facts.

It was recommended by the Ministry of Education that projects and real applications should be the focus of any training or curriculum reform. MOE also mentioned that linking training to rank-system makes the training more desirable to teachers, consequently ensuring its effectiveness.

Furthermore, teachers are role-models and they are the agents of change. If teachers' attitudes and behaviors are green- portray a higher consciousness towards protecting the environment and display positive behavior- so will the students. The curriculum only tackles and creates a change in knowledge, but for real attitudinal change youth need to be engaged in the process, and for positive behaviors to emerge they need to be immersed in the experience. Teachers as role models can provide this opportunity for students to use the knowledge that they gain in a more applicable and diverse manner. Thus, it has become more evident that trainings play a major role in equipping teachers with relevant environmental skills, which would in turn create the greatest impact on young people's attitudes and behaviors.

The Ministry of Education also feels that environmental ethics training should target all Ministry staff including administrative staff. Ethical behaviors modeled at the Ministry would produce a more sustainable environmentally-aware culture Ministry-wide. Furthermore, ERfKE 2's mandates have a focus on environmental sustainability specifically targeting Ministry infrastructure. The current ERfKE 2's mandate is to provide quality education facilities in a cost effective and sustainable manner so that students have access to environmentally friendly and efficiently operated quality physical learning environments. This would mean that learners would also be encouraged to practice positive environmental behavior

ERfKE 2 project also aims to address teacher skills and pedagogical style through focusing on teacher training and capacity building. ERfKE 2 comes as a sort of continuation to the earlier 4- year program ERfKE 1, which had greater emphasis on curriculum development based on new pedagogical approaches and e-learning.

Additionally, it has been evident through field evaluations of ERfKE 1, that curriculum textbooks carry a vast range of concepts that teachers are required to cover, and so educators find it very difficult to change their style of teaching to a more student-centered approach and simultaneously reach their semester goals and meet the requirements of completing the curriculum. Consequently, the Ministry of Education is undergoing a restructuring plan to create a new organizational framework. Part of this plan will entail developing an Education Training Center. The Education Training Center would work on two levels; preparing and orientating new teachers and providing in-service training programs. The delivery approach would be a supply and demand driven approach. Under the new mandate For example in-service training will shift from a central delivery approach to a more regional or even local delivery approach with demand initiating from local needs. While the supply-driven approach would be related to training on any changes in the curriculum, ICT and ECE training as well as Vocational Education Training and Special Education Training. While the demand-driven would be more specialized and specific covering the needs of the schools, the supply driven would be more vast and general covering needs identified by curriculum reform and other ministry-level reforms.

The approach towards training has changed from the cascade style to a more school-based style or on a school clustering level. A model of communities of practice has been developed in collaboration with the Queen Rania Teacher Training Academy (QRTA) and the Columbia Teacher College. Both the QRTA and Columbia College have designed and piloted the model of communities of practice.

4.2 Queen Rania Teacher Academy (QRTA)

The Queen Rania Teacher Training Academy is a non-profit organization initiated in2009 with seed funding from the Ministry of Planning, and eventually receiving funding in 2010 by USAID to continue its teacher empowerment programs through developing their pedagogical skills in the classroom.

QRTA aims to realize Queen Rania's vision for educational improvement and advancement, through developing multiple programs which focus on five key pillars; preparing new educators, promoting continuous learning, creating communities of practice, advancing policy-deliberation and research, raising awareness and conducting outreach. Their main partners include the Ministry of Education and CUMERC's (Columbia University Middle East Research Center) teacher's colleges which provides them with quality training curriculum specifically geared towards science, mathematics and English Writing. Their relevant programs related to training currently include a program geared towards developing the skills of science, math and English teachers and developing communities of practice between them.

Prior to piloting the programs, a team from Columbia University carried out a needs assessment to determine the needs of teachers and educators in specific communities of schools. Based on the assessment's results they developed teacher's training materials which were later edited by QRTA to ensure the material was culturally sensitive and compatible with local conditions.

Following this QRTA began the process of creating the first formalized pre-service teacher-training program in Jordan in cooperation with the Ministry of Education. At present, this work involves developing an instructional manual for teachers on the content of the curricula, providing teaching tips on the various subjects, and including a leadership skills segment to encourage school administrators to play an active role is student life. These core themes in the manual form the basis for a holistic training program that will ensure newly hired educators and school staff will develop their skills, relevant experiences, and theoretical insights,

in accordance with the Jordanian teaching standards before beginning to apply what they learn in the classroom.

The Academy's key project follows a unique system of three networks of professionals (also known as communities of practice), each network focusing on a specific subject area (such as math, English, and science). The communities of practice consist of 21 different schools in a certain region of the country. These are selected close to one another so that they are able to communicate easily and share knowledge even following the completion of the project. The main aim of the community of practice methodology is to raise the capacity of these teachers and school educators for and extensive period (three years), while simultaneously stimulating dialogue between educators on effective teaching methods, and creating a support network for educators consisting of teachers and directorate staff.

School principals also receive leadership training and gain skills to effectively support teachers in their networks, and to facilitate the successful implementation of their work. The strength of the communities of practice methodology lies in its ability to pass knowledge based on real needs. Yet, the training remains focused and concentrated allowing teachers the opportunity to freely critically evaluate the methodologies of pedagogy they are learning, evaluate their appropriateness to the curriculum, and receive real solutions to addressing challenges.

To ensure the effectiveness and sustainability of strong teaching practices, a support system for teachers for the first three years is created and regular visits and mentoring are provided. Following the three year initiation program, teachers develop a strong network through which they can later create a sustainable community of intellectual and interdisciplinary sharing.

The first cohort of networks is due to end soon, and the second cohort is due to begin in September 2010.

At present, neither the Academy nor the Ministry implements any environmental education training, nor is there is a specific component on environmental issues or concepts in science for example. However the 'communities of practice' methodology can be used to promote the inclusion of environmental concepts into teachers' pedagogical approaches.

The idea of introducing a 'communities of practice' system for environmental education would require selecting a network of schools in a specific geographical area, and implementing an initial thorough assessment of the way environmental concepts are incorporated and taught in the curriculum. A strong network of environmental education teachers would need to be created, and a teacher's guide would be developed, focusing on general environmental ethics as a base for environmental education. This would be followed by developing subject specific or interdisciplinary modules which focus on using student-centered pedagogies and project-based learning in teaching environmental education.

This can successfully ensure the systematization of environmental training, and guarantee the methodical dissemination of environmental knowledge to teachers, who are essentially core role models for students. The communities of practice system will also ensure the sustainability of the training, and catalyze the creation of environmental programs and incite environmental interest in schools. This would disseminate positive attitudes to students backed by solid, contextual knowledge from their local curriculum.

While QRTA currently has main partners, they are not opposed to working with local institutions as they are not mandated to work exclusively with Columbia University.

The Queen Rania Teacher Academy is considering expanding regionally in an effort to bring Her Majesty's vision of promoting positive and student-focused education to fruition. A time line for the expansion has not been established as of yet and the specific locations have not been officially determined, but likely countries for expansion are Saudi Arabia, Bahrain, and Palestine.

5.0 TEACHERS' FOCUS GROUPS: ASSESSING ENVIRONMENTAL EDUCATION FROM THE EDUCATOR'S PERSPECTIVE

The research team conducted focus groups with 40 teachers from varied schools, both public and private, to learn of their environmental knowledge, skills, and training needs. These sessions also explored existing gaps that need to be addressed to ensure the effectiveness of environmental education taught to students. The findings reveal that teachers currently already feel overwhelmed by the amount of content they need to cover to complete the curriculum and desire and need to receive accurate and meaningful training. Teachers also expressed their concerns around environmental content in textbooks, and made suggestions which will be included in this section and in the final recommendations of this report. Gaps in teachers' knowledge and skills will also be explored in further detail in the next chapter six.

5.1 Teachers' Perceptions of Curricula

Public School Teachers:

Teachers' responses varied with regards to their beliefs around the relevance of the environmental concepts found in the curricula. Some teachers perceived the material to be appropriate to the students' age, while others felt that there was a jump at the fourth grade that becomes too advanced for that age group, considering many of the basic concepts were not previously sufficiently covered. Most teachers were in agreement however, that environmental material was rather disorganized and sporadic, with the introduction to concepts appearing in the beginning of the book and then continued at a later stage in the end of the book, therefore lacking a continuum of ideas and therefore a holistic approach to learning. This, they felt, creates confusion for students and a difficulty in connecting ideas. Teachers suggested that environmental concepts need to be more organized to facilitate the students' comprehensive understanding of the topics explored.

All teachers believed that the environmental concepts present in the curricula assist in increasing the students' awareness of the environment. Some teachers even believed that the environmental content is successful in influencing students' behavior towards the environment to a certain degree. Yet others felt that the manner in which the material is presented makes it difficult for students to relate to concepts on a real-life level, in order to understand what they can do about it on an individual and participatory level.

Teachers differed on whether or not the environmental concepts covered in the curriculum encouraged interactive learning. Yet surprisingly, even teachers who believed that the material was interactively covered gave examples such as research and report writing as interactive approaches to directly engaging students in their own learning. This reveals that even teachers lack a holistic understanding of what level of interaction is suitable to engage the student on a more curious and exploratory level.

The majority of teachers complained about the excessively theoretical nature of the material presented and the lack of supplemental hands-on activities. Moreover, where hands-on and experiential methods are used (such as in biology), teachers commented on the absence of appropriate time given for such activities.

Private School Teachers

Environmental concepts taught in private schools do not follow a uniform approach, and instead environmental education depends largely on the specific curriculum followed at that school. Not all private schools follow the public curriculum, yet many provide their students the choice between the Jordanian

governmental "Tawjihi" system, and the British IGCSE and IB systems starting 9th grade onwards. Some as mentioned in previous chapters, such as the Amman Baccalaureate School, offer only an international curriculum for all grades, while others such as the Modern Montessori School, combine both national and international curricula, with subjects following the Jordanian as well as international curricula for younger grades. Moreover, while the current curricula followed by the Modern Montessori School do not contain many environmental concepts the school has an environmental coordinator who ensures the incorporation of such material into classes and activities.

For this reason teachers from different private schools felt differently about environmental education and the appropriateness of material for their students. Private school teachers following only the governmental curriculum felt largely similarly to those teachers at public schools discussed in the previous section. Schools, on the other hand, teaching a combination of curricula and those teaching an international-only curriculum felt and practiced different environmental education.

At combined curricula schools, teachers regarded the national curriculum to be dry and boring, lacking an interactive element that made learning enjoyable, and always needing supplementary material. They also perceived it to be largely theoretical and equally lacking in focus regarding environmental concepts. Some teachers at such schools also expressed they felt that parents sometimes inhibit the interest of their children in environmental subjects, prioritizing the classical subjects of mathematics and sciences. Therefore, teachers at these schools constantly felt the need to incorporate new concepts and activities to supplement that material as they felt necessary.

In these institutions environmental concepts were incorporated through supplementary tools or activities, developed and implemented as extracurricular programs to enhance the hands-on learning and support environmental topics across the variety of subjects. In some cases teachers at these institutions also felt that whether using the national or international curriculum; environmental concepts taught were in most cases not very relevant to Jordan's challenges and that special attention was required to ensure students relate their learning to local realities. Teachers teaching both curricula also worked together to ensure learning was interactive and that concepts learned through the curriculum were also reinforced through experiential and hands-on approaches.

At schools that taught only international curricula such as the IB program for example, environmental education was taught through these educational programs. Teachers at such schools seemed to be satisfied with their environmental education programs, acknowledging the abundance of environmental concepts in all subjects. In such curricula, students do not learn the environmental concepts through abstract theories, but rather focus on research, critical thinking, and hands-on activities. Teachers therefore recognize the interactive nature of the curricula, and engage students with the material by carrying out field trips and visits, making the theoretical material relevant to students' lives. Teachers spoke of the great interest many students show towards the environment, referring to the high demand for membership in the active extra-curricular environmental groups on campus.

5.2 The Teaching of Environmental Education (EE) in Schools

Governmental Schools:

Only four of twenty-five teachers interviewed received some form of environmental training, the majority of whom are environmental club supervisors. Additionally, when teachers were asked to assess their own self-knowledge on the environment, using a percentage to grade themselves, responses ranged from 10%-90%, with the average perceived self-knowledge being 50%. Many teachers requested workshops and courses for teachers on environmental topics, showing a willingness and desire to further increase their knowledge on the subject.

Despite teachers' personal interest in the subject, the only environmental concepts covered in school are those found in the curriculum in addition to lectures and reproaches on keeping classrooms and school grounds clean. That is what they felt was the extent of Environmental programs covered. The hours spent monthly incorporating environmental concepts in learning really depended on the subject matter, since the only hours spent are those spent teaching the official environmental lessons in the curricula.

Teachers did not find it difficult to teach EE from the textbooks. However, many teachers requested additional resources to aid teaching and to add to the theoretical nature of the current material. Students, currently, do not learn EE through practical approaches and therefore, do not apply any skills learned in real life. Suggested additional resources ranged from National Geographic documentaries on the environmental concepts covered, forums, hands-on activities, to field trips. Some teachers currently use the Internet and the school library to retrieve additional resources to aid in teaching EE.

Private Schools:

Teaching methods practiced in private schools for Environmental Education (EE) depend mainly on the school itself and the educational system it follows. Some schools, such as the Amman Academy, involve students in activities such as sorting trash, conducting experiments to measure air pollution, or giving students environmental projects to complete as homework. As expected, the Modern Montessori School system focuses on hands-on experiences as a main teaching method, using photography, gardening, field visits, and presentations to enhance EE. However, some other private schools that follow solely the Jordanian curricula offer little supplementary environmental activities in the way of hands-on learning and resemble many governmental schools with regards to environmental undertakings.

In private schools, theoretical environmental concepts taught also depend on the curriculum followed. Some private schools curricula cover environmental concepts in a mostly theoretical manner with little supplementary material, while others such as the Middle Years Programme (MYP) or the Primary Years Programme (PYP) cover topics in an interactive manner.

While the international curricula tend to pay close attention to environmental concepts, and at times incorporate it as an essential key theme in students' lives, many of the concepts presented tend to focus on global environmental issues, resulting in students' high knowledge of global environmental challenges, but lacking the same level of knowledge of local environmental problems. The Modern Montessori School extended an extra effort to apply global environmental concepts to Jordan, contextualizing learning and providing students with a global and local environmental perspective.

Private schools following some form of international system generally incorporate more environmental concepts into lessons, and also offer extra-curricular environmental activities. In addition to the extensive environmental concepts covered and incorporated into the International Baccalaureate program curricula, the Amman Baccalaureate School implements an exemplary environmental program (explained further in the 'Best Practices' section) that supplements the pervasive theoretical material.

5.3 Barriers to the Inclusion of Environmental Concepts in Education Programs

Teachers were also asked to reveal what they felt impeded or facilitated the inclusion of environmental concepts in the educational system. Many teachers, but especially public schools teachers, felt that the curricula were too dense, allowing little time to include additional information, conduct hands-on activities and fieldwork, or in some instances thoroughly explain the material. This they felt impeded the effective teaching of the material, and prevented the personalization of the environment to students. The environment remains something separate to the student, a theoretical concept read about but not experienced in real life. This was mostly true for schools using the national school curriculum, whether public or private.

In addition to the overly dense curriculum, some teachers in governmental schools felt that they were given too many classes to teach in one semester or year, therefore not allowing time for inclusion or planning of external activities, conducting research, or adding external information to the set curriculum. Even when teachers have the time for such activities, lack of funding arises as a major issue. Field trips, experiments, and environmental projects all require financial resources that governmental schools simply do not have.

Parental influences from home were also mentioned as a major factor impeding and facilitating the teaching of environmental concepts in education programs. Students living in environmentally friendly homes can more easily relate to the material, and connect behavioral solutions to the theoretical material. Equally where parents demonstrated a disinterest in environmental material and focused on classical subjects such as math, biology, and chemistry, their children too felt it unimportant or inferior learning.

On another note, teachers at public schools sometimes felt that students' attitudes at times inhibited the teaching of environmental concepts. Many students do not feel concern for the environment, and therefore lack a commitment to protect it. Teachers expressed that students have difficulty in comprehending the impact and consequences of environmental challenges, and still feel the benefits of using resources outweigh the harm resulting from using them. This creates difficulty in modifying any current behavioral cycles.

A common challenge shared by both private and public school teachers is the need to reach the requirements of curricula in time for examinations. Teachers at times felt forced to complete the material, rather than truly engage students in the learning process thoroughly. Private and public school teachers both felt overwhelmed at times by the curriculum given the allotted time given to cover the material.

Another factor which was expressed as either inhibiting or facilitating the inclusion of EE in education programs was the control or support of decision makers, whether they be school administrators, those responsible for creating curricula, or prominent political figures.

In public schools teachers mostly felt they lacked the support from their supervisors and the Ministry system to initiate change and sustain it. They felt it was difficult to intercept what has long been a practice fully rooted within the Ministry. Private school teachers mostly felt supported by their administration, principals and boards, which encouraged them to innovate new ways to enrich the curriculum and their students' experiences.

In one interesting incidence, the Modern Montessori School expressed the difficulty they faced at times in carrying out environmental activities outside school grounds due to government regulations and procedures which required permits and approvals, which in turn hindered their own processes as a private institution. Montessori has tried in the past to forge a partnership between the school and the governorate to freely implement local environmental projects, but the red tape complicated participation in community-level projects.

5.4 Teacher's Ethical Beliefs and Behaviors

An ethical component was included in the discussion, to assess teachers' values towards the environment, and whether these were intrinsically driven. This is important as teachers are role models for students and often impart their beliefs to the children.

Teachers generally understood the magnitude of the environmental situation, acknowledging the delicate balance of nature, the effects of pollution on health, on species, and on everyday life. Despite all teachers believing that conserving nature and its resources was of top priority, few teachers actually take proactive environmental measures, such as attaining memberships to environmental clubs, or participating in

environmentally friendly campaigns, and much less than half of these work with their own communities to solve environmental problems in their area.

The great majority of teachers however participated in environmentally friendly behavior on a household level by conserving water and energy, and by advocating the importance of environmental issues within their circles of family and friends. Teachers also recognized that human beings have a duty to preserve the environment for future generations, yet over half of teachers believe it is acceptable to sacrifice environmental quality if it benefits human society as a whole (see Fig. 13). One teacher commented that the reason we care for the environment is to benefit human society anyway, so we are willing to sacrifice environmental quality if it benefits human society as a whole.

Figure 13: Sacrifice environmental Quality Acceptance

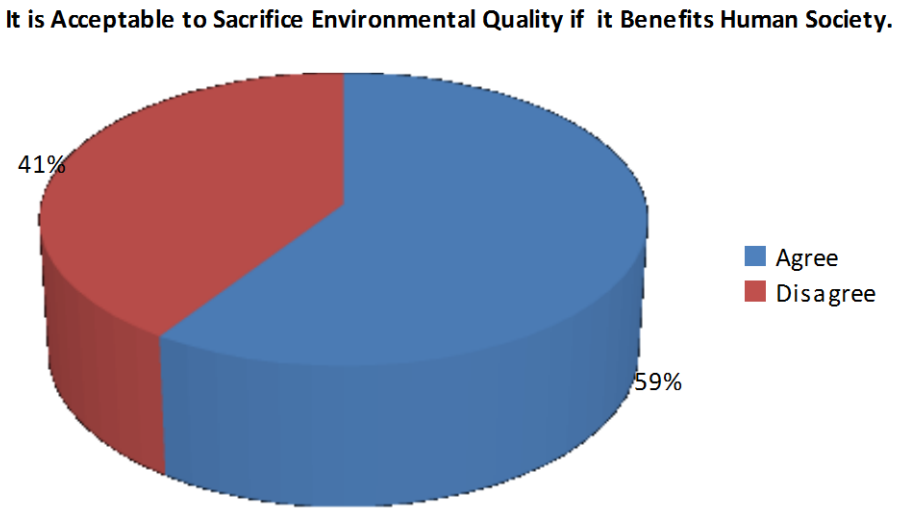


Figure 13

5.5 Teachers' Recommendations

A surprisingly large number of teachers desired to take part in training courses on Environmental Education, sensing they needed to increase their environmental knowledge and EE teaching methods. In addition to increasing their own capacities, teachers generally agreed that the curricula needed improvement, especially public school teachers. They felt the order and organization of environmental concepts in the national curriculum require adjustments to facilitate the flow of ideas and comprehensive understanding of the topics presented. Various teachers also recommended including suggestions and tips at the end of chapters, of ways students can take part and get involved in environmental activities in their local communities. Additionally, they proposed more research projects and presentations were needed to supplement material. Some teachers felt that the environmental material in the curricula should be increased, especially in younger grades when students are more easily influenced.

Yet another consensus amongst teachers of both public and private schools was the overly theoretical nature of the material at times. All teachers perceived that the field is the preferred training setting for Environmental Education with students. Public school teachers especially recommended adding field trips and hands-on activities to supplement the theoretical environmental concepts in the curricula. Furthermore, they felt there was a lack of sufficient resources available to their students. Suggestions for improvement included brochures and posters for classrooms, documentaries and videos, and designating scholarships for environmentally active youth from Nature Clubs or otherwise.

6.0 ASSESSING GAPS

Throughout the inquiry process, and while exploring variations it slowly became evident that student's knowledge mostly ranked high, and was always found to be sufficient as compared with the learning objectives of the curriculum used. At times knowledge was even found to be more advanced than that found in the curriculum, however in these instances it was mostly acquired from other sources such as television and personal experiences. Variations in knowledge were minimal and were visible only when other factors or external influences were present. These have been discussed thoroughly in the chapter on youth.

Yet the real challenge remains however, that behaviors have been largely unchanged, and students following the national curriculum mostly find it difficult to connect concepts they understand well abstractly, to the real world, therefore finding little application for these in their daily lives.

This raised further queries in our survey process around the effectiveness of the national curriculum in terms of impacting change and teachers' competencies, as it slowly emerged that major gaps affecting student participation, were related to these two key themes.

We've identified the following as priority matters and gaps that require attention and would need to be addressed on a curricular and an educators' level if students are to develop positive attitudes and practices through their learning.

6.1 Curricular and Academic Gaps and Challenges

Concepts are explored superficially and not contextualized

One of the earliest apparent challenges is one related to the presentation of concepts in the national curriculum in terms of quality and quantity. Most concepts have been presented in a very knowledge-oriented way, seeming to be removed from practical reality. Rarely if ever are concepts linked to real life experiences and especially how they are directly related to Jordan's local experience and unique challenges.

Additionally, while some concepts such as water concepts have been exhausted and to some degree contextualized, others such as energy and solid waste have only been touched superficially, and have oftentimes created confusions in students' perceptions as to their relevance to the Jordanian experience.

Both these factors coupled have created a clear dichotomy in young people's understanding of the relation between theory and practice, and this was clearly apparent from students' responses to our discussion pointers. While students were quite knowledgeable about water concepts, and could cite information on the Disi and Red-Dead Canal projects, they equally found it difficult to identify sources of energy for Jordan successfully, or be clear on the different waste disposal techniques we use locally.

The curriculum for example focuses largely on knowledge around renewable resources which created a misconception that these are resources we use vastly. At the same time solid waste management concepts were narrowly focused on recycling which also created a false impression that recycling is widely common in Jordan. Concepts of reduce and re-use are mostly absent in the curriculum and so were they in our discussions with young people.

The other issue prevalent is while students may understand these concepts abstractly; they found it difficult to see how these concepts were relevant practically. Students had to be prompted to think about what behaviors they believed could address environmental problems on an individual, societal and governmental level. Although their responses revealed valid and insightful solutions at times, when asked if they practiced such solutions, most assertively responded that they did not. This reveals the worrying extent to which

students feel they have no place for academic concepts in their lives. Academic concepts are seen as strictly the domain of the classroom.

Concepts Are Presented in a Disorganized Fashion

Another difficulty with the presentation of specifically environmental concepts in the curriculum is the unorganized and scattered fashion in which they appear. Because there is an absence of a scope and sequence chart for environmental education, staff and educators responsible for developing the curriculum, have done so independently, in a subject-specific manner, and irrespective of where, how, and why these concepts were introduced into other parts or subjects of the curriculum. Students for example learn about water concepts in geography, social sciences, natural sciences, and vocational and civic education. However these concepts are either repeatedly incorporated in all these subjects or they have no clear linkages between the various subject matter to ensure a spiral development of the concept in relation to the cognitive development of the child.

This also presents different challenges for students of different grades. At different intervals of the national curriculum there is a sudden saturation of concepts, which the student arrives at with a weak prerequisite experience, and weak knowledge-base. These problems were found to be quite prominent at the 4th grade and the 9th grade, where for example we find an abundance of water and energy themes.

Currently the curriculum's spiral development of concepts is addressed only per subject base, but environmental concepts specifically are not connected across the board for the variety of subjects and are not addressed as a learning continuum across the students' developmental stages, which exacerbates their confusion.

A very relevant example is when environmental concepts have been tackled in the past, this was not done in an interdisciplinary manner either, and rather environmental concepts were approached and incorporated as add-ons rather than as integral components to creating a holistic learning process. Ultimately we have found that all these factors related to the disorganized and unsystematic development of concepts in the curriculum, and is what has resulted in a fragmented understanding of the environment to students, and therefore they make little association of learning to real life.

Teachers have themselves expressed finding the curriculum disorganized with no continuity in theory development. Teachers for example cited how concepts on water tackled at the beginning of the year are re-visited at a later stage near the end of school year presenting a disconnect of ideas related to the same subject.

While the presence of a scope and sequence chart would ensure that the environment is a subject that is tackled holistically, this would still require the appropriate resources to contextualize learning.

Lack of Relevant Supplemental Resources

The national curriculum emphasizes the comprehension of concepts scientifically or theoretically as do many curricula internationally, however contrary to international curricula, it lacks the necessary variety of supplemental resources to engage students in relevant and applicable learning.

Most resources available at present, if available, are translations of imported foreign books and therefore lack an association to Jordan's unique environmental challenges. There is also a lack of additional external resources in the Arabic language which can be used by teachers to enhance the curriculum and engage students in different learning approaches. Some local NGOs and private organizations working in environmental work do create resources such as brochures and pamphlets, however they are mostly not easily accessible and rarely are they targeting youth, making it difficult for teachers to make use of such resources in their lesson plans.

Teachers in our focus groups expressed they felt both educators as well as students had insufficient access to supplementary resources that were relevant and enjoyable to use. Even when teachers wanted to be creative, they found it difficult to locate alternative resources in Arabic through which to contextualize the learning.

This coupled with the overwhelming task of juggling between new resources and the condensed knowledge-based curriculum; it becomes even more certain that educators will favor completing the curriculum requirements over engaging students in different types of learning.

The National Curriculum is not Impact-Oriented

The MOE curriculum division in the past has attempted to re-create a more impact-oriented curriculum of the old version used. This was carried out in recent years through the ERfKE 1 project's reform phase. While the curriculum was trying to promote critical thinking through the use and introduction of pictures and basic exercises with arbitrary questions, the textbooks remained principally focused on disseminating knowledge, and lacked in practical, hands-on activities and experiential learning, which are key to promoting participation and consequently modifying behaviors

The curriculum still provides many 'dos and don'ts' without knowledge of the value of things, reality of the problems, and the resulting consequences in real terms.

If we are to modify young people's practices towards the environment, the curriculum will need to place greater emphasis on reasons for conserving as it is related to the direct impact on people's lives, and this can only be learned through experience and action. Students need to be immersed in the learning first-hand in conjunction with receiving information from teachers second hand.

All these challenges related to the curriculum, coupled with lack of preparatory trainings and continuous professional development programs for teachers, add to the detriment of the curriculum as an effective and meaningful learning program that can create changes in students' behaviors

6.2 Needs Assessment of Teachers and Educators

Teachers Receive Inadequate Training Programs

Where teachers have received trainings in the past, it was usually only relevant to curriculum change and therefore mostly subject specific. While ERfKE 1 determined on introducing pedagogical methodologies focused on student-centered approaches, teachers could not make use of these due to lack of sufficient supplemental resources ranging from activity books and guidebooks, to simple things such as card board and arts materials. Furthermore, teachers feel the curriculum remains overly condensed and too time-consuming to include these new approaches.

Training execution is also another important challenge. Although some teachers may receive training on a variety of topics and pedagogies, these are usually introduced as standalone trainings and tend to be theoretical, with little deliberation for the realities of the classroom. For example group work concepts are taught to teachers that are responsible for managing 50 students in a small classroom space. It is clear in instances like this that teachers will find it difficult to incorporate the learning.

Additionally, while teachers receive such trainings, these are usually carried out in a cascade style, where learning is disseminated in a 3rd hand manner from colleagues who have not mastered the newly learned concepts and oftentimes are not yet sold on the idea themselves. Learning is therefore rushed and not internalized for either group - the original trainees or their successors. This only results in concepts being lost in the process and frequently a dissemination of the wrong, if not contrary messages.

Teachers' trainings at the Ministry are also not based on rewards and so rarely are teachers - who often get paid very low wages generally- motivated to do work beyond their responsibilities or apply new learning. Whether teachers partake in these trainings or not, they are still treated the same, in the sense that professional development does not reflect on their status or salaries.

For all the above reasons we find that teachers lack the competencies to engage pupils on a higher level of learning, where attitudes and behaviors can be translated. Teachers themselves still carry inappropriate attitudes and practices. And while they continue to use classical approaches to teaching, which disseminate knowledge to students in a very linear and factual manner, it is difficult to see how something unchanged will suddenly encourage students to participate actively in their own learning.

Teachers Lack Competencies Related to Environmental Education

This brings us to teachers' competencies regarding environmental education, meaning the knowledge, values and skills they carry and use in providing and disseminating environmental concepts.

To date there has been no environmental-specific training provided to teachers, with the exception of WEPIA's training on integrating water concepts into the national curriculum. WEPIA trained 90 teachers from diverse areas of the Kingdom, disseminating various styles of student-centered approaches through immersing the teachers themselves in the learning experience of a student. Teachers' own subjects were used as models through which to incorporate water concepts, and methodologies such as drama, problem solving, critical thinking and debates were modeled with teachers, so as to provide them an opportunity to experience these pedagogies firsthand.

Although the WEPIA training program was ample and focused, only very few teachers took part in the training, as the program was soon after discontinued and knowledge remained with the original 90 trainees. It is also hard to say whether the training in the long run would have proved effective as it was also intended to follow the cascade style learning.

Consequently it remains that due to the lack of efficient and experiential training in this subject for most of the Kingdom's educators, teachers still mostly lack the environmental ethical base required when teaching environmental concepts. The environment is still thought of as an abstract concept to teachers themselves, having little correlation to dimensions of attitudes and behaviors

This restricted understanding of the environment inevitably informs their own environmental behaviors, which usually stem from cultural, religious and other external factors. Considering every teacher's biases and unique perspectives and values, it is easy to see why these concepts are not being taught using a uniform approach, and why ultimately it is these environmental values that teachers carry that are directly transmitted to the student.

Teachers Lack Adequate Support from School Leadership

Having looked at present challenges with the curriculum, problems with training programs and teacher competencies, there is much to be said about the little support teachers often receive on a school and ministerial level.

While Ministry teachers do sometimes take part in a variety of training on various subjects, rarely are these demand-driven, or based on needs assessments linked to teachers' wishes and the schools' needs. Most training is enforced upon teachers based on needs identified centrally at the Ministry level, which is usually linked to temporary projects with scattered emphases. Since these programs are introduced mostly as ads-on, this creates pressure, and results in multitude of training programs and teachers with different abilities. Most teachers understand this is unsystematic and so find it difficult to cope with incorporating such programs.

Their first priority, clearly dictated by the Ministry, is to complete the curriculum, and so they are overwhelmed with continuously changing duties and methodologies, and cautious to achieve their core responsibilities of teaching the curriculum.

Additionally, no sufficient follow-up strategies to training are carried out. Subsequent to teachers receiving their initial training, no further training is provided to support and reinforce the learning and tackle the challenges that arise in the classroom when delivering new methodologies. Teachers easily find themselves falling back into the trap of classical style dissemination of information and facts.

This of course raises the issues of professional development. So although teachers are trained on random subjects, they receive no continuous professional development linked to continuous learning. At times they are awarded training certifications, but these are not revalidated and revisited to incorporate new learning and raise the level of knowledge, skills and competencies of teachers to a more advanced level, building on the knowledge-base acquired.

A final yet significant hurdle teachers meet is the lack of support given to them on a school level. Whilst teachers are paid very low wages, they are at times also inadequately supported by school leaderships such as principals. Principals seem to be concerned with what they believe are more pressing issues, and therefore do not necessarily provide teachers with the venue, encouragement or even time to implement new learning. This creates little motivation and interest in expressing positive attitudes towards new knowledge and employing it creatively in the classroom.

A thorough look at how both these matters: system efficiency (on a school level and a ministry level) and teacher's performance - are interlinked and can impact the success of one another, is crucial in understanding where improvements need to begin, and how they will take shape. These gaps should be considered if we are to introduce environmental programs that are efficient in disseminating concepts and theories, while connecting these to the real world, to Jordan, and to the Jordanian citizen, in order to affect behavioral change.

7.0 RECOMMENDATION

It was evident that although environmental concepts are covered vastly in the national curriculum, behaviors and attitudes were left unchanged even with increased knowledge. This gap of translating young people's knowledge into genuine interest, concern and action, results from the inadequacy of current pedagogical approaches and limited resources. Most Arabic resources do not engage and immerse young people in the learning process, and so students find it hard to appreciate how concepts affect their lives personally.

A first step to realizing successful environmental education programs is through making information available to both teachers and young people. This is done through developing relevant, creative and innovative resources, as well as providing opportunities for both teachers and students to develop skills through participation in trainings and projects.

The following recommendations address the above mentioned challenges in a holistic way. We propose a set of targeted actions that together represent a comprehensive system, with interdependent components. All of which are essential in their own right to making Environmental Education in Jordan more sustainable.

Develop Relevant Resources and Additional Supplemental Materials

It is essential that modern, relevant, Arabized resources and supplemental materials are developed for Environmental Education. These should be varied in approach and serve many purposes. The following are recommended:

a) In-the-class-room resources for students that contextualize the learning process of Environmental Education in the curriculum, making it more engaging and hands-on. These resources would build higher thinking skills in children allowing them to comprehend knowledge, and also apply and synthesize it. Children are then naturally inclined to come up with personal evaluations of situations and recommend sustainable alternatives and solutions. Examples of these resources are scientific experiment kits, pedagogical packages of games and activities that make learning more enjoyable and interesting.

b) The second type of resource is supplemental material for the textbooks. Such materials would include "activity books" for teachers, which they could use to incorporate during their regular lesson delivery to support the learning process. An example to that is an audit exercise for the school on water, energy and solid waste.

c) Finally, interactive materials are also important. These would be used as extra-curricular materials in environmental club programs or others. These kits would instigate and encourage participation and action. An example of this would be teachers' guides for water, energy and solid waste that are semester long, and encourage positive action at the school, home and local community level. It would provide teachers with tips on setting up projects, implementing them with students and evaluating their impact, while also involving students in the entire process holistically.

Develop Age-Relevant Projects to Support Environmental Concepts in the National Curriculum

When evaluating the learning objectives of environmental education in the national curriculum and comparing it to the knowledge and skills that youth acquired, it was clear that there was not only a knowledge gap but also a higher level skills gap. There is an apparent saturation of concepts for specific grades, mainly grades 4, 6 and 9. At times concepts were also repeated amongst subjects. Because of this saturation of concepts and challenges with delivery of concepts students sometimes seemed to develop negative attitudes towards nature.

It is recommended that semester long projects are carried out with these grades. Projects should start in early elementary grades focusing on awareness and knowledge through practical approaches, to develop later into fostering higher level thinking skills, and then further to promote participation on the level of school, home and community, for senior students.

1) In elementary school (grade 4) projects would focus on "hands-on" engaging techniques to teach children of young age critical concepts, while utilizing the school and home as experiment labs. Furthermore, all concepts would be contextualized and linked directly to the situation and experience of Jordan, referring to scarcity through observation, in order for youth to feel for nature and strive to conserve its resources. It is recommended that an interdisciplinary project is piloted for grade 4 students in which they could use project-based learning and link their understanding to real life issues. This would encourage learning on different levels, and instigate positive behavior which is more intrinsically driven.

2) In middle school, projects should develop into more advanced learning approaches focusing on scientific research and inquiry skills. Children are taught scientific reasoning using evidence based

learning, and concepts are at all times linked to curriculum. Scientific kits are essential resource materials which can be produced to use in such settings (as discussed in the earlier recommendation). This would result in scientific projects with real findings related to their environment. This would instigate positive behavior based on their findings.

3) Finally, in senior school, projects would focus on the use of project-based learning to promote participation and action. Methods such as debates, research and writing articles, as well as making change on a school and community level would be introduced and encouraged. Such programs can also include peer-led activities where students already involved in environmental activities would lead such projects to advocate for green behavior new resources should also be developed and piloted for such projects.

Developing Teachers' Skills in Delivering Environmental Education

This will require several stages to ensure teachers grasp the concepts themselves and can apply them skillfully in the classroom, as well model them as internalized behaviors

A) Train all teachers and educators on basic environmental ethics:

It was found that young people that showed positive environmental behavior were those who had teachers that role-modeled these behaviors In most cases however, these teachers were also motivated by the encouragement of their principals. Unfortunately over half of the teachers included in our study did not show a comprehensive understanding of the environment, and did not carry the fundamental environmental ethical base required to behave environmentally responsibly. Their knowledge varied and fragmented and it would be important to standardize teachers' green behaviors at school.

It is recommended that all teachers and educators undergo a basic environmental ethics training program. Teachers are trained on the importance of conservation to sustain life for future generations. The educators would be trained on basic conservation practices and would participate on both levels, that of the ministry and schools. This approach would ensure the sustainability of young people's green behaviors at school and at home.

B) Train teachers on environmental education using subject-specific approaches

Building on the previous recommendation, and ensuring an effective environmental education vision for Jordanian schools, it is important that classroom teachers are also trained on connecting subject learning to the environment meaningfully. This would strengthen curriculum effectiveness in relaying the right messages to students.

Select teachers from a network of communities can be identified by the Queen Rania Training Academy to undergo a more subject specific training. The training will consist of engaging children in learning through project-based learning, scientific reasoning, critical thinking and problem solving, using the very subjects they are learning. The teachers would be trained on the use of the already prepared resources and supplemental materials to support learning while covering the curriculum.

Teachers would be followed up to ensure that adequate environmental education training is being implemented in the class room. Teachers would be supported with an Environmental Education help-desk system through the QRTA, who would also encourage teachers in the network to meet occasionally and assist one another in their teaching. Once teachers master the use of multiple pedagogical approaches in their class room they would progress to the next stage in the delivery of Environmental Education.

C) Developing interdisciplinary communities of practice

Following rigorous training and the use of multiple resources and support materials, select teachers from the communities of practice model above would be identified based on their skills in using student-centered approaches and their experience in implementing projects. Interdisciplinary units between these teachers would be developed to allow them to add to and complement each other's knowledge and ensure knowledge is also disseminated holistically to students. These interdisciplinary units would be focused in subjects and grades where there are vast repetitive environmental concepts such as Geography and Sciences for grades 4, 6, and 9.

Assign an Environmental Coordinator at All Schools

Throughout our inquiry process we found that schools with environmental coordinators tended to have more structured and holistic approaches to tackling environmental education. Students at these schools generally had more comprehensive knowledge of environmental issues than their peers in other schools. They also connected theoretical knowledge to real-life situations more easily, held more positive attitudes towards the environment, and showed significantly higher participation in responsible environmental behaviors.

The task of environmental coordinators at these schools is to ensure the environment is tackled holistically through classroom settings as well as through hands-on experiences. A coordinator makes sure subjects taught to students incorporate relevant environmental themes across all subjects, and that the curriculum is complimented with participatory activities within the school, as well as externally. These schools also use a variety of activities, from scientific experiments to field visits, games and art to provide students myriad opportunities to learn.

It would be important to assign environmental coordinators at MOE public schools to achieve the success of any environmental education program. Their follow-up and supervision will guarantee environmental concepts are explored appropriately in all relevant subjects, as well as adequately supported with supplemental material and activities. The coordinator can recommend extra-curricular programs based on school needs and work with teachers to facilitate their implementation.

For this post to develop into a successful one, it is essential that coordinators themselves are well-trained, having passed through several stages of applying environmental concepts themselves, and have relevant environmental experience. It is also important that they possess a genuine concern and an intrinsic motivation for protecting the environment, as this will reflect through their work as they manage others.

Having staff members who are responsible and held accountable for coordinating environmental education at a school level is important. However, this must be activated essentially on a directorate and central Ministry level to facilitate the sustainability of these programs.

Develop Twinning Programs between Public and Private Schools

As some local private schools were found to be very active and diligent in providing innovative yet systematic environmental education, these places can be used as models of best practices. It may be important to develop twinning programs between public schools and strong private institutions such as the Amman Baccalaureate School or the Montessori school, to allow for sharing and exchange of knowledge and experiences. Venues such as Baccalaureate's schools grounds, and Montessori's potential research facility can be used to activate twinning programs.

These programs can be carried out through focused, semester-long or year-long joint projects. It would be essential to ensure that the exchange be mutually beneficial, and that expectations on both sides be realistic. This would be done through a resource and needs assessment. Creating a manual for setting-up the twinning

program would help teachers on both sides to understand project ideas, agree on communication methods and evaluation processes.

A team or committee of teachers and staff from both sides can also represent their schools, and environmental coordinators can activate the network, ensure ongoing communication, the timely implementation of the project, and the development of a close relationship between schools.

This type of shared experience would provide public school teachers with the benefit of learning from trained educators firsthand, as well as engage students in learning through action while exchanging ideas with their peers. The long-term nature of such projects also ensures that concepts learned, are followed up and reinforced, therefore eventually developing intrinsic feelings towards nature, and a sense of responsibility towards protecting the environment. Once projects are completed successfully, the approach can be adopted and used by those schools to develop new partnerships and different projects with other schools. This approach is also in line with the King's vision of creating effective partnerships between the private sector and public educational institutions, to support effective educational reform.

Develop a Reward Program to Encourage Participation and Promote Visibility of Environmental Issues

Currently, we have observed that the environment is not a priority in people's lives, whether young or old. It would be important to consider developing a reward system to popularize the environment at different levels of society- youth, educators and the government- that supports those individuals already active in it to continue their efforts. To make the environment a more desirable goal to pursue, the following steps can be taken to initiate the process:

1. Support those currently active in environmental activities and develop more interest in the environment. It may be worth considering developing an environmental sustainability conference, which would be held annually allowing excelling students, teachers and communities to share their experiences, practices and innovations.

   Youth and adults who are environmentally sustainable (green) are rewarded for their efforts with certificates or monetary prizes to continue those efforts. The forum can be championed under the patronage of a royal or governmental figure. This can develop a broader interest and raise the visibility of environmental issues on a national level.

2. Develop a certification system for teachers, based on a clear competencies framework, which is linked to the Ministry of Education's rank system and which is also reflected in an increase of salaries. This can be developed in conjunction with the Ministry of Environment and Ministry of Education. It would encourage teachers to dedicate more time to environmental projects and become more motivated to pursue environmental issues.

3. Create a small-grants fund to award active schools funding to develop further environmental initiatives and projects. Many public schools were interested in developing environmental projects, but rarely had the resources to do so. The fund would provide these and other active schools with an opportunity to materialize their ideas.

Schools would be asked to develop proposals to improve green behaviors and technologies at their schools. This will encourage them to excel in their ideas to compete to win funding for their projects. Funds will be awarded to the most innovative and sustainable ideas and projects, which should also be student-led and in line with new technologies, community work and advocacy.

8.0 ANNEXES

8.1 Annex A: complete summary of survey field work

School Name	School Type		Geographical Location		Gender		Grade Levels			
	Public	Private	Urban	Rural	Male	Female	G1	G2-G4	G5-G7	G8-G10
Balas	1			1	11					1
Ebeen	1			1		10				1
Jabal Al Akhdar	1			1		10				1
Jabal Al Akhdar						6	1			
Kofranja	1			1	10					1
Ez Edeen	1			1	6		1			
Ebeen						5	1			
Ez Edeen					10			1		
Jabal Al Akhdar						10			1	
Balas					10				1	
Ebeen						10			1	
Kofranja					12				1	
Ebeen						10		1		
Jabal Al Akhdar						10		1		
Total	**5**	**0**	**0**	**5**	**59**	**71**	**3**	**3**	**4**	**4**
Zarqa' Yamamah	1		1			11			1	
Edresi	1		1		10			1		
Maymonah	1		1			11		1		
Emam Shafe'	1		1		10			1		
Khaledah bent Hashem	1		1			10		1		
Edresi					5		1			
Nahdah	1		1		2	3	1			

Khaledah bent Hashem						5	1			
Emam Shafe'					5		1			
Edresi					11					1
Emam Shafe'					10					1
Qusoor	1		1			10			1	
Emam Shafe'					10				1	
Edresi					10				1	
zarqa' Yamamah						11				1
Qusoor						10				1
Total	**7**	**0**	**7**	**0**	**73**	**71**	**4**	**4**	**4**	**4**
Nothum Hadetha		1	1			8				1
Amman academy		1	1		8	5		1		
Nothum Hadetha					8	5		1		
Nothum Hadetha						8			1	
Amman academy					5	5			1	
Modern Montessori		1	1			6			1	
Amman Baccalaureate		1	1		5	5			1	
Modern Montessori					5	5				1
Amman Baccalaureate					5	5				1
Amman Academy					5	5				1
Total	**0**	**4**	**4**	**0**	**41**	**57**	**0**	**2**	**4**	**4**
Total	12	4	11	5	173	199	7	9	12	12
Total of NC	2	2	2	2	21	19				4
Total	**14**	**6**	**13**	**7**	**194**	**218**	**7**	**9**	**12**	**16**

Total of Students= 412