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ABSTRACT

Traditionally, education in various forms has been used as a tool to change values and behavior in children regarding the environment. This study reports findings from the We Love Reading Program that utilizes the reading of Social Stories in various communities in Jordan to address the environmental problems of Jordan. Results indicated the effectiveness of this informal educational intervention showing a significant increase in children's knowledge about environmental issues and a positive change in behavior related to electricity and water consumption and littering, as reported by parents. The authors provide several recommendations on how Social Stories and appropriate curriculum can be used in schools and community to create awareness in students regarding environmental issues.
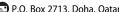
Introduction

The main purpose of environmental education is to develop within individuals and communities sophisticated understandings of the complex nature of their environments. More important, the goal is for individuals to acquire the knowledge, values, attitudes, and practical skills to participate in a responsible and effective way in solving social problems and managing the quality of the environment. Furthermore, environmental education seeks to develop a sense of responsibility and solidarity among countries and regions as the foundation for a new international order to improve the environment (Wals, 2007). However as cultures and ecosystems greatly vary, environmental educators in every country develop materials and methods that reflect these differences (Meadows & Wright, 2008).

This article presents social stories as an intervention to educate children in Jordan about local environmental issues. John Dewey (1938) argued "the primary purpose of education and schooling is not so much to not prepare students to live a useful life, but to teach them how to live pragmatically and immediately in their current environment" (Stemler & Bebell, 2013, p. 4). In this sense, education equips students with the necessary knowledge and skills enabling them to participate in their community and play a role in reconstructing society. This social reconstructionists' view of the role of education in society is based on several fundamental assumptions about society and education. Social reconstructionists believe society is threatened by problems such as pollution, resource shortages, illiteracy, war and poverty just to name a few (Schiro, 2013) and the existence of society is at risk unless these problems are resolved. However, this destruction can be prevented through education designed to promote the reconstruction of a better society.

Dewey has been considered an environmental educator (Dennis & Knapp, 1997) suggesting an experiential approach to student learning in the local environment in order to encourage students to connect with their particular corners of the world (Dewey, 1915). Dewey's work influenced various experiential environmental education models such as outdoor education (Quay & Seaman, 2013), place-based education (Gruenewald & Smith, 2007; Woodhouse & Knapp, 2000) and the action competence approach in environmental education (Jensen & Schnack, 1997).

In what follows, we address how education in the form of reading-aloud social stories by adults in the community can be employed to address the environmental problems of Jordan. First, we develop the context of this study by describing the environmental problems facing Jordanian society. Second, we discuss reading social stories as a pedagogical tool for children and describe the WLR Model. Finally, we report findings about the impacts of reading social stories about water, energy, and littering on children's knowledge and behaviors related to these environmental issues.

Environmental issues in Jordan

The country of Jordan had few documented environmental problems until the 1970s when faced with modernization and population growth (Hadadin & Tarawneh, 2007). As the population increased, Jordan faced, and still faces environmental challenges including scarcity of water and energy and increased pollution. Currently, Jordan is one of the driest countries in the world with only 145 cubic meters of water available per person annually, a level expected to fall below the absolute water poverty line in little more than a decade (Oehring & Huser, 2014).

Yorke (2013, p. 8) states "80% of current supply depends on non-sustainable over-abstraction of groundwater aquifers as well as and on cross-border surface flows, which are unpredictable and diminishing due to climate change, absence of joint management and regional instabilities." Hadadin and Tarawneh (2007) argue these growing deficits have dangerous consequences on the development and health of the population. On the current trajectory, "Jordan will need access to costly new bulk water supplies by the early 2020s. Since it lacks the resources to develop these on its own, it is in the region that long-term water security *will need* to be negotiated" (Yorke, 2013, p. 8). Based on this information, we argue that Jordanians need to be sensitive about water usage and minimize waste. Simple technologies will promote water consumption efficiencies and change in daily behaviors can support water conservation in household tanks.

In addition, Jordan is one of the few countries in the region with limited fossil fuel to generate energy. The country imports 97% of its energy (Milbert, 2014) and depends heavily on non-renewable energy sources. Until now, the imported gas used to generate electricity has met almost 90% of Jordan's energy needs. Imports of crude and mineral oil products rose in 2011 and 2012 by a respective 61 and 21% (Oehring & Huser, 2014). In addition, the overall energy requirements of Jordanian households have steadily increased since 2008 by an annual average of 10% and are expected to increase by another 50% during the next 50 years. Furthermore, the influx of at least 600,000 refugees from Syria to date increases the demand for energy and has exacerbated the problem. Energy consumption accounts for around 20% of Jordan's national GDP and cost the country approximately 4 billion JOD in 2012 (Oehring & Huser, 2014). As with water conservation, simple technologies can make energy use more efficient, and more importantly, changes in behavior may postpone rolling energy blackouts.

Finally, Balbo (2013a) states, "littering is a serious problem in Jordan, where trash collection infrastructure is poorly developed and people are nonplussed by tossing trash in public and open spaces." Children may be careful at home when disposing of trash, but they seem to be careless in public parks, throwing litter from car windows and littering their school environment. As the population of Jordan's cities has grown, Jordanians must change their views on littering before any meaningful change can happen (Balbo, 2013b). We argue that Jordanian children grow up with little understanding of appropriate public behavior regarding litter and garbage and this needs to radically change through effective education because of the unique population in Jordan. The United Nations Framework Convention on Climate Change (2014, p. 38) states, "the Jordanian population pyramid structure reflects the youthfulness of the population, around 12.75% of the population is under 4 years of age, and almost 24.57% is

under 14 years of age." More important, and especially for this context, children aged 4-10 in Jordan are considered among the most wasteful users of natural resources (World of Letters/PAP, 2010). This requires the younger generations to develop an awareness of these environmental issues and an ethic of appropriate environmental behavior, so they are equipped to possibly speak out to others about inappropriate behavior and the environmental consequences. We argue that this can be accomplished through education.

Environmental education

Over the past three decades, environmental education has received considerable attention worldwide (Arvai, Campbell, Baird, & Rivers, 2004; Athman & Monroe, 2004; Stern, Powell, & Ardoin, 2008). It has been argued that any environmental crisis such as global warming and pollution requires an increased level of awareness of this threat in order to protect the environment (Castillo, Garcia-Ruvalcaba, Martinez, & Luis, 2002). Furthermore, Erzengin and Teke (2013) argue the cause of numerous environmental problems lies in the careless behaviors of people. Therefore, it is vital that individuals cultivate an understanding of environmental problems and reflect on their own behaviors and the related consequences of that behavior. The main assumption embedded in many environmental educational interventions is increasing knowledge and awareness (Armstrong & Impara, 1991; Trewhella et. al., 2005; Vaughan, Gack, Soloranzo, & Ray, 2003) improving attitudes (Aipanjiguly, Jacobson, & Flamm, 2002) and having the potential to change behavior (Erol & Gezer, 2006). Therefore, many environmental interventions target environmental attitudes such as care and concern for the environment, knowledge, awareness, and environmentally conscious behavior as ways to improve citizens' environmental behavior.

It is important to note that the assumption of a linear causality of knowledge and attitude leading to behavior change or simply that knowledge alone can lead to behavior change has been challenged (Heimlich & Ardoin, 2008). It has been argued that understanding the problem will not necessarily lead to behavior change. However, information about the problem is likely to lead to a change in behavior when lack of knowledge is the main barrier to change (Spehr & Curnow, 2011). Furthermore, improving people's understanding of environmental issues and their impact contains an intrinsic value. When members of the community have comprehensive understanding of a problem, the greater the opportunity to provide solutions and the more likely change will be supported) Kollmuss & Agyeman, 2002).

The intervention in this study targets young children aged 3–12 who are considered among the most wasteful users of natural resources in Jordan. Young children at this age probably lack information about Jordan environmental problems, including causes of such problems, and how they can contribute to the solutions. Tuncay, Yılmaz-Tuüzuün, and Tuncer Teksoz (2012) found the need to address the affective and cognitive domains in order to raise environmentally responsible citizens whereas Santrock (2006) argues that children's understanding of environmental issues and their related behavior choices are not based solely in the cognitive realm but rather, the affective and cognitive should be treated equally.

Traditionally, formal environmental curriculum and informal interventions mainly target university and school children (Damerell, Howe, & Milner-Gulland, 2013; Khawaja, 2003; Kiziltas & Halmtov, 2014; Metin, 2010; Sabo, 2010). Children are frequently selected for targeted interventions because attitudes toward the environment develop at an early age and once formed, are not easily changed (Asunta, 2003). Preschoolers are capable of constructing concepts concerning environmental problems and enacting citizenship responsibilities (Sabo, 2010). Also, if children do not develop respect for the environment in the early years of life, there is a risk that this attitude will never be developed (Kahyaoğlu & Yetişir, 2015; North American Association for Environmental Education, 2010; Tilbury, 1994; Victorian Curriculum and Assessment Authority, 2008; Wilson, 1994). Furthermore, children have a longer life span to influence environmental quality and can be effective agents for promoting environmentally responsible behaviors among others (Damerell et al. 2013). Evidence supports a bi-directional influence between parents and children regarding children's impact of their parent's environmental knowledge, attitudes, and behaviors (Knafo & Galansky, 2008; Damerell et al. 2013).

Gender differences in environmentally responsible behaviors and attitudes have received considerable attention by scholars in the field of environmental education (Carlsson-Kanyama & Lindén, 2007; Gilg, Barr, & Ford, 2005; Räty & Carlsson-Kanyama, 2010). Reported findings have been inconsistent. A group of studies indicated that females have a higher level of pro-environmental attitudes and behaviors than males (Matthies et al., 2002; Sherkat & Ellison, 2007; Torgler, García-Valiñas, & Macintyre, 2008; Zelezny, Chua, & Aldrich, 2000), whereas another group of studies found no gender differences in environmental behaviors (Blankenau, Snowden, & Langan, 2008) or males to be stronger environmental behavior participants (Eisler, Eisler, & Yoshida, 2003). The current study contributes to the literature regarding gender and environmentally responsible behavior.

Reading social stories in public: Utilizing WLR model

Since Gray (1995) developed the use of social stories, their use in education has grown (O'Hara, 2010). Basically, a social story is a "social learning tool that supports the safe and meaningful exchange of information" (Gray, 2016, para. 1). Social stories are short, simple personalized stories with illustrations written at the children's reading levels and from the perspective of the child using first-person language (Gray, 2000; Gray & Garand, 1993). Social stories incorporate a variety of learning modes and are often found interesting by the children because the stories contain information derived directly from children's personal experiences (More, 2010).

The use of social stories can be considered as "a behavioral intervention to improve children's social skills through combination of visual and verbal cues (O'Hara, 2010, p. 2). They are often written and used by educators to convey social instruction and "to help children successfully negotiate specific social situations that are frequently encountered by children" (More, 2011, p. 168). In particular, Attwood (1999) explains how the what, when, how, who, and why of a particular social situation can be provided by social stories. Social stories transmit values, engage the imagination, and foster community (Kosa, 2008) and their use remains a central component of moral/ethics education and continues to be used as a foundation for values instruction (Hunter & Eder, 2010).

Research demonstrates that social stories can be a useful pedagogical strategy (Barnes & Bloom, 2014; Gray & Garand, 1993; Kokina & Kern, 2010). Each social story utilized in this study reflects Gray's (2015) requirements for social stories. Social stories must provide meaningful information with a reassuring quality. Stories should provide answers to the "wh" questions and utilize positive language. Each story should be tailored to the abilities, preferences, talents, and interests of the readers and provide illustrations to enhance the meaning of the text. Furthermore, for the effective use of a social story, quality communication skills and a positive relationship with the children is crucial. Effective reading aloud and storytelling techniques encourage young children, especially those who cannot yet read, to engage in their learning. Kosa (2008, p. 43) states,

> consider the senses that learners rely on when presented with new information: kinesthetic learners learn best when physically involved; tactual learners work best when feeling through tough and personal relationships; auditory learners when speaking, hearing, discussing, and thinking aloud; and visual learners when seeing, reading, and observing. Storytelling appeals to all.

Reading a story as a dramatic narrative may stir the emotions, contribute to the cognitive power of these emotions, and make a particular contribution to moral learning (Hunter & Eder, 2010). According to Bouchard (2002), educational research demonstrates that children lack genuine moral experiences that can be used to develop and demonstrate moral reasoning. This narrative approach creates a situation where children can practice reasoning through self-reflection. We argue reading social stories for children at a young age could become an effective tool for promoting environmental ethics because social stories offer a more balanced human-environment relationship (Agelidou, 2010; Gough, 1993; Nanson, 2005).

This study utilized a local program designed to encourage children to read for pleasure, We Love Reading (WLR) was founded in 2006 and was selected by UNSECO as a literacy program and received

a literacy best-practice award from the Library of Congress and an award for innovation in education from the World Innovation Summit for Education (WISE). The program consists of trained adults who hold regular reading sessions in their local communities in public spaces such as children centers, mosques, and parks and these are termed WLR Libraries. Although storytelling has been used as a learning tool in environmental education (Agelidou, 2010), this study utilized reading social stories through the WLR Model that aim at developing love for reading in children. In this model, the social stories were read aloud in a meaningful way to the children, and they were encouraged to perform the activities listed at the end of each story, including coloring of informative drawings, and completing the worksheets.

Methods

Procedure for developing the environmental intervention

Expert writers developed 12 fiction and/or non-fiction social stories, addressing the environmental issues relevant to Jordanian society including water, energy, and littering. All 12 social stories were written in Arabic and designed to introduce children to one of the three environmental issues by providing a particular relevant situation related to an environmental issue, asking a motivating question that encourages children to think about possible solutions, identifying environmentally appropriate action taken and portraying the benefits of the particular action. Stories include colorful illustrations and an informative drawing for the child to color. Each book also includes a worksheet with suggested activities related to conservation behaviors the child can perform in home or in the community. At the end of each session, children are encouraged to implement the activities and to monitor and record their own behaviors during the week. Examples of these activities include turning off the lights at home regularly; dropping litter into an appropriate container when in public areas; turning off tap water while brushing teeth; and admonishing someone else on inappropriate behavior. The worksheet activities are intended to help the child acquire, through practical physical experience, the neural pathways needed to ensure the new environmental values are firmly embedded in the long-term memory. Altogether, the stories, worksheets, and drawings set the stage for children to think critically about these three local environmental issues and to reflect on their own environmental behaviors. The stories were pretested with a group of children (ages 3 through 12) for the clarity of text, contents, and illustrations (see Appendix A for a sample of illustrations, Appendix B for a sample of drawings, and Appendix C for a sample worksheet in the supplementary online files).

In this study, 100 adult volunteers from the community were invited to We Love Reading (WLR) training sessions and were committed to read aloud the stories to the children in 100 WLR libraries in neighborhoods throughout Jordan. WLR training was provided through various interactive modules addressing theoretical aspects of reading such as the importance of reading, and theories that encourage children to read. Adult volunteers were introduced to the WLR model and a detailed discussion on the implementation of the model was provided emphasizing fundamental points such as choice of location, times, and dates, how to gather the children and how to communicate with the parent and communities. The training modules included practice of reading aloud in small and large groups that provided feedback, discussion of possible challenges, and a detailed presentation of practice using follow-up activities. Each trained volunteer read the stories to approximately 40 children in his or her neighborhood library once a week for three months.

Assessment tools

Knowledge worksheet

Environmental issues addressed in the stories were presented to children as a worksheet with 10 drawings (see supplementary Appendix D for sample Knowledge Worksheet). Each depicted either an appropriate or an inappropriate behavior related to electricity, water consumption, or littering. Children were invited to respond to each drawing by selecting either the check mark if the behavior

depicted on the drawing is perceived as appropriate or the cross, if the behavior was perceived inappropriate. Children were required to respond to the worksheets before and after listening to the stories. Worksheets were marked based on a high score of 10, and each child had two scores (pre- and post-tests). Two thousand worksheets were distributed and 1,901 children ages 3 through 12 from 94 libraries responded to the pre- and post-tests.

The behavior change measure

Parent Checklist: An assessment tool was used to collect data regarding children's behavior change. An educational consultant developed a checklist of 12 statements describing the three target environmental issues including four statements for each target issue. A group of five parents reviewed the checklist for clarity prior to implementation. Parents were asked to use the checklist to record the frequencies of their children's behavior on a 3-point scale— always, sometimes, and rarely—after their children participated in the intervention. The checklist included items that assessed children's behavior change regarding electricity consumption (e.g., My child turns off the light in his room before he or she leaves it), water consumption (e.g., My child brushes his or her teeth using a cup of water), and littering (e.g., My child collects the garbage and puts it in the recycle bin). Out of 600 checklists sent to parents, 522 parents responded (an 87% return rate).

Findings

The results from assessing the impacts of the social stories intervention on children's environmental knowledge and behavior are presented here.

The impact of the intervention on children's environmental knowledge

To assess the impact of reading social stories about the environmental issues, electricity consumption, water consumption and littering on children's knowledge, the means and standard deviation of children's scores on the worksheet before and after the intervention were computed. Before analyzing the data, children were divided into three age groups; early stage (3–6) years old, intermediate stage (7–9) years old, and late stage (10–12) years old. Table 1 shows the results according to children's gender and age group.

The Table 1 results indicate differences between the means of children's scores on the knowledge test before and after the intervention according to gender and age group. For example, the knowledge mean for male children in the early stage was 6.89, whereas post intervention it was 8.60. Moreover, the knowledge mean for all children was 7.50 before the intervention, whereas post intervention it was 8.63. In order to examine whether the differences presented in Table 1 were significant, the statistical procedure Two-Way ANOVA for repeated measure (One within-two between) design was applied. Table 2 shows the results.

Table 2 shows that children's knowledge differs significantly ($p<0.05$) before and after the intervention, the value of partial eta squared, which reflects the size of the intervention effect on children's knowledge was 0.158, which is considered a large effect size according to Cohen (1992). However, the effect of the intervention did not differ according to children's gender,

Table 1. Means and standard deviation of children knowledge before and after the intervention according to children's gender and age group.

Gender Age Group Environmental Knowledge	Male						Female					
	Early Stage		Intermediate Stage		Late Stage		Early Stage		Intermediate Stage		Late Stage	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mean	6.89	8.60	7.52	8.58	7.95	8.82	6.95	8.59	7.71	8.64	8.29	8.72
SD	2.02	1.77	1.74	1.48	1.38	1.06	2.10	1.85	1.71	1.48	1.43	1.62
N	318		349		92		369		444		329	

Table 2. Two-Way ANOVA for repeated measure design results for the effect of the intervention on children knowledge before and after the intervention.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intervention	887.203	1.000	887.203	356.349	.000	.158
Intervention * gender	7.847	1.000	7.847	3.152	.076	.002
Intervention * Age group	138.008	2.000	69.004	27.716	.000	.028
Intervention * gender *Age group	3.588	2.000	1.794	.721	.487	.001
Error (intervention)	4717.979	1895.000	2.490			

which means that the intervention equally increased male and female knowledge about environmental issues. Figure 1 demonstrates how the intervention affected children's knowledge according to their gender.

In addition, the Table 2 results indicate that the effect of the intervention on children's scores on the knowledge test differ significantly according to the children's ages. Figure 2 demonstrates how the intervention affected children's knowledge according to their age group.

As shown in Figure 2, the effect of the intervention on the knowledge of children in early stage was greater than its effect on children in the intermediate and late stages. These results indicate that although the effect of the intervention was significant for all children its effect on early stage children was more evident than the effect with the other two stages.

The impact of the intervention on children's environmental behavior

Table 3 illustrates the results of parent's ratings of their children's electricity consumption behavioral change as a result of the intervention.

As shown in Table 3, 46.9% of the parents rated highly that their children changed electricity consumption behavior, 38.9% rated moderately that their children changed their electricity consumption behavior, whereas only 14.2% of the parents rated that their children minimally changed their electricity consumption behavior.
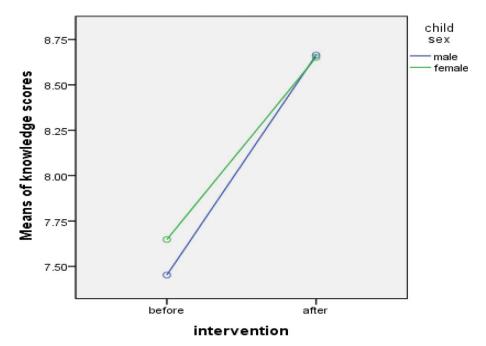

Figure 1. Line-graph of children's means on knowledge test before and after the intervention according to their gender.
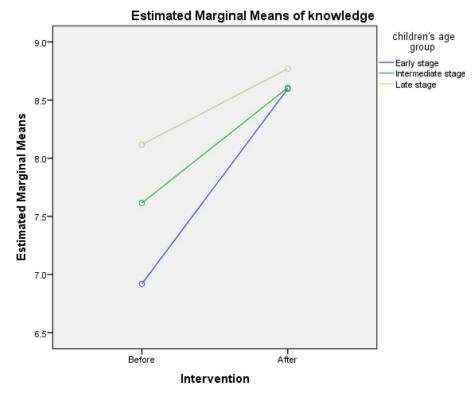
Figure 2. Line-graph of children's means on knowledge test before and after the intervention according to their age group.

As Table 4 illustrates, 50% of the parents rated their children as moderately changing their water consumption behavior, 31.4% of them rated their children as highly changing their water consumption behavior, whereas only 18.6% of the parents rated that their children minimally changed their water consumption behavior.

Table 5 demonstrates that 45.4% of the parents rated their children as moderately changing their littering behavior, 40.6% of them rated their children as highly changing their littering behavior, whereas only 14.0% of the parents rated that their children minimally changed their littering behavior.

Discussion

The primary goal of environmental education, in both formal and informal education, is to promote awareness and sensitivity to environmental issues and to facilitate development of positive attitudes, emotions, thoughts, and behaviors about the environment (Erol & Gezer, 2006; Metin, 2010). Sabo (2010, p. 263) states, "environmental education activities must be conducted in a relaxing atmosphere, where interest and communication encourage the initiatives, but also everyone's options." However, most studies have focused on environmental education in formal education settings such as schools and universities (Kusmawan, Reynolds, & O'Toole, 2006; Lo, 2010; Makki, Abd-El-Khalicj, & Boujaoude, 2003; McMillan,

Table 3. Frequencies of parents' ratings regarding their children electricity consumption behavioral change.

Parents Ratings Behavioral change	Frequency	Percent	Valid Percent	Cumulative Percent
Low	74	14.2	14.2	14.2
Medium	203	38.9	38.9	53.1
High	245	46.9	46.9	100.0
Total	522	100.0	100.0	

Table 4. Frequencies of parents' ratings regarding their children water consumption behavioral change.

Parents Ratings Behavioral change	Frequency	Percent	Valid Percent	Cumulative Percent
Low	97	18.6	18.6	18.6
Moderate	261	50.0	50.0	68.6
High	164	31.4	31.4	100.0
Total	522	100.0	100.0	

2003). The current study is a large-scale intervention that took place in an informal setting within the community utilizing reading social stories—a pedagogical tool that children inherently favor (Barnes & Bloom, 2014).

Khawaja (2003) emphasized that the target of many of the environmental education interventions is to raise children's awareness about global issues facing the environment and that little has been done toward educating children about similar issues plaguing local communities. In addition, it has been argued in order to make environmental education more effective, it must begin at an early stage, where children, including preschoolers, are capable of forming concepts concerning environmental problems and enacting citizenship responsibilities (Hoge, 1996; Mencius, 1997; Thompson, 2011). This study capitalized on this argument, targeting children aged 3–12 years focused on three local and relevant environmental issues including electricity consumption, water consumption, and littering. The findings support the value of the intervention, increasing children's environmental knowledge and changing their behaviors. Specifically, children's knowledge about the three environmental issues increased significantly. However, the increase in the environmental knowledge of the young children at the age of (3–6) years was more evident. Keep in mind that, compared to younger children, older children could possibly possess a basic or even a somewhat advanced understanding of the environmental issues addressed. Therefore, there could be less change in older children's' knowledge. For younger children, these issues could be new to them and therefore we could see a greater degree of change in their knowledge and possibly their behavior. This result is consistent with previous research suggesting that preschoolers are highly capable of forming concepts concerning environmental issues (Kiziltas & Halmtov, 2014; Sabo, 2010). Nevertheless based on these findings, it can be argued that environmental education can be utilized successfully with children up to 12 years of age. Additional research is needed to determine the effectiveness of social stories addressing environmental issues with adolescents.

Whitehead (2007) argues that the most important aim in utilizing social stories in education is to provide information to students. The current findings indicate that not only did the social stories provide information about the three environmental issues, but also have a significant impact on children's behavior as most parents rated that their children's behavior to have changed highly or moderately in the three environmental issues. These results indicate that children's knowledge and behaviors have been positively affected by the reading of social stories across all three environmental issues. Furthermore, studies of childhood have demonstrated that children possess significant views and perspectives and children can use this knowledge to be active agents of social change (James & Prout, 1997; Jenks, 1996; Linares & Velez, 2007). Children as agents of social change move beyond changes in their behavior in relation to these environmental issues and become proactive individuals who start to raise questions and challenge the behavior of others. The activities within this program provided opportunities

Table 5. Frequencies of parents' ratings regarding their children littering behavioral change.

Parents ratings Behavior change	Frequency	Percent	Valid Percent	Cumulative Percent
Low	73	14.0	14.0	14.0
Moderate	237	45.4	45.4	59.4
High	212	40.6	40.6	100.0
Total	522	100.0	100.0	

for children to act as agents of social change. For each environmental issue, there are coloring activities and worksheets that ask children to monitor their behavior for one week in relation to the various environmental issues. For example, water, a coloring activity, encourages children to "Ask Dad to install a water-saving faucet" and in regard to littering, a worksheet asks the child to record if he or she "told my friends about the harms of letting trash pile up." (See Appendixes B and C). Overall, these results indicate that children's knowledge and behaviors have been positively affected by the reading of social stories across all three environmental issues and opportunities are provided for children to become agents of change.

Recommendations

Considering the social reconstructionists' understanding of the purpose of education, we recommend the use of social stories as a form of informal education within communities utilizing programs like WLR. In the realm of formal education, we recommend that public schools develop appropriate curriculum and pedagogies that can be integrated within existing curricula or courses to build an awareness among students of the three pressing environmental issues facing Jordanian society. Curriculum needs to include the knowledge, skills, and dispositions necessary and provide opportunities for students to engage in a self-analysis of their own behavior in real-life situations while developing complex understandings of these important environmental issues. This should include the use of social stories by teachers who have well-developed reading-aloud and storytelling skills. Additional research could be conducted to assess the effectiveness of social stories within this context.

More important, children should engage in activities that require them to synthesize possible solutions to environmental issues and explore opportunities to engage their own communities in projects to develop awareness. For example, children might develop a community project that involves litter collection or give a presentation to increase litter awareness to local community organizations. The presentations should provide more complex understandings of litter problems by addressing topics such as the harmful effects of litter on animals, the environmental problems that occur with the use of plastic and littering, and the effects of decomposition on water supplies and plant life. These environmental projects focus on the children's experiences and invite them to engage in real social action activities, the essence of the social reconstructionist philosophy and the beginning of the reconstruction of society.

A deliberate effort to develop additional social stories that center not only on these three environmental issues, but also provide opportunities for students to develop deeper and more complex understandings of broader environmental issues, is relevant not only to Jordan, but worldwide. If possible, engaging students in the development of these stories would add value by incorporating their experiences in the story content.

In closing, changing culture and behavior requires community involvement coupled with schools to develop environmental understandings with students and support their active role in their community. Incorporating an established program such as WLR, in addition to school curriculum that utilizes social stories is well suited to achieve these goals and provide an opportunity for schools to have a lasting positive effect on students and culture.

Limitations

This study has several limitations that should be addressed. First, the study used a checklist that was completed by parents to collect data about children's behavioral change. Using such an indirect method to measure children's environmental change was significant in this study because using a direct method of observing children's behavior was not feasible due to the large number of children participants. Further, it was also a concern to use a self-report measure with children at this young age of 3–12. However, using the parent checklist raises an issue regarding recall bias. The relatively long period of the intervention might influence parents' memory and their retrospective ability. Future research should utilize different methods to collect data regarding behavior change. In addition, future studies

need to introduce other methods to collect qualitative data to investigate how children who receive the intervention construct their environmental knowledge. Finally, another set of data should be collected after 6–12 months, as a follow-up to assess the effectiveness of the current intervention.

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