

# Literature in the Garden Curriculum Effects on Life Skills of Children

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**SUMMARY.** Children's gardens have recently been shown to increase life skills. The purpose of this study was to assess the effects that gardening/plant activities from the Junior Master Gardener curriculum, Literature in the Garden, have on children's life skills. The life skills examined were leadership, teamwork, self-understanding, decision-making skills, and communication skills. About 130 third-grade students from a Lee County, AL, school participated in the study. Students were equally divided into control and experimental groups, and each student was given the youth life skills inventory (YLSI) as a pre- and posttest. The experimental group participated in eight gardening/plant activities after the pretest, whereas the control group did not complete the activities. No significant differences were found between pretests and posttests for teamwork, self-understanding, decision making, communication, and overall life skills. Significant decreases from pretest to posttest were found on leadership skills for the experimental group. Several trends were observed with students who read more for fun, read more each week, and read more garden books generally increasing in life skills.

In today's society, children have many obstacles to overcome to mature into a healthy adult. One possible impediment is that children today are more often disconnected from nature, which they view academically as they watch programs about nature but rarely experience personally. The lack of time spent in nature may be because United States children spend  $\approx 30$  h per week either in front of a television or computer (Louv, 2005).

Along with everyday decisions, many children are being forced to make increasingly more significant decisions about their well-being, such as whether to join a gang or carry a gun to school, and they must make these decisions at surprisingly young ages (Shuvall et al., 2010). According to the Federal Bureau of Investigation (2001), juveniles were the victims in 10% of murders, 70% of sexual assaults, 11% of robberies, and 17% of aggravated assaults. Also, in a study of nearly 1000 youth in New York, about one-third of participants were gang members; however,

they accounted for around 70% of self-reported violent crimes and drug dealing (Krug et al., 2002).

A seemingly less pressing issue than violence among youth is the general decline of face-to-face social interaction among individuals (Kraut et al., 1998; Lee et al., 2010). However, as incidents of school violence, such as the 1999 Columbine, CO shooting (Muschert, 2009), were examined in the 1990s, the shooters' social statuses were often discussed. Generally, the perpetrators of these acts were viewed as outsiders by their peers, had few friends, and spent much of their time interacting with technology, rather than people (Hazler and Denham, 2002; Newman et al., 2004). Though certainly not accounting for all the problems of individuals, such as the Columbine shooters, a lack of social skills was perhaps one contributing factor in their social isolation leading to their committing such extreme acts of violence. These individuals were lacking in social competence, which refers to the social, emotional, and cognitive skills as well as behaviors that children need for successful social adaptation (Welsh and Bierman, 2008). Social competence is attained through several factors: social skills, social awareness, and self-confidence. Social competence can help a child to establish positive relationships while avoiding negative treatment or victimization from others (Welsh and Bierman, 2008).

Each of these issues (i.e., disconnect with nature, violence, and social difficulties) are most effectively addressed at a young age (Blume and Zembar, 2007; Louv, 2005; Shuvall et al., 2010). Most children are in school from the age of 3 to 18 years for  $\approx 8$  h per day,  $\approx 49\%$  of their time awake. Experiences gained in the early school years are very important since many life skills and leadership abilities are developed at a young age (Gardner, 1987).

Garden- and plant-based activities provide a means for children to learn skills that can help them overcome many socially limiting obstacles. Skills obtained in the garden include decision-making, planning, and problem-solving skills as children are challenged by the questions of what, where, and how to plant. Teamwork is another skill gained as children seek to achieve common goals (Robinson and Zajicek, 2005). The garden also provides benefits associated with emotional well-being, self-image, and relating to other people and things. For example, research has shown that adults feel that gardening increases a child's self-esteem and reduces stress (Waliczek et al., 2000). This study focused on one of those benefits, life skills, by measuring the effects of plant activities on the following five life skill areas: leadership, teamwork, self-understanding, decision-making skills, and communication skills.

## Materials and methods

**SAMPLE.** This study was conducted at Smiths Station Elementary School in Smiths Station, AL, during the Spring semester of the 2007–08 school year. Participants were third graders from 12 participating classrooms: six experimental and six control. A total of 73 students participated in the experimental group and 54 in the control group.

**CURRICULUM.** The curriculum used in this study was the Literature in the Garden curriculum. Literature in the Garden is a part of the Golden Ray Series that is a "stand-alone unit of study of the Junior Master Gardener<sub>sm</sub> (JMG<sub>sm</sub>) Level One curricula" (JMGkids, 2008). The JMG<sub>sm</sub> program is a youth gardening program of the Texas Cooperative Extension and Texas A&M University. JMG<sub>sm</sub> provides youth an opportunity to learn about gardening and nature through

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hands-on group and individual activities. These activities include horticultural and environmental education as well as community service and life skill activities. The mission of JMG<sub>sm</sub> is “to grow good kids by igniting a passion for learning, success and service through a unique gardening education” (JMGkids, 2008).

The Literature in the Garden curriculum uses six children’s books and provides activities for each that follow the themes of that book. The six books are *Plantzilla* by J. Nolen, *Miss Rumphius* by B. Cooney, *Brother Eagle, Sister Sky* by Chief Seattle, *The Gardener* by S. Stewart, *Tops & Bottoms* by J. Stevens, and *Weslandia* by P. Fleischman. Literature in the Garden was developed for grades three to five and includes eight chapters: one chapter that reviews basic garden knowledge, six chapters that accompany each of the six literature books, and one chapter for developing life skills (JMGkids, 2008; Junior Master Gardener, 2005). Upon completion of the study, each of the 12 classrooms received a copy of the curriculum and two sets of the six accompanying children’s books were donated to the school library.

The experimental group completed eight activities with the researcher. Six of the activities corresponded with one of six children’s literature books and two corresponded with the life skills chapter in the Literature in the Garden curriculum. The researcher visited each of the six experimental classrooms over a 2-d period to complete one activity per visit. The activities lasted about 1.5 h for each classroom. Activities that correlated to the literature books began by reading the book to the students, then completing the activity. One activity was completed every 2 weeks with each of the classrooms over the 16-week semester.

**INSTRUMENTATION.** The instrument used for this study included a biographical information section and the YLSI. The biographical information section of the survey included 11 questions pertaining to student demographics, such as gender, ethnicity, and place of residence. Questions were also included about daily after school activities such as how much time they spend outside each day, how many books they read each day, and whether they had gardened before.

YLSI was developed by Robinson (2001), based on the life skills inventory

(LSI) created at Iowa State University in 1980. LSI includes 21 statements that coincide to five internal scales (Townsend and Carter, 1983). The internal scales are the following: 1) leadership, 2) working with groups, 3) self-understanding, 4) making decisions, and 5) communicating (Robinson, 2001). YLSI was taken from the abbreviated LSI and expanded to 31 statements to make the statements appropriate for a third-grade reading level (Robinson, 2001). LSI is based on a five-point Likert-type scale (Likert, 1967). To make the survey appropriate for children, the YLSI uses a three-point Likert-type scale where 0 = no, 1 = maybe, and 2 = yes.

**DATA COLLECTION.** Auburn University Institutional Review Board approval was granted before the project began in Spring 2008. Pretests were administered to both the control and experimental groups in Jan. 2008 by the teachers. Teachers also administered the posttests in May 2008, 1 week after the eight activities were completed. To ensure confidentiality, surveys were collected and then coded so that each student’s pre- and posttest could be matched to compare life skills changes. Students who did not return a signed consent form did not complete the

questionnaire. All missing scores were coded as missing values.

Data from the biographical and YLSI sections of each test were entered into Excel© (2003 for Windows<sup>TM</sup>; Microsoft, Redmond, WA) for scoring. All data were then entered into the SPSS (release 16.1 for Windows; SPSS, Chicago, IL) spreadsheet for evaluation. The SPSS procedure “Frequencies” was conducted to ascertain descriptive statistics, including central tendencies and percentages.

## Results and discussion

Cronbach’s coefficient alphas were calculated for the five internal scales and the overall instrument. The YLSI was found to have a high internal consistency of 0.87. Paired sample *t* tests were conducted to compare pretests and posttests (Tables 1 and 2), whereas one-way analyses of variance (ANOVA) tests were used to determine if there were any significant differences between the experimental and control groups before (Table 3) and after (Table 4) treatment. Additionally, one-way ANOVA tests with “select cases” were conducted to determine if there were any connections between total posttest scores and certain demographics (Tables 5 and 6).

**Table 1. Two-tailed *t* test for paired samples analyses comparing the life skills constructs (self-understanding, leadership, decision making, communication, and teamwork) pretest scores [score obtained on the youth life skills inventory (YLSI) before the experiment began] of the experimental group (third graders that participated in the Literature in the Garden activities) to the life skills constructs posttest scores (score obtained on the YLSI after the experiment was concluded) of the experimental group.**

Life skill construct	Test variable	N	Mean score	SD	Mean difference	df	<i>T</i> <sup>z</sup>	<i>P</i>
Leadership (0–12 scale)	Pre	73	9.64	1.829	-0.83	72	3.060	0.003**
	Post		8.81	2.093				
Teamwork (0–14 scale)	Pre	73	12.60	1.770	-0.33	72	1.456	0.150
	Post		12.27	1.858				
Self-understanding (0–14 scale)	Pre	73	11.68	2.006	0.42	72	-1.111	0.270
	Post		12.10	3.051				
Decision making (0–10 scale)	Pre	73	7.16	1.922	-0.13	72	0.660	0.512
	Post		7.03	1.871				
Communication (0–12 scale)	Pre	73	9.86	2.143	-0.22	72	0.804	0.424
	Post		9.64	2.130				
Overall (0–62 scale)	Pre	73	50.96	6.873	-1.11	72	1.193	0.235
	Post		49.85	8.032				

<sup>z</sup>*T* scores are standard scores, which use SD units to express an individual’s performances relative to the group’s performances.

\*\*Significant at *P* ≤ 0.01.

**LEADERSHIP SKILLS.** *T* tests for paired samples were used to compare the experimental group's leadership

skills pretest scores to their posttest scores (Table 1). Paired sample *t* tests were also used to compare the control

group's leadership skills pretest scores to their leadership skills posttest scores (Table 2). A significant difference ( $P = 0.003$ ) occurred between the experimental group's pre- and posttest scores with the score decreasing ( $-0.83$ ). A significant change occurred in the control group as well ( $P = 0.025$ ) with the score increasing ( $0.61$ ).

One-way ANOVA tests were conducted to compare the participants in the Literature in the Garden program and the control group for both the pretest (Table 3) and posttest (Table 4). At the beginning of the study, the experimental and control group leadership skills scores were significantly different. The experimental group's leadership skills scores were significantly higher than the control group ( $P = 0.019$ ). At the end of the study, the control group's leadership skills scores were higher than the experimental group's, though not significantly higher ( $P = 0.058$ ).

These results may have occurred because some of the experimental group students increased in self-understanding and realized that their leadership scores were lower than they initially indicated. Additionally, while entering the pretest data the primary researcher noticed that a number of students circled the first answer nearly every time, resulting in a higher score. When posttest data were entered this was still true of several tests in the control group but occurred much less often in the experimental group. The students in the experimental group may have answered the questions with more care after working with the researcher for the course of the study, resulting in a lower posttest score. It is also true that psychological variables are very complex and difficult to influence (Pope et al., 1988).

**TEAMWORK, SELF-UNDERSTANDING, DECISION-MAKING SKILLS, COMMUNICATION SKILLS, AND OVERALL LIFE SKILLS.** Paired sample *t* tests revealed no significant differences for any of these internal scales when the pretest and posttest scores were compared for both the experimental and control group (Tables 1 and 2). Additionally, one-way ANOVA tests showed no significant differences between experimental and control group scores for any of these internal scales (Table 3 and 4). The activities were chosen based on overall life skills and not all of the activities focused on each of the individual

**Table 2.** Two-tailed *t* test for paired samples analyses comparing the life skills constructs (self-understanding, leadership, decision making, communication, and teamwork) pretest scores [score obtained on the youth life skills inventory (YLSI) before the experiment began] of the control group (third graders that did not participate in the Literature in the Garden activities) to the life skills constructs posttest scores (score obtained on the YLSI after the experiment was concluded) of the control group.

Life skill construct	Test variable	N	Mean score	SD	Mean difference	df	<i>T</i> <sup>z</sup>	<i>P</i>
Leadership (0–12 scale)	Pre	54	8.85	1.907	0.61	53	-2.307	0.025*
	Post		9.46	1.610				
Teamwork (0–14 scale)	Pre	54	12.81	1.874	0.06	53	-0.234	0.816
	Post		12.87	1.904				
Self-understanding (0–14 scale)	Pre	54	11.85	1.956	0.48	53	-2.093	0.041*
	Post		12.33	1.648				
Decision making (0–10 scale)	Pre	54	6.89	1.723	0.17	53	-0.702	0.486
	Post		7.06	1.280				
Communication (0–12 scale)	Pre	54	10.17	2.081	-0.06	53	0.226	0.822
	Post		10.11	2.044				
Overall (0–62 scale)	Pre	54	50.57	7.309	1.26	53	-1.825	0.074
	Post		51.83	6.333				

<sup>z</sup>*T* scores are standard scores, which use SD units to express an individual's performances relative to the group's performances.

\*Significant at  $P \leq 0.05$ .

**Table 3.** One-way analyses of variance tests comparing the life skills constructs (self-understanding, leadership, decision making, communication, and teamwork) pretest scores (score obtained on the youth life skills inventory before the experiment began) of the experimental group (third graders that participated in the Literature in the Garden activities) to the life skills constructs pretest scores of the control group (third graders who did not participate in Literature in the Garden activities).

Life skill construct	Treatment	N	Mean score	SD	Mean difference	df	<i>F</i> <sup>z</sup>	<i>P</i>
Leadership (0–12 scale)	Experimental	73	9.64	1.829	0.79	125	5.613	0.019*
	Control	54	8.85	1.907				
Teamwork (0–14 scale)	Experimental	73	12.60	1.770	0.21	125	0.424	0.516
	Control	54	12.81	1.874				
Self-understanding (0–14 scale)	Experimental	73	11.68	2.006	-0.17	125	0.219	0.640
	Control	54	11.85	1.956				
Decision making (0–10 scale)	Experimental	73	7.16	1.922	0.27	125	0.696	0.406
	Control	54	6.89	1.723				
Communication (0–12 scale)	Experimental	73	9.86	2.143	-0.31	125	0.639	0.426
	Control	54	10.17	2.081				
Overall (0–62 scale)	Experimental	73	50.96	6.873	0.39	125	0.092	0.762
	Control	54	50.57	7.309				

<sup>z</sup>*F* scores are standard scores, which use SD units to express an individual's performances relative to the group's performances.

\*Significant at  $P \leq 0.05$ .



**Table 4. One-way analyses of variance tests comparing the life skills constructs (self-understanding, leadership, decision making, communication, and teamwork) posttest scores (score obtained on the youth life skills inventory at the conclusion of the experiment) of the experimental group (third graders that participated in the Literature in the Garden activities) to the life skills constructs posttest scores of the control group (third graders who did not participate in Literature in the Garden activities).**

Life skill construct	Treatment	N	Mean score	SD	Mean difference	df	F <sup>z</sup>	P
Leadership (0–12 scale)	Experimental	73	8.81	2.093	-0.65	125	3.674	0.058
	Control	54	9.46	1.610				
Teamwork (0–14 scale)	Experimental	73	12.27	1.858	-0.60	125	3.132	0.079
	Control	54	12.87	1.904				
Self-understanding (0–14 scale)	Experimental	73	12.10	3.051	-0.23	125	0.269	0.605
	Control	54	12.33	1.648				
Decision making (0–10 scale)	Experimental	73	7.03	1.871	0.03	125	0.009	0.924
	Control	54	7.06	1.280				
Communication (0–12 scale)	Experimental	73	9.64	2.130	-0.47	125	1.546	0.216
	Control	54	10.11	2.044				
Overall (0–62 scale)	Experimental	73	49.85	8.032	-1.98	125	2.189	0.142
	Control	54	51.83	6.633				

<sup>z</sup>F scores are standard scores, which use SD units to express an individual's performances relative to the group's performances.

\*Significant at  $P \leq 0.05$ .

**Table 5. One-way analyses of variance tests with select cases examining the effect of amount of books read for fun each week on the decision making and overall life skills constructs (self-understanding, leadership, decision making, communication, and teamwork) of all participants in the Literature in the Garden program (Junior Master Gardener, 2005).**

Life skill construct	Books read for fun (no.)	N	Mean life skill score	SD	df	F <sup>z</sup>	P
Decision making (0–10 scale)	0	17	6.00	2.318	16	2.830	0.041*
	1–2	48	7.12	1.468	47		
	3–5	30	7.20	1.730	29		
	>5	32	7.31	1.176	31		
Overall (0–62 scale)	0	17	46.06	9.660	16	2.839	0.041*
	1–2	48	51.15	7.208	47		
	3–5	30	50.87	6.296	29		
	>5	32	52.31	7.082	31		

<sup>z</sup>F scores are standard scores, which use SD units to express an individual's performances relative to the group's performance.

\*Significant at  $P \leq 0.05$ .

scales. If more activities were completed that dealt with all of the internal scales individually, those scores might have been affected. It is also possible that some of the children increased in self-understanding and then realized that their life skills were lower than they had indicated on the pretest. It has been reported that changes in life attitudes in children occur over a period of time (Shepard and Speelman, 1985). This may mean that one semester

was not long enough to change a child's life skills.

**ADDITIONAL RESULTS.** One-way ANOVA tests were conducted with select cases to determine the effect that several variables had on each of the life skills (Tables 5 and 6). A significant connection was found between reading more books for fun and higher decision-making skills and higher overall life skills (Table 5). For all participants, as they read more for

fun each week, their decision-making skills score increased ( $P = 0.041$ ) and overall life skills also increased ( $P = 0.041$ ). Similarly, as all participants spent more time reading each day, their decision-making skills score increased ( $P = 0.007$ ) and overall life skills also increased ( $P = 0.013$ ) (Table 6). Reading has been shown to produce many lifelong benefits which are both intellectual and social (Blume and Zembar, 2007; Kleeck et al., 2003). It has been shown that reading increases self-esteem (Rumbaugh and Brown, 2000), which may improve decision-making skills (Cosden et al., 1999) as students are more confident to make their own decisions. Reading may also improve students' decision-making skills as they see the characters in a book make decisions and see the consequences of those decisions (Valerie, 2010). These findings also support that reading increases life skills.

## Conclusions

This study provided students with the opportunity to explore horticulture as well as the opportunity to perform hands-on activities. As students participate in hands-on activities, they are more involved in the learning process and therefore tend to understand material more fully and benefit more from it (McCormick et al., 1989). Although no significant increases were found for the treatment group, it was very encouraging to see the increase of life skills with the increase of reading. Reading may increase self-esteem, encourage seeing other's points of view, and increase the ability to empathize with others. Improvements in each of these areas can increase life skills. These findings support many studies that have shown the numerous benefits gained from reading (Anderson et al., 1985; Blume and Zembar, 2007; Cosden et al., 1999; Kleeck et al., 2003; Rumbaugh and Brown, 2000). The students in this study were in middle childhood, which is a period of emotional development, self-esteem changes, and many social developments. Social developments may include a deepening of relationships, increased social skills, and an interpersonal understanding (Blume and Zembar, 2007). Research has shown that adults feel that working with plants increases a child's self-esteem and reduces stress (Waliczek et al., 2000). In education, the goal is to produce creative, inventive, and

**Table 6. One-way analyses of variance tests with select cases examining the effect of time spent reading each day on the decision making and overall life skills constructs (self-understanding, leadership, decision making, communication, and teamwork) of all participants in the Literature in the Garden program (Junior Master Gardener, 2005).**

Life skill construct	Time spent reading each day (h)	N	Mean life skill score		df	F <sup>z</sup>	P
			Mean	SD			
Decision making (0–10 scale)	0	16	5.81	2.228	15	4.244	0.007*
	1	81	7.10	1.578	80		
	2	8	7.62	0.916	7		
	>2	22	7.50	1.144	21		
Overall (0–62 scale)	0	16	45.06	9.219	15	3.713	0.013**
	1	81	51.46	6.881	80		
	2	8	50.75	7.815	7		
	>2	22	51.95	6.966	21		

<sup>z</sup>F scores are standard scores which use SD units to express an individual's performances relative to the group's performances.

\*, \*\*Significant at  $P \leq 0.01$  or 0.05, respectively.

interested students as well as students who can think critically and who will search for answers on their own. This is done by active work and growing in self-understanding, which are both things that can be learned through working with plants (Piaget, 1932).

**RECOMMENDATIONS FOR FUTURE RESEARCH.** In future research, it is recommended that this study be conducted with participants from urban areas. It is also recommended that the curriculum be tested among other youth settings, such as after-school programs and summer camps. Testing students over multiple years of exposure to the garden program is also recommended, as scores may improve over a longer period of time. Finally, a fuller picture of student growth might be achieved if teachers were also surveyed about student life skills pre- and poststudy.

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