21ST CENTURY COMMUNITY LEARNING CENTERS PROGRAM

EV3 ROBOTICS PROJECT

SUMMATIVE EVALUATION REPORT

FLORIDA INTERNATIONAL UNIVERSITY
Miami, Florida

July, 2015
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ACKNOWLEDGMENTS

I would like to acknowledge the contributions of Dr. E. George Simms, assistant vice provost at FIU, as well as Mr. Adly Norelus, the EV3 project director for their support and assistance for this evaluation. I would also like to acknowledge the cooperation and contributions of the site coordinators, Ms. Althea Dixon-Hooks and Ms. Diana Antoine, as well as staff and students at the North Miami Middle School and the Edison K-8 Center.

Thomas C. Monahan, Ed.D.
External Evaluation Consultant
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Program Overview

The year 2014-2015 is the first full year of implementation (under a new 5-year contract) of the 21st Century Community Learning Centers Program – EV3 Robotics Project, administered by Florida International University through the North Miami Middle School and the Edison K-8 Center within the Miami-Dade Public Schools.

As part of the overall evaluation effort, the external evaluator conducted a planning session via telephone early in the project year with the project director, Mr. Adly Norelus, to confirm the scope of the evaluation activities for the year. Consultation between the external evaluator and the project director is open and ongoing in order to discuss procedures and progress. Two site visits were planned for the year, one in January and one during the summer, near the end of the project year. During these ongoing consultations, the external evaluator consultant and the project director agreed on a division of labor to achieve the state-imposed evaluation requirements. This report provides information concerning the responsibilities of the external evaluation consultant.

Based on the March 2015 site monitoring visit; interviews with the project director, the site coordinators, staff, and students; and a review of the project’s goals and objectives, program components, and survey data, the following conclusions and recommendations have been reached.

Student Demographics

The 2014-2015 FIU EV3 Robotics Program served 165 students from two target schools. All participants in the program come from a low-income households and receives free or reduced lunch.

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<th>EDISON PARK K-8 CENTER -GENDER</th>
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<tr>
<td>GIRLS</td>
<td>42</td>
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<td>BOYS</td>
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<th>EDISON PARK K-8 CENTER -GRADE LEVELS</th>
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<td>7TH GRADE</td>
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Program Operation

The 21st Century Community Learning Centers Program at FIU, the EV3 Robotics Project, is currently in its first year of operation under a new 5-year grant. Although the project had originally been designed to run from August 22, 2014 through June 1, 2015, final approval for the grant was not provided by the Florida Department of Education until late in the Fall 2014 term, and the project did not officially begin until January 20, 2015. A 6-week summer program (6 hours per day and 5 days per week) was also conducted from June 22, 2015 through July 31, 2015 for approximately 170 participants (85 at each site) in grades 6-8 to continue their out-of-school time learning.

During the regular school year component, under the leadership of the project director, Mr. Adly Norelus, the program operates in two schools within the Miami-Dade Public School system, including the North Miami Middle School and the Edison Park K-8 Center. At North Miami Middle School, the project has established a target enrollment objective of 85 students in grades 6-8 and operates from 3:10 p.m. to 5:40 p.m., Monday through Friday following full day school sessions according to the district calendar. At Edison Park K-8 Center, the project has also established a target enrollment of 85 students in grades 6-8 and operates from 3:10 p.m. – 5:40 p.m., Monday, Tuesday, Thursday, and Friday and from 2:10 p.m. – 4:40 p.m. on Wednesday.

During the regular school year component, the programs at both the North Miami Middle School and the Edison Park K-8 Center are each staffed with a site coordinator, teachers, and teacher assistants. Specifically, at North Miami Middle School, students are served by 10 teachers and 5 teacher assistants. At Edison Park K-8 Center, students are served by 5 teachers and 5 teacher assistants. One STEM Problem-Based Learning (PBL) computer consultant/trainer and two PBL consultant assistants are also assigned to the program to provide robotics and computer technology instruction to participating students in both schools.

During the regular school year and summer components, the project also served the parents/family members of participating students through monthly workshops in basic computer literacy. During the summer component, the project will serve 85 students in each school from 8:30 a.m. to 2:30 p.m. on FIU’s Biscayne Bay Campus. At each school, students were be served by 10 teachers and 12 teacher assistants.
Quality of Staffing
The FIU EV3 Robotics employed 14 certified teachers and 12 teachers’ assistants for the 2014-2015 programmatic year. Six teachers are certified to teach mathematics. Six teachers are certified to teach reading and language arts. Two teachers are certified to teach science. In addition to the instructional staff, the program employed two counselors who are also certified teacher to serve as the site coordinator for each program. The 26 instructional staff ensured the program maintained a 10:1 teacher to student ratio during both the academic and robotic components of the program. All instructional staff received instruction in project based learning, LEGO EV3 Robotics, and basic programming from educational consultant Augmented Intelligence Inc.

Program Objectives Assessments
The Florida Department of Education has approved the following performance-based objectives for the EV3 Project for the project year 2014-15.

Objective 1: 75% of the regularly participating students will receive a grade of C or better in language arts as measured by report card grades from Quarter 2 to Quarter 4.
  • 96% of regularly participating students maintained a grade C or better in language arts as measured by report card grades from Quarter 2 to Quarter 4.

Objective 2: 75% of the regularly participating students will receive a score of 3 or better in language arts/reading on the Florida State Assessment.
  • Results from the Florida State Assessment exam is not available upon the completion of the Summative Evaluation.

Objective 3: 75% of the regularly participating students will receive a grade C or better in mathematics as measured by report card grades from Quarter 2 to Quarter 4.
  • 95% of regularly participating students maintained a grade C or better in mathematics as measured by report card grades from Quarter 2 to Quarter 4.

Objective 4: 75% of the regularly participating students will receive a score of 3 or better in mathematics on the Florida State Assessment.
  • Results from the Florida State Assessment exam is not available upon the completion of the Summative Evaluation.

Objective 5: 75% of the regularly participating students will receive a grade C or better in science as measured by report card grades from Quarter 2 to Quarter 4.
  • 96% of the regularly participating students maintained a grade of C of better in science as measured by report card grades from Quarter 2 to Quarter 4.
Objective 6: 75% of the regularly participating students will receive a score of 3 or better in science on the Florida State Assessment.
- Results from the Florida State Assessment exam is not available upon the completion of the Summative Evaluation.

Objective 7: 75% of the regularly participating students will show improvement in their critical thinking and problem solving skills as evidenced by a rating score of 3 or better on a project-administered survey.
- 89% of the regularly participating students demonstrated improvement in their critical thinking and problems solving skills as evidenced by a rating score of 3 or better program surveys.

Objective 8: 85% of the regularly participating students will design, program, and present their robotic body to an audience of parents, guests and community partners in a coherent manner as evidenced by a rating score of 3 or better on a project-developed authentic assessment instrument.
- 100% of students participated in the program was able to design, program, and present their robotic body to an audience of parents, guest and community partners in a coherent manner as evidenced by a rating score of 3 or better on a project developed and assessed by Augmented Intelligence Inc.

Objective 9: 40% of adult family members will show improvement in the knowledge and use of basic computer tools as evidenced by a rating score of 3 or better on a project-administered survey.
- 58% of adult family members showed improvement in their knowledge and use of basic computer tools as evidenced by a rating score of 3 or better on an Augmented Intelligence Inc. administered assessment.

Objective 10: 40% of the adult family members of regularly participating students will participate in two or more monthly adult basic computer literacy training sessions as evidenced by project attendance logs.
- 25% of the adult family members of regularly participating students participated in two or more monthly adult basic computer literacy training sessions as evidenced by project attendance logs.

Objective 11: 65% of the regularly participating students will express interest in STEM-related career paths at the conclusion of this program as evidenced by a rating score of 3 or better on a project-administered survey.
- 82% of the regularly participating student expressed interest in STEM-related career paths at the conclusion of this program as evidenced by a rating score of 3 or better on a project-administered survey.

Objective 12: 60% of regularly participating students will expect to be enrolled in high school STEM-related programs, extra-curricular activities, or planning to enroll in a STEM undergraduate program as evidenced by a rating score of 3 or better on a project-administered survey.
• 98% of regularly participating students expressed interest in STEM-related career paths at the conclusion of the program.

Objective 13: 65% of regularly participating students will show positive social, interpersonal, and disciplinary behaviors as evidenced by a rating score of 3 or better on a project-administered survey.
• 92% of regularly participating students demonstrated a positive social, interpersonal, and disciplinary behaviors as evidenced by a rating score of 3 or better on the project-administered survey.

Objective 15: 85% of the regularly participating student will show fewer than 10 unexcused absences from school as evidenced by school attendance records.
• 94% of regularly participating students had fewer than 10 unexcused absence from school as evidenced by school attendance records.

Progress Toward Sustainability

After School Snack
The program was able to secure a nutritious snack for participant of the FIU EV3 Robotics program through Miami-Dade County Public Schools. MDCPS provide meals to program participants free of cost to the FIU EV3 Robotics Program, target schools, or Program participants.

Project Services and Activities
The after-school project is comprised of two components: (1) tutoring, homework completion, and reading, and (2) instruction in robotics. Each of the teachers received training in robotics in order to assist the primary instructional contractor, Augmented Intelligence Academy, Inc. The tutoring/homework completion assistance is provided primarily by the teacher assistants (advanced standing high school and college students, who have also demonstrated a capacity for STEM-related subjects) under the supervision of the teacher. Robotics instruction is provided by the robotics instructional consultant, with the assistance of the after-school teachers and robotics consultant assistants.

The project also has begun working with parents in helping them to gain the necessary college readiness skills to assist their children in the project.

Project Coordination
During the start-up phase of the 2014-15 regular school year component of the project, no formal agreements with collaborators or community agencies/groups have been initiated. However, the project director has reported that plans are currently underway for the development of formal partnerships beginning with the summer 2015 project.

Advisory and Other Boards
An initial Program Advisory Board has been organized, and the present plan is to have the board meet at least quarterly. The project director has reported that he plans to expand the Program
Advisory Board in the coming years. He also reported plans to create a Student Advisory Board, which he expects will meet at least once every semester.

**EV3 Robotics Club**
Each target institution are in the process of creating an EV3 Robotics Club for students interested in participating the EV3 Robotics Program. This will allow the program to continue beyond the duration of the grant and ensuring the programs’ success beyond the grant.

**Conclusions and Recommendations**

**Conclusions**

1. Despite the challenges and difficulties that are commonly associated with first-time start-up projects like this one, the project director and staff have shown remarkable success in getting the program up and running in a timely manner.

2. Among the start-up challenges and difficulties was the lack of sufficient administrative assistance at the beginning of the project. While the University has since committed to providing such assistance; initially, the project director had been forced to assume all of the responsibilities for program planning; curriculum development; scheduling; project administration, including recruiting school-based staff, coordination with the school site coordinators, and program logistics (including making weekly trips to BJ’s Discount Store to purchase foodstuffs for the students at both schools); and program reporting. This was a daunting task for a single individual, and had not such administrative assistance been forthcoming, the sustainability of the project might have been questionable.

3. The aforementioned challenges and difficulties notwithstanding, the project has been staffed with dedicated, enthusiastic site coordinators, teachers, and teacher assistants, who seem to be well-informed of the goals and objectives of the project, and who (primarily because most are district personnel who work at the schools during the regular school day) provide a seamless linkage to the regular school day curriculum and operations.

4. Project stakeholders identified several significant accomplishments, strengths, and areas of concern that are noted on pp. 7-9. They have also offered several suggestions to address their concerns and challenges (see pp. 9).

5. Given the evidence that shows that many of the skills taught in regular school day classrooms and the project, there appears to be a good linkage between the EV3 Robotics Project and the regular school day curriculum.

6. Student attendance in the after-school project has been generally inconsistent. In addition, parent attendance and participation in project activities has also been generally inconsistent and problematic.

7. Survey data suggests that students’ interpersonal and disciplinary behaviors have been positive.
8. Survey data also suggests that communication within the project has generally been effective; nevertheless nearly half (43%) of the staff reported that lines of communication within the project could be improved.

**Recommendations**

Based on the observations, interviews, and data collected and analyzed since the beginning of the project in January 2015, the following recommendations are offered.

1. The finalization of a complete, coherent, and cohesive robotics curriculum, with the appropriate content, scope, and sequence is strongly recommended. While it is clear that substantial progress has been made in this effort, there is still much work to be done. However, that takes time and effort, and it is recommended that this remain a top project priority. It is further recommended that contact be initiated with the robotics hardware/software distributor (LEGO® Education) to determine if it can assist with some creative ideas for curricular adaptation.

2. Recruiting and sustaining student participants are also an important priority. While the project finally has achieved its targeted enrollment at both project sites, the requirement to demonstrate sustained student attendance (i.e., a minimum of 30 days) appears not to have been achieved at either site. Consequently, it is recommended that the project director develop and implement multiple strategies to increase the applicant pool and to recruit students who will attend consistently. As part of this effort, attention should be given to nearby public and nonpublic schools whose students may be interested in enrolling in the project.

3. The project director should also explore strategies to recruit parents into project adult-related project activities and stimulate increased parent involvement and in their children’s education.

4. Professional development for both the teachers and teacher assistants is a critical element for both curriculum implementation and project sustainability. Teachers and teacher assistants need to be trained in the relevant aspects of robotics in order for them to provide variability within the curriculum sufficient to achieve the project’s goals and objectives and to maintain student interest and enthusiasm.

5. The project director should carefully review the feedback in this report from project stakeholders (site coordinators, teachers/teacher assistants students, and parents), with particular attention to the comments regarding strengths, concerns and challenges, and suggestions for change.

6. The results of this evaluation should be disseminated to University and project staff, parents, and school administrators, teachers, and community members through appropriate information channels to both promote the project and recruit future stakeholders.
7. The project director should consult with the project stakeholders to determine the feasibility of and interest in having students organize a STEM Career Fair to educate and generate interest in opportunities in STEM professions for participants and their families.

8. The project director should continue to survey the community and conduct Internet research for new collaborators and project partners to enrich programming who might add new ideas and enrichment to the project.

9. The project director should continue to explore of the benefits of expanding the Advisory Board to include school administrators and community members to promote the program and recruit new students. Furthermore, the project director should provide the leadership necessary for the Student Advisory Board to function effectively (especially in the first few years of the project).

10. The project would clearly benefit from the addition of laptop computers and robot kits. Accordingly, the project director and staff should explore strategies (e.g., FIU’s instructional technology unit, community vendor donations, external grant sources) to secure the resources necessary to acquire this equipment.

11. The project director should consult with University administrators and school building administrators about securing additional storage space for project-related activities. The need to adequately provide a secured space within each school for the project equipment (i.e., robots and laptops) when not in use is particularly acute.

12. The project director should consult with University Administrators and school food administrators about securing a permanent location that will support the program’s needs in providing a nutritious breakfast and lunch for the summer program.

13. The project director should consult with University Administrators and Department of Academic Space to secure adequate classroom space to support the program throughout the summer program located on the Biscayne Bay Campus (BBC). Although the program was able to maintain a 10:1 student to teacher ratio, the academic courses was very large.

14. The Teachers Assistants continues to be one of the strongest component of the project. They continue to provide strong academic support to the program and should continue to be a part of the program moving forward.
Achievement of Project Objectives
At the time of the preparation of this report, it was premature to assess the extent to which some of the project objectives have been achieved. For example, of the 15 Florida DOE-approved project objectives, the first three are performance-based, which employ standardized test score data as measures. Such data are not expected to be available until the fall of 2015. However, data regarding students’ self-assessments have been collected and are presented in the section that follows below (see Stakeholder Assessment of Participants’ Knowledge, Skills, Behaviors, and Attitudes, Table 1, on p.16).

Project Monitoring, Observations, Interviews, and Surveys
As indicated above, during the initial start-up year of the EV3 Project, the external evaluator would conduct two monitoring visits to each project site, during which time the project director, the site coordinators, and small numbers of staff and students would be interviewed. In addition, pre/post survey questionnaires would also be administered to the project staff, students, and parents of participating students. In the paragraphs that follow, the findings from the initial site visit (March 30 – April 1) including observations and interviews, as well as the preliminary surveys are presented and discussed.

At the time of the first monitoring visit to North Miami Middle School on March 31, 2015, the project was serving an average of 65 students per day. As of April 27, 2015, enrollment had increased to its target level of 85 students, of whom 75 students (88%) had been in attendance for 30 days or more. All (100%) of the participating students were eligible to receive free or reduced price lunch. There were four students with physical disabilities or IEPs, and no non-public school students were participating in the program. While the targeted enrollment objective was achieved, not all of the 85 students enrolled had been in attendance for 30 days or more.

At the time of the first monitoring visit to Edison K-8 Center on April 1, 2015, the project was serving an average of 65 students per day. As of April 27, 2015, enrollment had increased to its target level of 85 students, of whom 73 students (86%) had been in attendance for 30 days or more. All (100%) of the participating students were eligible to receive free or reduced price lunch. There were 15 students with physical disabilities or IEPs, and no non-public school students were participating in the program. While the targeted enrollment objective was achieved, not all of the 85 students enrolled had been in attendance for 30 days or more.

During the monitoring visits to the project, the external evaluator conducted a series of personal interviews with the project director, the two site coordinators, and a sample of program staff and students. The results of these interviews are presented and discussed in the paragraphs that follow. In presenting these findings, it is important to note that some of the comments that have been offered during the interviews represent those of a single individual or a very small group of individuals. They should not be interpreted as representing a consensus or a majority of all the stakeholders in the project.

Program Accomplishments
During the regular school-year component of the project, the project director and site coordinators noted the following accomplishments:

**Project Director**
- The very fact that the program is up and running was noted as a major accomplishment.
- Students’ ability to design, code, and manipulate the robots.
- The project has received very positive attention in the local media including the Miami Times, Miami Herald, FIU student newspaper *The Beacon*, and NBC-Channel 6 television.
- The relationships that have been forged between the students and the teacher assistants (primarily high school and college students). These relationships have showcased the leadership skills of the teacher assistants and have also clearly demonstrated the growth of the teacher assistants in their own knowledge and skills.
- The project has also been able to generate at least some parental involvement and participation.
- Securing a Program Assistant for the program.

**Site Coordinators**
- Students’ critical thinking skills have improved by engaging in problem-based learning.
- Students have been introduced to STEM-related disciplines.
- Students have been provided with a greater sense of accomplishment and pride.

**Project Teachers**
- Students have learned and understand ways of applying math knowledge and skills. They have become more organized and have learned the importance of structure.
- Students are learning ways to generate and engineer their own ideas.
- Students have become very engaged, and they really enjoy the competition.

**Program Strengths**
Program stakeholders were asked to identify what they considered to be programmatic strengths. Among those that were reported were the following:

**Project Director**
- Significant student interest in the robotics component of the project.
- Safe, secure, and supervised environment in which children can learn and have fun.
- The competitions that occur between the children and their robots, which has maintained student enthusiasm for the project.

**Site Coordinators**
- A caring and compassionate staff who have a passion for teaching and helping children.
- The children made productive use of their time after school learning and exploring, using trial and error and experimentation to engage in problem solving.
- The potential for what the project can achieve in the long run.

**Project Teachers**
• Caring and dedicated teachers, knowledgeable teacher assistants, and enthusiastic students.
• A student-centered project that has allowed the kids to excel.
• Excellent and productive teacher/student interactions; teamwork with fellow students.
• The project has been empowering for the students. It teaches them how to be imaginative, and how to improvise and be self-reliant.
• An emerging curriculum (that still needs improvement).

Project Concerns or Challenges
The above accomplishments and strengths notwithstanding, the following concerns or challenges were also identified by some of the stakeholders.

Project Director
• The most significant concern and challenge that the project faces is a lack of a fully developed, systematic, cohesive, and coherent curriculum. While there has been some recent progress in developing a complete technical and pedagogical curriculum, much work still remains to make it fully coherent and cohesive.
• Another significant concern and challenge is the lack of administrative/management support for the project. As discussed above, the project director is the sole leader and administrator for the project. As such, he is fully responsible for all aspects of project administration/management, a task that consumes an inordinate amount of time. At the time of the site visit by the external evaluator, the project director reported that he was being prevented from exercising the leadership necessary to ensure that the project was implemented in an efficient and effective manner because of all the time that he was forced to spend “putting out fires.” This has since been addressed with the provision of a project assistant.
• Two other challenges that constitute significant potential obstacles to project success are the lack of adequate resources that might be used as incentives and rewards to stimulate and maintain students’ attendance and a lack of clear and consistent direction from the Florida Department of Education. The project director has reported that he faces continuing difficulties in getting consistently clear directions from state Department of Education personnel regarding project requirements, especially reporting requirements.

Site Coordinators
• Lack of a complete structured curriculum that is well organized in content, scope, and sequence.
• Low student attendance continues to be a concern and challenge.
• Insufficient professional development for the teachers and teacher assistants.

Project Teachers
• Lack of a complete relevant curriculum.
• Insufficient professional development for the teaching staff.

1 The robotics consultant, Augmented Intelligence, Inc., bore the responsibility for developing only the technical content of the curriculum; the pedagogical aspects of the curriculum remained emergent and developmental for much of the first few months of project implementation, which was caused, at least in part, by a lack of time available to the project director.
• Keeping students engaged and focused (some of them are fading in excitement). Some students don’t really try because of fear of failure.
• Competition with other programs and activities for student attendance and attention.
• The growth pains associated with a start-up program.

Project Needs and Suggested Changes
Among the changes that were suggested by the project stakeholders were the following.

Project Director
• The need to achieve a fully developed, systematic, coherent, and cohesive curriculum is of paramount importance. Absent such clearly defined content, scope, and sequence, the project is ineffective and inefficient.
• The project continues to need additional administrative/management support. At the time of the site visit by the external evaluator, too much time necessary to properly lead and administer the project was being spent on routine logistical problems. Subsequently, this has been addressed.
• More resources and time for important professional development for both the teachers and teacher assistants is needed.
• More resources are needed to improve the food services (i.e., snacks) component of the project.
• Additional space, both within the school sites and at FIU’s Biscayne Bay Campus, is needed for storage of project materials, supplies, and equipment. Absent such storage, the project’s robotics equipment remains at risk to damage or loss.

Site Coordinators
• Improved strategies for recruiting and retaining children in the after-school project.
• A complete structured curriculum that is well organized in content, scope, and sequence.
• More laptops and robots would be helpful.

Project Teachers
• More support from the school administration.
• More positive interactions between the teachers and children.
• Incentives and rewards for both children and parents.
• Establish weekly or bi-weekly goals to provide structure and motivate the children.
• Persistence (the project will get better).
• A coherent and well-articulated curriculum.
• Increased professional development for the project staff.

Staffing
The project director demonstrated a very clear and persistent need for a project assistant. As described above (see “Project Concerns and Challenges,” at the time of the site monitoring visit by the external evaluator, the project director was the sole administrator for the project, and he bore direct responsibility for all of the leadership and administrative/management tasks and responsibilities for the project. A project assistant was subsequently provided who can assume
some of the administrative/management tasks and thus “free up” the project director to engage in more important leadership tasks and responsibilities.

In addition, at the Edison Park K-8 Center, there is a need for a project security guard and two teacher assistants.

**Professional Development Activities**

During the regular school-year component of the project, professional development has been limited to the director attending required project directors’ meeting in October in Orlando and some in-house in-services for project staff. Teachers received approximately 10 hours of in-service training in facilitating robotics instruction, and the teacher assistants received weekly inservice in robotics from the robotics consultant, Augmented Intelligence, Inc. Again, as described above, there is a continuing need for additional professional development for the project staff.

**Linkage between the After-School Program and the Regular School Day Curriculum**

The project director and site coordinators affirmed that most of the project teachers are also classroom teachers in the regular school day program. Thus, the linkage between the after-school project and regular school day curriculum is relatively seamless. Some students have consistently been observed applying the math knowledge and skills that they learn in the regular school day curriculum to their work in their after-school robotics work. One site coordinator reported that, “if the curriculum is structured correctly, what happens in the after-school Robotics Project will become a natural extension of the regular school day curriculum.” In addition, using both email or face-to-face contacts, the project teachers maintain contact with regular school day classroom teachers concerning student needs and progress.

The after-school teachers, most of whom also teach in the school, reported that they are familiar with students’ regular curriculum and other classroom teachers, so they are well-prepared to help with homework. They also reported that the project provides many opportunities for team building that carries over to the regular school day program. One teacher remarked, “There appears to be a growing symbiosis between the regular school day program and the after-school project.”

**Student Attendance and Social and Disciplinary Behaviors**

The project director reported that, at this point in the project, student attendance has been inconsistent. Because the first two months of the project were marked by what can best be characterized as an emerging curriculum, the content, scope, and sequence of the curriculum had not been fully developed. As a result, the first few months of the project were characterized by a lack of curricular coherence and cohesion. This may have had an adverse effect on student attendance and participation insofar as students rapidly became bored, with a sense of “what else are we going to do.” The project director reported that, on average, daily attendance has numbered approximately 55 students. (The site coordinators estimated daily attendance slightly higher, at approximately 65 students per day.) The project director also reported that, because the project participants at both sites are students in the schools where the after-school project occurs, the social and interpersonal interactions among the participants are good. Moreover, he reported that there were no significant disciplinary problems that couldn’t be handled by the teachers themselves or the site coordinators.
The site coordinators estimated student attendance at approximately 65 students per day. In the very beginning of the program, the attendance was outstanding. However, as time passed, some students began to lose interest. Students who remain committed to the concept of engineering and robotics continue to attend; but for those whose interest in the project is waning, their attendance is inconsistent. It has been suggested that the repetition caused at least in part by the lack of a complete, structured curriculum has contributed to this drop in attendance. Further, the site coordinators reported that the Robotics Project competes for student attendance with school-required after-school tutoring and organized sports teams, e.g., basketball. Regarding students’ social and interpersonal behaviors, the site coordinators agreed that, since the children attended the school where the after-school project was implemented, they all knew each other well, so their social skills seemed not to be much of an issue. Nevertheless, the site coordinators reported that students interact more easily because they seem to have a common interest (i.e., robotics), and they have observed more mature conversations among the students. Finally, the site coordinators reported that the disciplinary behaviors of the children are those typical of young teenagers, and none of the children have exhibited any significantly problematic behaviors.

The project teachers reported that the attendance began very well, but then began to drop off, presumably because some of the children became bored with the repetition that was probably influenced by the lack of a clearly articulated robotics curriculum. At the time of the site monitoring visit by the external evaluator, they reported that the average attendance rate was approximately 65 students per day. The children who are really “into” engineering-type activities will continue to attend. However, some children apparently have become bored and have adopted a kind of “been there – done that” attitude (these are the children who have either stopped coming or who come on an inconsistent basis). Regarding students’ social and interpersonal relationships, the project teachers reported that the students all seem to get along very well, as many of them share a common purpose for coming. For the most part, they enjoy working with their partners on the robotics projects. Peer mentoring is very evident. The teachers have also reported that there don’t seem to be any significant disciplinary issues in the project.

Parent and Family Participation
The project stakeholders (i.e., project director, site coordinators, and the project teachers) have all essentially agreed that parent involvement and participation have been inconsistent and a bit problematic. At the very beginning of the project in January 2015, an orientation meeting was held, which drew large numbers of parents and family members, who were anxious to see what the program had to offer their children. Since then, however, parent participation has fallen significantly. The site coordinators reported that working parents often find it difficult to attend frequently because of other demands on their personal and family lives. Relatively few parents consistently visit the project to see what their children are doing; however, it was noted that some parents will participate in events and activities, but only if they are asked to do so. The project director did report that he is attempting to work with the schools’ parent-teacher groups to plan activities that seek to increase parental involvement and participation.

Availability of Materials and Supplies
All of the project stakeholders (i.e., the project director, site coordinators, project staff, and student participants) reported that there didn’t appear to be significant problems getting materials
and supplies. However, they all reported that the project did need more equipment, primarily laptops, robots, and ancillary robotic equipment (e.g., motors, Legos). At present, one robot is assigned to every two students, and for every two robots, there is only one laptop computer (or four students to each laptop). To make the project more efficient and effective, more laptops and robots are needed. It was also noted by one of the site coordinators that the inclusion of a good robotics book will add to the effectiveness of the project by introducing a language arts/reading dimension to robotics design. One of the teachers reported that it would also be good if the project could get some “advanced” materials and equipment for “advanced” students. Another teacher reported that they needed more professional development and time to plan and learn how to best use the materials, supplies, and equipment they have.

**Communication with Classroom Teachers**
The project stakeholders (i.e., project director, site coordinators, and the project teachers) all generally reported that communication between after-school teachers and the regular school day teachers has been greatly facilitated due to the fact that the after-school teachers are part of the school’s regular faculty. (One site coordinator reported that the after-school teachers were the best teachers on the school faculty, while another site coordinator suggested that some of the after-school teachers had to deal with a bit of a learning curve in that their regular school day classes focused on elementary as opposed to middle school youngsters.) Moreover, the project director meets at least weekly with the after-school staff and at least bi-weekly with the site coordinators, who maintain daily contact with the school principal and faculty.

**Feedback from Program Participants and Other Stakeholders**
The project director reported that students overwhelmingly like the project; they especially love the robotics component. However, although they may not clearly or directly articulate it, the students crave curricular structure. They want to know what they’re going to be doing in the future. As noted above, while there has been recent progress in crafting a fully developed technical and pedagogical curriculum structure, much work continues to be necessary to bring it to closure. The project director also noted that he continues to receive feedback from students about the need for additional laptops.

The site coordinators reported that the feedback they receive clearly demonstrates that the children love the program, especially, the programming and construction aspects of robotics. Children have been observed “showing off” their robots to other kids in the school, attempting to recruit them into the Robotics Project. Further, they like the competition with other kids in which they match their robots with those of other kids. However, some of the children have indicated that they have become bored with doing many of the same things with the robotics (this has been noted as an outcome of the lack of a systemic, structured curriculum), and some of the kids (presumably those who would prefer to spend all of their after-school time working on their robots) expressed a dislike for the tutoring, homework, and reading component of the project.

During the interviews, the project teachers reported that students really like the project, especially the robotics component. They like the teachers, their partners, and the competition. Some of the teachers reported that some students have expressed some boredom with “the same old, same old” features of the robotics activity. However, for the most part, the project has been effective in motivating the children to come to school during the day, so that they can attend the project activities after school. They are also unhappy when the after-school time is usurped by
teacher meetings or when school is closed. One teacher reported that the project is especially good because it represents a safe place and a nurturing environment for many of the kids—“it’s a place where it’s OK to be a little geeky or nerdy.”

The students were also asked to provide feedback about the program. Specifically, they were asked to comment on what they learned as a result of participating in the program, what changes they have noted in their math skills, their own behaviors and self-confidence, and what they liked most and least about the program.

Regarding their math skills, the students agreed that the project helped them both to better understand the math principles they learn during the school day and then apply those principles in the after-school project. Regarding their behaviors, all of the students who were interviewed indicated that they were well-behaved anyway, so there really weren’t any behavioral issues. Regarding their self-confidence, one student remarked that the “project provided her with lots of initiatives to do things on her own.” Another student reported that “what they learn in the project will help them to be better prepared for college.”

Regarding their likes and dislikes about the project, the students noted that they like the robotics and their functions, the hands-on building of robots, and getting a head start of learning about engineering. They also thought that the snacks were “OK.” None of the students who were interviewed indicated a dislike for any feature of the project. However, they did indicate that they would like to have more laptops (so everyone can have his/her own).

**Stakeholder Assessment of Participants’ Knowledge, Skills, Behaviors, and Attitudes**

Students, staff, and parents were asked to assess the knowledge, skills, behaviors, and attitudes of student participants as a result of their participation in the regular school year component of the EV3 Robotics Project. Their responses are illustrated in the tables immediately following.

**Student Survey**

Sixty-six students responded to an on-line survey in which they self-assessed their knowledge, skills, behaviors, and attitudes. Two thirds of the students (67%) were from the Edison Park K-8 Center and 33% were from North Miami Middle School. Nearly half of the students (49%) reported that they were sixth graders; 36% reported that they were seventh graders; 11% reported that they were eighth graders; and 5% reported that they were in some other grade.
Table 1: Student Self-Assessment – All Students Combined (N=66)

<table>
<thead>
<tr>
<th></th>
<th>Excellent (1)</th>
<th>Good (2)</th>
<th>Needs Some Improvement (3)</th>
<th>Needs a lot of Improvement (4)</th>
<th>Don’t Know, Can’t Judge, Too Soon to Tell (5)</th>
<th>Mean Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>knowledge of the goals and objectives of the project</td>
<td>43%</td>
<td>29%</td>
<td>20%</td>
<td>3%</td>
<td>5%</td>
<td>1.97</td>
</tr>
<tr>
<td>reading skills</td>
<td>41%</td>
<td>36%</td>
<td>17%</td>
<td>2%</td>
<td>5%</td>
<td>1.92</td>
</tr>
<tr>
<td>math skills</td>
<td>33%</td>
<td>38%</td>
<td>22%</td>
<td>5%</td>
<td>3%</td>
<td>2.08</td>
</tr>
<tr>
<td>technical (i.e., STEM) skills</td>
<td>25%</td>
<td>48%</td>
<td>20%</td>
<td>5%</td>
<td>3%</td>
<td>2.14</td>
</tr>
<tr>
<td>writing skills</td>
<td>35%</td>
<td>35%</td>
<td>24%</td>
<td>3%</td>
<td>3%</td>
<td>2.05</td>
</tr>
<tr>
<td>critical thinking skills</td>
<td>35%</td>
<td>47%</td>
<td>15%</td>
<td>0%</td>
<td>3%</td>
<td>1.89</td>
</tr>
<tr>
<td>problem solving skills</td>
<td>36%</td>
<td>44%</td>
<td>18%</td>
<td>0%</td>
<td>2%</td>
<td>1.86</td>
</tr>
<tr>
<td>social and interpersonal behaviors</td>
<td>30%</td>
<td>42%</td>
<td>18%</td>
<td>6%</td>
<td>3%</td>
<td>2.09</td>
</tr>
<tr>
<td>personal disciplinary behaviors</td>
<td>40%</td>
<td>36%</td>
<td>15%</td>
<td>0%</td>
<td>10%</td>
<td>2.03</td>
</tr>
<tr>
<td>attitudes toward school</td>
<td>46%</td>
<td>31%</td>
<td>17%</td>
<td>3%</td>
<td>3%</td>
<td>1.86</td>
</tr>
<tr>
<td>participation in class</td>
<td>34%</td>
<td>43%</td>
<td>14%</td>
<td>3%</td>
<td>6%</td>
<td>2.05</td>
</tr>
<tr>
<td>rate of homework completion</td>
<td>31%</td>
<td>46%</td>
<td>15%</td>
<td>2%</td>
<td>6%</td>
<td>2.06</td>
</tr>
<tr>
<td>participation in STEM-related in-school activities</td>
<td>49%</td>
<td>35%</td>
<td>9%</td>
<td>2%</td>
<td>5%</td>
<td>1.77</td>
</tr>
<tr>
<td>participation in STEM-related extra-curricular activities</td>
<td>49%</td>
<td>31%</td>
<td>11%</td>
<td>5%</td>
<td>5%</td>
<td>1.85</td>
</tr>
<tr>
<td>interest in STEM-related careers</td>
<td>50%</td>
<td>30%</td>
<td>9%</td>
<td>5%</td>
<td>6%</td>
<td>1.88</td>
</tr>
</tbody>
</table>

Mean ratings are predicated on a scale in which 1=Excellent and 5= Don’t know, Can’t Judge, Too Soon to Tell.

As the data in Table 1 clearly demonstrate, a substantial majority (≥70%) of students self-assess their knowledge, skills, attitudes, and behaviors as either excellent or good. It is especially noteworthy that these data support the achievement of a number of project objectives as follows:

(a) 82% and 80% respectively of project participants self-assessed their critical thinking and problem solving skills as either excellent or good (objective #7 achieved).
(b) 80% of project participants reported that their interest in STEM-related careers was either excellent or good (objective #11 achieved);
(c) 80% of the project participants self-assessed their participation in STEM-related extra-curricular activities as either excellent or good (objective #12 achieved).
(d) 72% and 76% respectively of project participants self-assessed their social and interpersonal behaviors and their personal disciplinary behaviors as either excellent or good (objective #14). (See Figure 1 on p. 14)

Students were also asked two questions about what they perceived to be in their futures. To the first question, nearly one third of the students (32%) reported that they definitely intended to enroll in STEM-related courses in high school; 33% reported that they thought they would enroll in STEM-related courses in high school; 27% reported that they didn’t know or weren’t sure
whether they would enroll in STEM related courses in high school; and 8% reported that they
definitely would not enroll in STEM-related courses in high school.

To the second question, slightly more than one third of the students (36%) reported that they
definitely intended to enroll in STEM-related courses in college; 25% reported that they thought
they would enroll in STEM-related courses in college; 28% reported that they didn’t know or
weren’t sure whether they would enroll in STEM related courses in college; and 11% reported
that they definitely would not enroll in STEM-related courses in college.

Disaggregated data for the two project schools (i.e., North Miami Middle School and the Edison
Park K-8 Center) are presented in Appendix B. No statistically significant differences were
observed between the two schools in relation to the student self-assessment findings.
**Staff Survey**

Fourteen staff members assessed the knowledge, skills, attitudes, and behaviors of the EV3 Robotics Project students; 12 staff were teachers and two were teacher assistants. Eight staff taught at the North Miami Middle School and six taught at the Edison Park K-8 Center.

**Table 2: Staff Assessments (N=14)**

<table>
<thead>
<tr>
<th></th>
<th>Excellent (1)</th>
<th>Good (2)</th>
<th>Needs Some Improvement (3)</th>
<th>Needs a Lot of Improvement (4)</th>
<th>Don’t Know, Can’t Judge, Too Soon to Tell (5)</th>
<th>Mean Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>staff knowledge of the goals and objectives of the project</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
<td>0%</td>
<td>0%</td>
<td>2.50</td>
</tr>
<tr>
<td>lines of communication in the project</td>
<td>7%</td>
<td>50%</td>
<td>43%</td>
<td>0%</td>
<td>0%</td>
<td>2.36</td>
</tr>
<tr>
<td>staff collaboration with regular school day teachers and staff</td>
<td>36%</td>
<td>50%</td>
<td>14%</td>
<td>0%</td>
<td>0%</td>
<td>1.79</td>
</tr>
<tr>
<td>linkage of the 21st Century Robotics Project with the regular school day curriculum</td>
<td>7%</td>
<td>29%</td>
<td>43%</td>
<td>14%</td>
<td>7%</td>
<td>2.86</td>
</tr>
<tr>
<td>professional development staff receive as part of the EV3 Robotics Project</td>
<td>0%</td>
<td>71%</td>
<td>21%</td>
<td>7%</td>
<td>0%</td>
<td>2.36</td>
</tr>
<tr>
<td>students’ reading skills</td>
<td>7%</td>
<td>43%</td>
<td>36%</td>
<td>7%</td>
<td>7%</td>
<td>2.64</td>
</tr>
<tr>
<td>students’ math skills</td>
<td>7%</td>
<td>43%</td>
<td>36%</td>
<td>7%</td>
<td>7%</td>
<td>2.64</td>
</tr>
<tr>
<td>students’ technical (computer and STEM-related) skills</td>
<td>21%</td>
<td>36%</td>
<td>36%</td>
<td>0%</td>
<td>7%</td>
<td>2.36</td>
</tr>
<tr>
<td>students’ writing skills</td>
<td>7%</td>
<td>36%</td>
<td>43%</td>
<td>7%</td>
<td>7%</td>
<td>2.71</td>
</tr>
<tr>
<td>students’ social/interpersonal behaviors</td>
<td>14%</td>
<td>57%</td>
<td>21%</td>
<td>7%</td>
<td>0%</td>
<td>2.21</td>
</tr>
<tr>
<td>students’ disciplinary behaviors</td>
<td>7%</td>
<td>50%</td>
<td>36%</td>
<td>7%</td>
<td>0%</td>
<td>2.43</td>
</tr>
<tr>
<td>students’ critical thinking skills</td>
<td>7%</td>
<td>57%</td>
<td>21%</td>
<td>7%</td>
<td>7%</td>
<td>2.50</td>
</tr>
<tr>
<td>Students’ problem solving skills</td>
<td>7%</td>
<td>50%</td>
<td>36%</td>
<td>7%</td>
<td>0%</td>
<td>2.43</td>
</tr>
<tr>
<td>students’ attitudes toward school</td>
<td>14%</td>
<td>57%</td>
<td>21%</td>
<td>7%</td>
<td>0%</td>
<td>2.21</td>
</tr>
<tr>
<td>students’ rate of homework completion</td>
<td>7%</td>
<td>50%</td>
<td>21%</td>
<td>7%</td>
<td>14%</td>
<td>2.64</td>
</tr>
<tr>
<td>students’ class participation</td>
<td>15%</td>
<td>77%</td>
<td>8%</td>
<td>0%</td>
<td>0%</td>
<td>1.92</td>
</tr>
<tr>
<td>participation in STEM-related in-school activities</td>
<td>14%</td>
<td>43%</td>
<td>29%</td>
<td>7%</td>
<td>7%</td>
<td>2.50</td>
</tr>
<tr>
<td>participation in STEM-related extra-curricular activities</td>
<td>14%</td>
<td>36%</td>
<td>43%</td>
<td>0%</td>
<td>7%</td>
<td>2.50</td>
</tr>
<tr>
<td>students’ interest in STEM-related careers</td>
<td>17%</td>
<td>50%</td>
<td>17%</td>
<td>0%</td>
<td>17%</td>
<td>2.50</td>
</tr>
</tbody>
</table>

Mean ratings are predicated on a scale in which 1 = Excellent and 5 = Don’t know, Can’t Judge, Too Soon to Tell.

The data in Table 2 clearly demonstrate that teachers generally believe that the students’ knowledge, skills, attitudes, and behaviors were either good or need a little improvement. It is noteworthy, however, that a large percentage of staff also believe that students’ knowledge, skills, attitudes, and behaviors in selected areas need improvement. Moreover, the data in this table also demonstrate the following:
• 50% of the staff respondents believe that they need to improve (at least a little) their knowledge of the project’s goals and objectives;
• 57% of the staff respondents believe that the linkage between the project and the regular school day curriculum needs to be improved a little or a lot;
• 43% of the staff respondents believe that the lines of communication within the project needs to be improved at least a little; and
• 28% of the staff respondents believe that they need additional professional development as part of the EV3 Robotics Project.

Disaggregated data for the two project schools (i.e., North Miami Middle School and the Edison Park K-8 Center) are presented in Appendix B. No statistically significant differences were observed between the two schools in relation to the staff assessment findings.

**Parent Survey**
Fifty-one parents responded to a survey in which they assessed their children’s knowledge, skills, behaviors, and attitudes; 17 respondents (33%) were parents of children at North Miami Middle School and 32 respondents (63%) were parents of children at the Edison Park K-8 Center. Approximately 4% of the respondents did not indicate a school affiliation.

**Table 3: Parent Assessments (N=51)**

<table>
<thead>
<tr>
<th></th>
<th>Excellent (1)</th>
<th>Good (2)</th>
<th>Fair (3)</th>
<th>Poor (4)</th>
<th>Don’t Know, Can’t Judge, Too Soon to Tell (5)</th>
<th>Mean Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>child’s knowledge of the goals and objectives of the project</td>
<td>65%</td>
<td>20%</td>
<td>10%</td>
<td>2%</td>
<td>4%</td>
<td>1.61</td>
</tr>
<tr>
<td>child’s reading skills</td>
<td>55%</td>
<td>41%</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
<td>1.49</td>
</tr>
<tr>
<td>child’s math skills</td>
<td>47%</td>
<td>29%</td>
<td>22%</td>
<td>2%</td>
<td>0%</td>
<td>1.80</td>
</tr>
<tr>
<td>child’s technical (i.e., STEM) skills</td>
<td>41%</td>
<td>45%</td>
<td>12%</td>
<td>2%</td>
<td>0%</td>
<td>1.76</td>
</tr>
<tr>
<td>child’s writing skills</td>
<td>48%</td>
<td>38%</td>
<td>15%</td>
<td>0%</td>
<td>0%</td>
<td>1.67</td>
</tr>
<tr>
<td>child’s critical thinking</td>
<td>45%</td>
<td>35%</td>
<td>16%</td>
<td>4%</td>
<td>0%</td>
<td>1.80</td>
</tr>
<tr>
<td>child’s problem solving skills</td>
<td>56%</td>
<td>29%</td>
<td>10%</td>
<td>2%</td>
<td>2%</td>
<td>1.65</td>
</tr>
<tr>
<td>child’s social and interpersonal skills/behaviors</td>
<td>49%</td>
<td>29%</td>
<td>18%</td>
<td>2%</td>
<td>2%</td>
<td>1.78</td>
</tr>
<tr>
<td>child’s personal disciplinary behaviors</td>
<td>54%</td>
<td>28%</td>
<td>14%</td>
<td>0%</td>
<td>4%</td>
<td>1.72</td>
</tr>
<tr>
<td>child’s attitudes toward school</td>
<td>43%</td>
<td>37%</td>
<td>12%</td>
<td>2%</td>
<td>6%</td>
<td>1.90</td>
</tr>
<tr>
<td>child’s participation in class</td>
<td>59%</td>
<td>31%</td>
<td>4%</td>
<td>2%</td>
<td>4%</td>
<td>1.61</td>
</tr>
<tr>
<td>child’s rate of homework completion</td>
<td>38%</td>
<td>46%</td>
<td>16%</td>
<td>0%</td>
<td>0%</td>
<td>1.78</td>
</tr>
<tr>
<td>child’s participation in STEM-related activities in school</td>
<td>55%</td>
<td>26%</td>
<td>8%</td>
<td>0%</td>
<td>12%</td>
<td>1.88</td>
</tr>
<tr>
<td>child’s interest in extra-curricular STEM-related activities</td>
<td>53%</td>
<td>28%</td>
<td>8%</td>
<td>0%</td>
<td>12%</td>
<td>1.90</td>
</tr>
<tr>
<td>child’s interest in STEM-related careers</td>
<td>56%</td>
<td>24%</td>
<td>10%</td>
<td>0%</td>
<td>10%</td>
<td>1.84</td>
</tr>
</tbody>
</table>

Mean ratings are predicated on a scale in which 1=Excellent and 5=Don’t know, Can’t Judge, Too Soon to Tell.
As the data in Table 3 clearly demonstrate, a substantial majority of parents assess their children’s knowledge, skills, attitudes, and behaviors as either excellent or good. It is especially noteworthy that these data support the achievement of objective #9, i.e., 76% of parents reported that their knowledge and technical and computer skills were either excellent or good (objective #9 achieved);

Parents were also asked to indicate their perceptions of the extent to which their children might enroll in STEM-related courses in high school and college. Regarding the extent to which they believed that their children would enroll in high school STEM-related courses, 30% of the parent respondents reported that they thought their children definitely would enroll, 37% reported that they thought their children might enroll, 28% reported that they didn’t know or weren’t sure, and 4% reported that they believed that their children definitely would not enroll in STEM-related courses in high school.

Regarding the extent to which they believed that their children would enroll in STEM-related programs (i.e., major or minor) in college, 30% of the parent respondents reported that they thought their children definitely would enroll, 30% reported that they thought their children might enroll, 35% reported that they didn’t know or weren’t sure, and 4% reported that they believed that their children definitely would not enroll in STEM-related programs in college.

Finally, parents were also asked to self-assess their own knowledge and skills about the project. Their assessments about their own knowledge of the 21st Century Robotics Project goals and objectives were as follows: excellent (15%), good (44%), fair (13%), poor (7%), and don’t know, can’t judge or too soon to tell (22%). In addition, the assessments of their own technical and computer skills were as follows: excellent (26%), good (50%), fair (15%), poor (2%), and don’t know, can’t judge or too soon to tell (7%).

Disaggregated data for the two project schools (i.e., North Miami Middle School and the Edison Park K-8 Center) are presented in Appendix B. No statistically significant differences were observed between the two schools in relation to the parent survey findings.

Stakeholder Assessment of Project Strengths, Shortcomings/Difficulties, and Suggestions for Improvement

As part of the written survey questionnaires, students, parents, and project staff were also asked to provide comments on what they perceived to be significant project strengths, shortcomings, and suggestions for project improvement. These comments have been summarized below. In considering these comments, it is important for readers to understand that at least some of the comments may not represent consensus or even a majority among the stakeholders. In fact, they may constitute only the remarks by one or a few stakeholders.

Program Strengths
The most frequently reported program strengths identified by students were: being able to program and build robots (24) as well as their own technical skills (13) and having the opportunity to learn new things. The most frequently identified program strength reported by staff was the students’ critical thinking skills (5). The most frequently identified program
strengths reported by parents were their children’s ability to build and program their own robots (9) and opportunities for their children to learn new things.

Shortcomings
The most frequently reported program shortcomings identified by students were: the difficulties that they encountered in trying to program the robots (5), their perception that the project wasn’t very challenging (4), and their perception that some of the kids didn’t take the project seriously (4). The most frequently identified program shortcomings reported by staff were the absence of a complete coherent curriculum and lesson plans (5) and ineffective project communication (3). The most frequently identified program shortcoming reported by parents was their perception that the program was too long. It is noteworthy that large numbers of students (12) and parents (7) reported that they didn’t think the project had any shortcomings.

Suggestions for Change
Finally, the most frequently reported suggestion for change reported by students were to provide more pieces for the robots (6), make the project more challenging and interesting (6), more programming (5), make the project better to have more fun (5), and better snacks. The most frequently reported suggestion for change reported by staff was to improve student pacing, create pacing guide, and set periodic instructional goals and objectives (5). The most frequently reported suggestions for change reported by parents were to get more advanced technologies (5), expand the program 93), and shorten the project day (3). It is perhaps noteworthy 10 students reported that they didn’t think the project needed any changes.
Table 4: Summary of Student Respondents’ Narrative Comments (N=66)

<table>
<thead>
<tr>
<th>Project Strengths</th>
<th>No.</th>
<th>Project Shortcomings</th>
<th>No.</th>
<th>Suggestions for Improvement</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doing something I’ve never done before</td>
<td>3</td>
<td>Not enough pieces</td>
<td>3</td>
<td>Reduce homework time; increase robotics time</td>
<td>1</td>
</tr>
<tr>
<td>Great program; cool program</td>
<td>3</td>
<td>No “advanced” pieces</td>
<td>2</td>
<td>More programming</td>
<td>5</td>
</tr>
<tr>
<td>Opportunity to learn new things</td>
<td>10</td>
<td>Not very challenging</td>
<td>4</td>
<td>Eliminate homework time</td>
<td>2</td>
</tr>
<tr>
<td>Creating things using our imaginations</td>
<td>2</td>
<td>Programming difficulties</td>
<td>5</td>
<td>Remove bad kids/improve their behaviors</td>
<td>4</td>
</tr>
<tr>
<td>Good teachers</td>
<td>5</td>
<td>Having to work alone sometimes</td>
<td>1</td>
<td>Provide better snacks</td>
<td>5</td>
</tr>
<tr>
<td>Builds our technical skills</td>
<td>13</td>
<td>Having to do homework</td>
<td>1</td>
<td>Provide more field trips</td>
<td>2</td>
</tr>
<tr>
<td>Programming and building robots</td>
<td>24</td>
<td>Kids don’t take the program seriously</td>
<td>4</td>
<td>Make the project more challenging, more interesting</td>
<td>6</td>
</tr>
<tr>
<td>Engaging in competitions</td>
<td>2</td>
<td>Project is boring</td>
<td>2</td>
<td>Recruit more kids who really want to be in the project</td>
<td>4</td>
</tr>
<tr>
<td>Learning how to work in teams</td>
<td>3</td>
<td>Poor/insufficient snacks</td>
<td>1</td>
<td>Make the project more fun</td>
<td>5</td>
</tr>
<tr>
<td>Challenging ourselves</td>
<td>4</td>
<td>Forcing us to come when we don’t want to</td>
<td>2</td>
<td>Let kids who want to work alone do so</td>
<td>2</td>
</tr>
<tr>
<td>Homework time and homework help</td>
<td>2</td>
<td>Not enough kids in the project</td>
<td>3</td>
<td>Provide more laptops</td>
<td>3</td>
</tr>
<tr>
<td>Tutoring</td>
<td>1</td>
<td>Robots break too easily</td>
<td>1</td>
<td>Provide more competitions</td>
<td>1</td>
</tr>
<tr>
<td>Problem solving and critical thinking</td>
<td>1</td>
<td>Not enough time for robotics</td>
<td>1</td>
<td>Adjust the program schedule</td>
<td>1</td>
</tr>
<tr>
<td>Doing fun stuff</td>
<td>2</td>
<td>Too much work</td>
<td>1</td>
<td>Let kids who want to move faster do so</td>
<td>1</td>
</tr>
<tr>
<td>Preparing for college and career</td>
<td>2</td>
<td>Work is too hard</td>
<td>1</td>
<td>Improve the project; go to EV4</td>
<td>2</td>
</tr>
<tr>
<td>Teaches persistence/determination</td>
<td>2</td>
<td>Not enough laptops</td>
<td>1</td>
<td>Provide more pieces for the robots</td>
<td>6</td>
</tr>
<tr>
<td>Don’t know</td>
<td>1</td>
<td>Project isn’t fun</td>
<td>1</td>
<td>Let kids take their robots home</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Don’t know</td>
<td>3</td>
<td>Don’t force kids to come when they don’t want to</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>None</td>
<td>12</td>
<td>Provide more tutorials, more hands-on</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Don’t know</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>None</td>
<td></td>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>
### Table 5: Summary of Staff Respondents’ Narrative Comments (N=14)

<table>
<thead>
<tr>
<th>Project Strengths</th>
<th>No.</th>
<th>Project Shortcomings</th>
<th>No.</th>
<th>Suggestions for Improvement</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students’ critical thinking skills</td>
<td>5</td>
<td>Absence of a complete coherent curriculum and lesson plans</td>
<td>5</td>
<td>Provide complete coherent curriculum and lesson plans</td>
<td>3</td>
</tr>
<tr>
<td>Students’ problem solving skills</td>
<td>1</td>
<td>Ineffective communication</td>
<td>3</td>
<td>Improve project organization and management</td>
<td>1</td>
</tr>
<tr>
<td>Students’ interpersonal skills</td>
<td>1</td>
<td>Lesson plans are overly stringent; lack of flexibility for student creativity</td>
<td>1</td>
<td>Improve student pacing; create pacing guide; set periodic instructional goals and objectives</td>
<td>5</td>
</tr>
<tr>
<td>Hands-on activities</td>
<td>1</td>
<td>Ineffective organizational management</td>
<td>2</td>
<td>Provide more hands-on activities</td>
<td>1</td>
</tr>
<tr>
<td>Teamwork</td>
<td>2</td>
<td>Insufficient professional development for teachers and teacher assistants</td>
<td>1</td>
<td>Provide field trips and/or featured speakers</td>
<td>1</td>
</tr>
<tr>
<td>Passionate, dedicated teachers and teacher assistants</td>
<td>1</td>
<td>Lack of teacher planning and preparation time</td>
<td>1</td>
<td>Increase the number of competitions</td>
<td>1</td>
</tr>
<tr>
<td>After-school activities that are fun and educational</td>
<td>2</td>
<td>Inadequate articulation between teachers and teacher assistants</td>
<td>1</td>
<td>Provide student incentives</td>
<td>1</td>
</tr>
<tr>
<td>Integration of math and science with fun activities</td>
<td>2</td>
<td>Insufficient number of laptop computers</td>
<td>1</td>
<td>Improve professional development for teachers and teacher assistants</td>
<td>2</td>
</tr>
<tr>
<td>Homework help</td>
<td>2</td>
<td>Insufficient number of robots and pieces for robots</td>
<td>1</td>
<td>Provide planning and preparation time for teachers</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Insufficient number of competitions and opportunities for student demonstrations</td>
<td>1</td>
<td>Accommodate students who are more “advanced’ than others</td>
<td>1</td>
</tr>
</tbody>
</table>

### Table 6: Summary of Parent Respondents’ Narrative Comments (N=51)

<table>
<thead>
<tr>
<th>Project Strengths</th>
<th>No.</th>
<th>Project Shortcomings</th>
<th>No.</th>
<th>Suggestions for Improvement</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great program</td>
<td>3</td>
<td>The programming</td>
<td>1</td>
<td>Continue the program in high school</td>
<td>1</td>
</tr>
<tr>
<td>Kids learning new things</td>
<td>5</td>
<td>Program too long each day</td>
<td>5</td>
<td>Shorten the time each day</td>
<td>3</td>
</tr>
<tr>
<td>Science and engineering focus</td>
<td>3</td>
<td>The competitions</td>
<td>1</td>
<td>Get more advanced technologies</td>
<td>5</td>
</tr>
<tr>
<td>Kids building/programming their own robots</td>
<td>9</td>
<td>Insufficient robots</td>
<td>2</td>
<td>More teacher assistants</td>
<td>1</td>
</tr>
<tr>
<td>Builds technical skills</td>
<td>1</td>
<td>None</td>
<td>7</td>
<td>More encouragement to attend each day</td>
<td>1</td>
</tr>
<tr>
<td>Team work</td>
<td>2</td>
<td>Don’t know</td>
<td>2</td>
<td>Great program</td>
<td>1</td>
</tr>
<tr>
<td>Technical support</td>
<td>1</td>
<td></td>
<td></td>
<td>Expand the program</td>
<td>3</td>
</tr>
<tr>
<td>Safe after-school environment</td>
<td>1</td>
<td></td>
<td></td>
<td>Field trips</td>
<td>1</td>
</tr>
<tr>
<td>Competition</td>
<td>1</td>
<td></td>
<td></td>
<td>Better snacks</td>
<td>1</td>
</tr>
<tr>
<td>Homework time and help</td>
<td>1</td>
<td></td>
<td></td>
<td>Have a Parents’ Day</td>
<td>1</td>
</tr>
<tr>
<td>Don’t know</td>
<td>4</td>
<td></td>
<td></td>
<td>Don’t know</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Don’t know</td>
<td>4</td>
</tr>
</tbody>
</table>
Student Responses

Significant Strengths and Benefits

- The benefit is having to do something new I never did before.
- The most benefits of the EV3 Robotics Project are that I am getting a full...
- I consider that the robotics project is an awesome, amazing, and a cool program for people to learn and create new stuff by using our imagination, and also the teachers are doing their best by helping and telling us that maybe we can get a scholarship to FIU.
- I consider to be among the most significant strengths by doing great and participating in everything.
- I consider that the benefit of the EV3 Robotics Project is to make the robots more harder to build so all the students can be challenging.
- I consider that the people in robotics are doing a good job by teaching us how to work on robots.
- The strength of this robotics program is that we get to learn how to use robots and compete against other schools.
- Yes, because the EV3 program teaches us how doing things on your own makes certain things easier to do alone
- I would like to be an artist (architecture).
- The good thing I like about the EV3 robotics program is that we are able to challenge ourselves by making different robots and programming them to work and follow the track and the black line, and also what I like about the EV3 robotics program is that it gives us a opportunity to do our homework and gives other kids the opportunity to go to tutoring. The thing I don't like is when we have to stay until 5:30 on Wednesdays. That is come it be the significant strength because is could it be fan the program.
- I consider that problem solving and critical thinking to be the most significant benefits in the EV3 robotics project.
- My most significant strength is building, because I can use my own mind to do it.
- My strength is building things to help in the world, like robots and other things in life
- I don't know
- The most significant strengths or benefits of the EV3 Robotics Project is having hope that you can build and program your own robot.
- The programming
- I think the Robotics program is a great place to be.
- Well, it is very cool, but I hate that they force us to come to the after-school program.
- More people for EV3.
- Since the Robotics Program deals with a lot of technology, that is a great benefit for me since everything in the world deals with machines.
- When you program challenges your brain.
- Building the robot
- The thing I consider to be the most significant strength or benefit of the EV3 robotics project is when we program the robot and have competition.
- I consider how they help us know these new programs, and we are experiencing new activities.
The strength of the EV3 Robotics Project is a good program.
The best benefit I believe is that it creates an opportunity to learn much more about being a team and learning a lot more about the world around you. It creates a great opportunity to realize how to program and use the computer much more.
Well I think that robotics is a good engineering program that helps me learn new things that I have never learned before. Robotics teaches me about programming and how to build and fix. Even though I get mad and frustrated sometimes, I figure my out and that helps me learn even more.
I consider I try to learn more things in programming & building the robot.
Being able to be a part of a team where I can learn more about the EV3 robotics
Well, the most significant event in robotics that I learned is how to make my robot follow the black line. It helps me to learn even more programs, so later on when I have to program it myself, then I will know what to do myself.
It teaches you how to program.
I'm a good student in robotics, and I like it, but my grandma don't want me to be successful in life.
I am learning all about robotics. I am learning to program the robot and get the wheel to move.
The programming in the EV3.
I like when the teachers help you. They work with you and I like when you got helped by teachers they stay with you everything you need you go it.
In the future I might get a great job.
The most significant strength I know is programming the robot to do what it’s made for.
The programming.
Gives scholarship.
Deze nuts
Fun and good to do it.
College.
Building robots
The most significant strengths or benefits of the program are the challenges that the teachers or teachers assistants give us to stimulate our brains.
Learning how to use the brick and computer to program the robot. And to complete tasks.
The strength of this program is helping with getting homework done.
its good and helps you with technical skills.
The fact that we get to work hands-on with the robots, and learn how to program them while still being in a friendly environment. The teachers and the TA's all seen passionate about what they are doing and genuinely care about our well being.
The strength or benefit of the EV3 Robotics Project is nothing because i don’t give two sh*ts.
Technical and robot programming.
You learn math.
It can help us strengthen and deepen our connection to technology.
Friendship :)
The mazes and tracks we do.
The EV3 Robotics Program teaches me a lot about programming robots and how technology works.
- It helps me program and build.
- It is a great program because it has a lot of stuff to do with Legos and technology.

**Shortcomings or Difficulties**
- A shortcoming is the lack of pieces. We should have pieces that are more advanced
- Good, but I don't think it would be a hard but challenging course.
- I see no shortcomings or weaknesses.
- Programming is one of my weaknesses.
- The shortcomings or weaknesses of the EV3 program are trying to do certain things alone. When I try to do things by myself, it’s because I think it’s easy.
- The weakness are that we do homework and come in on Wednesdays.
- Robotics do not have any weakness yet.
- The weakness of the EV3 Program is that the kids are not taking it seriously because they say that they don't know how to do it and their coach's come and help them. Also, some kids are trying to skip robotics because they say that it's boring, and they come because their friends/cousins say they don't want to come or they say that they quit and lots of them don't show up. Plus, some of them only come for the snacks.
- I consider to be among the major shortcoming it really a great program
- The EV3 Robotics Project has no shortcomings.
- I consider that the robotics project is not a weakness. I like the time it starts and the time it ends.
- I improve to do the light center.
- When I don't know how to do new things, but I'm going to keep trying and I'm going to practice my writing.
- The weaknesses are how they don't teach us hard programming.
- Well, the most significant weakness in the program was how to make the robot go in different directions, which was very, very, very easy.
- The lack of other kind of pieces to make more of a variety of robots.
- I am not sure at this time.
- Robotics is a good program, I am having fun and building robots, but I am losing interest because some of the teachers try to force us to come when we the students do not want to come, and also teachers try to take away the fun from robotics by calling parents, and telling them that where playing too much. We can play and at the same time get what we have to get done, I mean after all it is afterschool.
- The major shortcoming is how we are able to be brought up and introduced to new technology
- Programming.
- I consider that it's becoming kind of boring and that's making the students slack off.
- The thing I like is when we program the robot, and there is nothing that I don’t like about this program.
- How to program the robot.
- Programming the robot.
- When I build from my ideas.
- I think the Robotics Program should improve the kits, so that the students can build better and bigger robots. This will be exciting.
• Less people in the EV3.
• Making it cancel.
• I think that there is no weakness in the EV# Robotics Program.
• The robot can break easily.
• The major shortcoming or weakness of the EV3 Robotics Project is that we don’t get enough time to build and program the robots.
• I don't know
• I have no weakness. All it takes is hard work and thinking out what you going to build.
• My major shortcoming is programming because some time I just forget and I get mad, and sometimes Mr. Christopher does not want to help me. I know he can't spoon feed me he say no
• I think the major outcome in the program is that the program teaches determination. It helps us not give up when things don't go right.
• Shortcomings because is come it be to tree to fourth middle.
• I would be considered a helper to help the kids
• That it is boring, and I don't like to come.
• The weakness of the robotics program is nothing.
• I would consider being a helper to help the kids.
• That it is boring and I don't like to come
• None that I think so.
• The weakness that I need to improve on is understanding the steps to program the robot.
• Nothing.
• I don’t know.
• The TA's nuts
• Nothing.
• Less work and challenges.
• Teaching us
• The major shortcoming or weakness of the program is that other students do not come or do not do their work and participate in the program.
• Trying to accomplish very hard missions
• This weakness is like there ain’t enough kids. A whole bunch of kids think it’s boring, and half my friends quit.
• Good.
• Sometimes, not all of the smaller groups can use laptops to be able to use the EV3 software in which there are multiple features, which are needed in order to complete our tasks.
• The weaknesses of the EV3 Robotics Project is that they don't add any fun or stuff that us kids could relate to in anything.
• Robot programming.
• Really nothing to me.
• Snacks :( need more snacks!!
• When the robot doesn't follow my program correctly.
• The amount of kids and how they all need to focus on their work.
• I don't consider anything.
• That they should let us use more amagnantion (imagination).
Suggestions for Improvement

• No homework for the first hour, so we can work with more advanced robots.
• Spend more time on code.com
• No suggestions
• A suggestion I would like to make is not having to do any homework in the program because homework is for home
• Remove the bad kid from the program so the rest us can learn.
• I think we shouldn't do homework during the program, more snacks, and field trips to FIU.
• I would like to improve some more programming to keep us busy.
• The EV3 Robotics Program can be better if they just make it little more challenging for the students, and if some of them want to quit, find new people and see they are interested in the FIU EV3 Robotics Program.
• The EV3 Robotics Project does not need any improvement.
• I would like to change the way the kids behave, and the teacher should let us have a little bit of fun and also let us make our own robot instead of having a partner.
• I like robotics because they can help you to get better.
• A recommendations or suggestion I would like to make to improve the EV3 Robotics Project and make it better is how to program the robot to follow the black line and to make the program better is if our Robotics teacher would make program way better and more fun.
• That the whole class should be quickly work on the robotics and how they be so playing with there friends and li don’t work with them.
• The EV3 Robotics Program should teach us hard programming.
• The suggestions I would like to add to the robotics program is that everybody should have their own laptops because students in the classroom move at a different pace and it is slowing some students down (I move at a very fast pace in the class). So, I would recommend that every student in robotics should have their own laptops.
• Nothing needs to be changed it good the way it is.
• They need to be more fun more participation and they need to give more food.
• I would like us to have parties and robot fights.
• The recommendations that I suggest is that Mondays-Thursdays the time schedule should be 2:10 till 4:10 and on Fridays the time schedule should be 2:45 till 5:45.
• My answer to this question is could it be fan the program.
• I would recommend that the program be a little more interesting. Also, instead of waiting for other students to catch up to the students who are ahead, let the students who are ahead move on without being stopped.
• I have one suggestion that teacher should ____us little more an could I go to 8th grade.
• The thing I would like to improve is nothing it is perfect how it is.
• I think we should build real robots out of real ____.
• The suggestion that I would like to make is that we should have extra parts for the robots.
• Have better food.
• I want to have the robot that we made and build better robots.
• More people to sign up for EV3
• We should just improve the kits, so that we can build bigger robots.
• Nothing.
• I would like to listen carefully to the TA carefully while they teach us the basics of robots.
• Learning how to program
• I would like for kids to pay attention when the teacher is showing something about the robot.
• We need to do more and new things, but other than these nothing else.
• We should be able to not have partners so then will be able to take it home with us and probably keep it
• No recommendations; the program is great.
• I would like to recommend that the robotics teachers and assistants stop trying to force us to come and stop calling parents, sometimes they should let us have fun. I understand they have rules, but please bring it down a notch.
• I am not sure.
• Make them stop forcing us to come and make have fun like they said.
• They are perfect!!!!
• What the EV3 Robotics project need to improve is nothing. Its just perfect as it is.
• Great the way it is.
• More tutorials, more hands-on examples when a TA is teaching.
• The food
• Yes
• Let us take the robots home.
• To learn more
• I recommend that we should have more pieces that we can use to make our robots more spectacular.
• I would like to improve my programming skills to finish tasks faster than usual.
• It needs work on the matter of fun sometimes I fall asleep. It needs to be more fun and exciting.
• It’s fun and educational
• I would say to get more laptops but, other than that, I think the program is fine the way it is.
• My recommendation or suggestion for this program is to become more modern and up-to-date with this program.
• The teachings and the instructors.
• Nothing.
• It needs more snacks, and more members, and better laptops.
• Other boxes than just the Rally Rover.
• Meet other kids that are in the same program.
• For the program to more kids, to go on more field trips, and to upgrade to EV4 maybe?
• More pieces.

Staff Responses

Significant Strengths and Benefits
• Since the induction of the EV3 Robotics Project, the most significant strengths are the students capability of using critical thinking skills to program the robots and figure out next steps when faced with a stumbling block.
• Teaches children problem solving skills as well as interpersonal skills among peers and authority as their interest in STEM topics increase; therefore creating the future of STEM
career individuals starting at an early age through the innovative project-based learning structure.

- It enables the students’ critical thinking skills Allows the student to explore. Provides a lot of hands-on activities.
- Allowing the students to think critically on their own as to how to better program robots and working together as a team.
- Allows the students to collaborate to work as one.
- The program allows students to participate in after school program that is both fun and educational.
- Passionate teachers and assistants that want to do well to make the project succeed.
- Students in this program do not realize that they are actually using math and science in the tasks they are doing. This makes it more fun when the teachers get them to make the connection.
- I think it is great the students are able to have homework help for a short time before beginning to work with the robots.
- The students can apply science and math concepts.
- The homework portion at the beginning as well as the problem solving scenarios presented to the students.
- The abilities of the students to think creatively and critically. The abilities of students to get extra-curricular experience with computers, robots, and the software.

Shortcomings or Difficulties

- As with any program, a set curriculum should be in place so that the students can progress effectively and get a clear understanding of the objectives and goals of the program.
- Communication! Things happen and teachers have no idea. Out input is not solicited.
- The strict guidelines of the newly implemented lesson plans. Students should be able to still do what is needed in the lesson plans without having to strictly adhere to them on a daily basis; meaning they should learn these topics at their own pace and freedom to truly complement the project based leaning aspect of the program.
- No specific curriculum that is mapped out from week to week that is integrating with the state-mandated standards No teacher input about decisions being made at the school about the program. No organization between dismissal time from day school and starting time of the program at the school Too many bosses.
- No lesson plans as to what the students are going to learn that day or week.
- The repetitiveness of the program and the students do not have any objective or goal to work at.
- There should be daily objectives.
- Lack of professional development and lack of time to plan lessons and curriculum.
- One of the weakest areas of concern is for the Teacher Assistants to be on the same page.
- More computers and more robots.
- More competitions and more actual demonstrations and walk throughs as to what the students are expected to do.
- Lack of organization and communication. Lack of students that are intrinsically motivated.
**Suggestions for Improvement**

- Providing the staff with a plan of action and a curriculum that can be used as a guide to move effectively through the program.
- Everyone should be on the same page. I feel like there are too many people that want to be the boss.
- Change the way the lesson plans are implemented in the program; meaning let students learn such skills at their own pace through project-based learning.
- A curriculum that allows the students' interest to be maintained in the program. A variety of robotic activities to the students. Not prolonging the same activities day by day until every class catches up with another class.
- Lesson plans; more instructions and then allow hands-on experiences
- Set weekly or bi-weekly goals; provide field trips or bring in other individuals that are doing the same thing we are doing and let them know where this could lead to
- There should be daily objectives, weekly competitions, and incentives. Teachers need access to the software and should be allowed to build a basic robot before students are allowed to do so.
- Hold frequent professional development for teachers and assistants. Also schedule frequent time for teachers and assistants to plan when students are not present.
- Using a pacing guide that would highlight the entire year curriculum would help creating weekly or monthly plan or tasks for the students to do. This will help both the teachers and the students.
- I think it would be great to have more projects for the students to complete. We have some students who can complete 10 different assignments within a day or 2. We need additional projects or challenges for the students to accomplish once they have completed the goals for the week.
- I suggest more variety of robots.
- A gradual release model for each task.
- Make robotics more structured to ensure that all students are understanding before moving on.

**Parent Responses**

**Significant Strengths and Benefits**

- The best place ever.
- That she is learning.
- Don’t know.
- I have no idea.
- I don’t know because I rally don’t know much about the program.
- Learning science and engineering.
- It will be very helpful for all ages to experience something different.
- When the children have to build their own robots without instructions.
- It gives students opportunities to increase their technical skills, which keeps up with the dramatic changes starting to develop. Technology is changing constantly.
- The most significant strengths of the EV3 Robotics Program is to try something new.
I would like to be like my Robotics instructor, Mr. ____, because I could help other children become something special in life.

I consider the most significant strengths [to be] teaching the kids how to build robots and do great things like programming.

Kids learning to engineer and program their own robots, which can be useful in the future.

(unnecessary) to consider when constructing your robot for the strength of light that enters the window from the environment.

The two major difficulties standing in the way of such an interface and (unnecessary) at this stage it strictly a do-it-yourself project for the sophisticated hobbyist.

The programs and buildings.

The project engages a student teaching students initiative.

Learning science engineering.

Teaching the kids about technology through electronics; hands-on learning socializes in a positive, productive way.

My child learns many things during the program.

I would not know.

One of your strengths is your teaching our children to program robots and build them even it is out of Legos.

Learning how to use technology in educational use.

The participation in a group, team work, the technical support, the entire safe environment, and mostly competition between different groups in class.

The programming.

Jeremiah has never been more excited to go to school be will be with you guys in the afternoon. He wants to be a robotics engineer, and this program helps so much with encouraging him.

Letting the kids being able to do their homework and getting tutoring from the assistants.

The fact that my son learns to build and program robots.

I think you guys really go in-depth into teaching this kids how to program.

Shortcomings or Difficulties

The programming.

Don’t know,

That they have to go every day.

How long it takes.

When my child go to a real competition and they go against other schools.

Nothing; cause I love robotics for my child. I want it to make my child have a good career.

The hours (evenings).

The robots and technology here at true robots.

My child loves the program; he says he loves everything about it.

How long it takes.

None at the moment.

More and smart engineers.

The fairness.

Don’t know.
• The only robot is one thing that is needed to work on because the students should have different robots of the choosing.
• Supply limitation.
• Nothing.
• None; you guys are awesome!!
• None.
• Nothing.
• Time consuming.

Suggestions for Improvement
• Her to continue in high school and college
• Don’t know.
• They should go twice a week.
• More advanced technology.
• Nothing; everything is good.
• Improve the hours and/or have less hours.
• I would recommend more TA for the EV3 Robotics Program.
• I recommend my child to go to the program every day and stay focus in the program.
• Accessible for introductory programming project or the newly released Lego Mindstorm EV3 robot platform and its applicability.
• I would like to upgrade the robot and pieces of robots.
• The expansion of materials to move robots bigger.
• More advanced technology.
• Keep the program at my child’s school; engage in putting program in other schools as well.
• Continue with the program to enroll more students.
• More respect from staff.
• Nothing. My son loves it, and from what he has been telling me; it’s great, perfect.
• Bigger or more technical robots.
• Field trips to different automatic factories, industries, and some light practical classes on the FIU campus.
• Great as it is.
• To feed the kids more.
• The EV3 Robotics Expansion Set.
• Have a Parents Day that we can see exactly what the kids are doing.
APPENDIX B

Student Survey - Edison Park K-8 Center (N=44)

<table>
<thead>
<tr>
<th></th>
<th>Excellent (1)</th>
<th>Good (2)</th>
<th>Needs Some Improvement (3)</th>
<th>Needs a lot of Improvement (4)</th>
<th>Don’t Know, Can’t Judge, Too Soon to Tell (5)</th>
<th>Mean Rating</th>
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<tbody>
<tr>
<td>knowledge of the goals and objectives of the project</td>
<td>40%</td>
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<tr>
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<tr>
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<td>11%</td>
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<td>12%</td>
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<td>1.93</td>
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</table>

Of the 44 respondents from Edison park K-8 Center, 52% were sixth graders, 30% were seventh graders, 14% were eighth graders, and 5% reported that they were in some other grade.

Students were also asked two questions about what they perceived to be in their futures. To the first question, slightly more than one quarter of the students (27%) reported that they definitely intended to enroll in STEM-related courses in high school; 34% reported that they thought they would enroll in STEM-related courses in high school; 34% reported that they didn’t know or weren’t sure whether they would enroll in STEM related courses in high school; and 5% reported that they definitely would not enroll in STEM-related courses in high school.

To the second question, one third of the students (33%) reported that they definitely intended to enroll in STEM-related courses in college; 28% reported that they thought they would enroll in STEM-related courses in college; 30% reported that they didn’t know or weren’t sure whether they would enroll in STEM related courses in college; and 10% reported that they definitely would not enroll in STEM-related courses in college.
Student Survey – North Miami Middle School (N=22)

<table>
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<th>Don’t Know, Can’t Judge, Too Soon to Tell (5)</th>
<th>Mean Rating</th>
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<td>knowledge of the goals and objectives of the project</td>
<td>52%</td>
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<td>5%</td>
<td>2.10</td>
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<tr>
<td>technical (i.e., STEM) skills</td>
<td>29%</td>
<td>52%</td>
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<td>10%</td>
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<td>problem solving skills</td>
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<td>1.86</td>
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<td>social and interpersonal behaviors</td>
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<tr>
<td>rate of homework completion</td>
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<td>43%</td>
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Of the 44 respondents from North Miami Middle School, 38% were sixth graders, 52% were seventh graders, 5% were eighth graders, and 5% reported that they were in some other grade.

Students were also asked two questions about what they perceived to be in their futures. To the first question, more than one third of the students (38%) reported that they definitely intended to enroll in STEM-related courses in high school; 33% reported that they thought they would enroll in STEM-related courses in high school; 14% reported that they didn’t know or weren’t sure whether they would enroll in STEM related courses in high school; and 14% reported that they definitely would not enroll in STEM-related courses in high school.

To the second question, more than two thirds of the students (40%) reported that they definitely intended to enroll in STEM-related courses in college; 20% reported that they thought they would enroll in STEM-related courses in college; 25% reported that they didn’t know or weren’t sure whether they would enroll in STEM related courses in college; and 15% reported that they definitely would not enroll in STEM-related courses in college.
<table>
<thead>
<tr>
<th></th>
<th>Excellent (1)</th>
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<th>Needs Some Improvement (3)</th>
<th>Needs a Lot of Improvement (4)</th>
<th>Don’t Know, Can’t Judge, Too Soon to Tell (5)</th>
<th>Mean Rating</th>
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### Staff Survey - North Miami Middle School (N=8)

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<tr>
<td>students’ social/interpersonal behaviors</td>
<td>25%</td>
<td>75%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>1.75</td>
</tr>
<tr>
<td>students’ disciplinary behaviors</td>
<td>13%</td>
<td>75%</td>
<td>13%</td>
<td>0%</td>
<td>0%</td>
<td>2.00</td>
</tr>
<tr>
<td>students’ critical thinking skills</td>
<td>0%</td>
<td>75%</td>
<td>13%</td>
<td>0%</td>
<td>13%</td>
<td>2.50</td>
</tr>
<tr>
<td>Students’ problem solving skills</td>
<td>0%</td>
<td>63%</td>
<td>37%</td>
<td>0%</td>
<td>0%</td>
<td>2.38</td>
</tr>
<tr>
<td>students’ attitudes toward school</td>
<td>25%</td>
<td>75%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>1.75</td>
</tr>
<tr>
<td>students’ rate of homework completion</td>
<td>13%</td>
<td>63%</td>
<td>13%</td>
<td>0%</td>
<td>13%</td>
<td>2.50</td>
</tr>
<tr>
<td>students’ class participation</td>
<td>25%</td>
<td>63%</td>
<td>13%</td>
<td>0%</td>
<td>0%</td>
<td>1.88</td>
</tr>
<tr>
<td>participation in STEM-related in-school activities</td>
<td>13%</td>
<td>50%</td>
<td>25%</td>
<td>0%</td>
<td>13%</td>
<td>2.50</td>
</tr>
<tr>
<td>participation in STEM-related extracurricular activities</td>
<td>13%</td>
<td>50%</td>
<td>37%</td>
<td>0%</td>
<td>0%</td>
<td>2.25</td>
</tr>
<tr>
<td>students’ interest in STEM-related careers</td>
<td>`13%</td>
<td>50%</td>
<td>13%</td>
<td>0%</td>
<td>25%</td>
<td>2.75</td>
</tr>
</tbody>
</table>
Parents were also asked to indicate their perceptions of the extent to which their children might enroll in STEM-related courses in high school and college. Regarding the extent to which they believed that their children would enroll in high school STEM-related courses, 35% of the parent respondents reported that they thought their children definitely would enroll, 28% reported that they thought their children might enroll, and 38% reported that they didn’t know or weren’t sure if their children would enroll in STEM-related courses in high school. Regarding the extent to which they believed that their children would enroll in STEM-related programs (i.e., major or minor) in college, 35% of the parent respondents reported that they thought their children definitely would enroll, 31% reported that they thought their children might enroll, and 35% reported that they didn’t know or weren’t sure if their children would enroll in STEM-related programs in college.

Finally, parents were also asked to self-assess their own technology knowledge and skills. Regarding their own knowledge of the 21st Century Robotics Project goals and objectives, they responded as follows: excellent (17%), good (35%), fair (10%), poor (7%), and don’t know, can’t judge or too soon to tell (31%). In addition, their assessments of their own technical and computer skills were as follows: excellent (28%), good (45%), fair (14%), poor (3%), and don’t know, can’t judge or too soon to tell (10%).
### Parent Survey– North Miami Middle School (N=17)

<table>
<thead>
<tr>
<th>Category</th>
<th>Excellent (1)</th>
<th>Good (2)</th>
<th>Fair (3)</th>
<th>Poor (4)</th>
<th>Don’t Know, Can’t Judge, Too Soon to Tell (5)</th>
<th>Mean Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>child’s knowledge of the goals and objectives of the project</td>
<td>65%</td>
<td>24%</td>
<td>12%</td>
<td>0%</td>
<td>0%</td>
<td>1.47</td>
</tr>
<tr>
<td>child’s reading skills</td>
<td>71%</td>
<td>29%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>1.29</td>
</tr>
<tr>
<td>child’s math skills</td>
<td>56%</td>
<td>31%</td>
<td>13%</td>
<td>0%</td>
<td>0%</td>
<td>1.56</td>
</tr>
<tr>
<td>child’s technical (i.e., STEM) skills</td>
<td>53%</td>
<td>41%</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>1.53</td>
</tr>
<tr>
<td>child’s writing skills</td>
<td>44%</td>
<td>50%</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>1.63</td>
</tr>
<tr>
<td>child’s critical thinking</td>
<td>47%</td>
<td>41%</td>
<td>6%</td>
<td>6%</td>
<td>0%</td>
<td>1.71</td>
</tr>
<tr>
<td>child’s problem solving skills</td>
<td>77%</td>
<td>18%</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>1.29</td>
</tr>
<tr>
<td>child’s social and interpersonal skills/behaviors</td>
<td>71%</td>
<td>18%</td>
<td>12%</td>
<td>0%</td>
<td>0%</td>
<td>1.41</td>
</tr>
<tr>
<td>child’s personal disciplinary behaviors</td>
<td>71%</td>
<td>24%</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>1.35</td>
</tr>
<tr>
<td>child’s attitudes toward school</td>
<td>53%</td>
<td>35%</td>
<td>12%</td>
<td>0%</td>
<td>0%</td>
<td>1.59</td>
</tr>
<tr>
<td>child’s participation in class</td>
<td>69%</td>
<td>25%</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>1.38</td>
</tr>
<tr>
<td>child’s rate of homework completion</td>
<td>44%</td>
<td>50%</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>1.63</td>
</tr>
<tr>
<td>child’s participation in STEM-related activities in school</td>
<td>65%</td>
<td>18%</td>
<td>6%</td>
<td>0%</td>
<td>12%</td>
<td>1.76</td>
</tr>
<tr>
<td>child’s interest in extracurricular STEM-related activities</td>
<td>53%</td>
<td>29%</td>
<td>12%</td>
<td>0%</td>
<td>6%</td>
<td>1.76</td>
</tr>
<tr>
<td>child’s interest in STEM-related careers</td>
<td>47%</td>
<td>24%</td>
<td>12%</td>
<td>0%</td>
<td>18%</td>
<td>2.18</td>
</tr>
</tbody>
</table>

Mean ratings are predicated on a scale in which 1=Excellent and 5= Don’t know, Can’t Judge, Too Soon to Tell.

Parents were also asked to indicate their perceptions of the extent to which their children might enroll in STEM-related courses in high school and college. Regarding the extent to which they believed that their children would enroll in high school STEM-related courses, 20% of the parent respondents reported that they thought their children definitely would enroll, 53% reported that they thought their children might enroll, 13% reported that they didn’t know or weren’t sure, and 13% reported that they believed that their children definitely would not enroll in high school. Regarding the extent to which they believed that their children would enroll in STEM-related programs (i.e., major or minor) in college, 20% of the parent respondents reported that they thought their children definitely would enroll, 27% reported that they thought their children might enroll, 40% reported that they didn’t know or weren’t sure, and 13% reported that they believed that their children definitely would not enroll in STEM-related programs in college.

Finally, parents were also asked to self-assess their own technology knowledge and skills. Regarding their own knowledge of the 21st Century Robotics Project goals and objectives, they responded as follows: excellent (13%), good (60%), fair (20%), poor (0%), and don’t know, can’t judge or too soon to tell (7%). In addition, the assessments of their own technical and computer skills were as
follows: excellent (27%), good (53%), fair (20%), poor (0%), and don’t know, can’t judge or too soon to tell (0%).