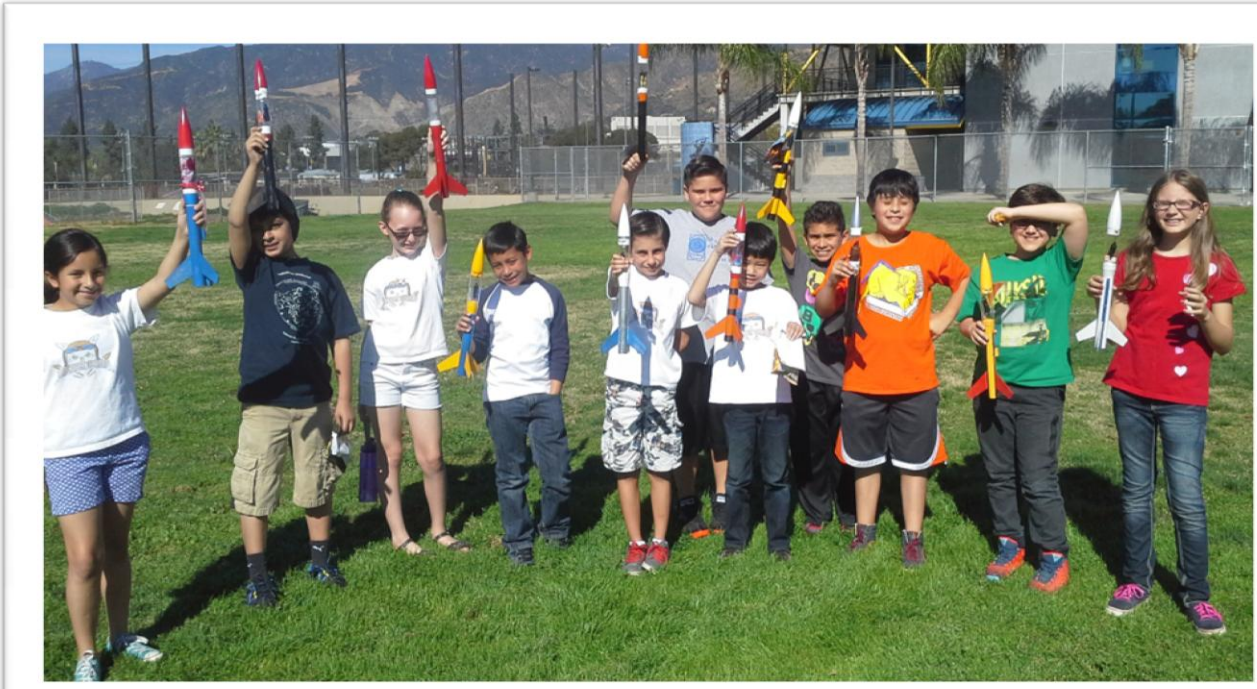
Junior Rocket Owls

Academic Year: 2014 - 2015



Program Evaluation

Performed by:

Lucia Riderer, Ed.D.

July 13, 2015

TABLE OF CONTENTS

Executive Summary

A program evaluation was conducted to assess the implementation of the Junior Rocket Owls program at Citrus College. The Junior Rocket Owls program is a year-long outreach program designed and facilitated by Citrus College physics faculty and students for 5th grade students enrolled in the Glendora Unified School District. This program was piloted with participating students from La Fetra Elementary School during the 2014-2015 academic year. Out of the 14 students who enrolled in the program initially, 11 completed the program successfully. The program's main goals were to increase young students' interest in math, science and technology, enhance their teamwork and communication skills and provide them with new knowledge of math and science rocketry-related concepts. The evaluation model used to assess the Junior Rocket Owls program was a Context, Input, Process, and Product Program Evaluation model that addressed the following evaluative aspects: concerns addressed by the program; what strategies were implemented and why; which resources were utilized; and whether participation resulted in gaining skills that could help partakers in their future academic endeavors and careers. Quantitative and qualitative data was collected via surveys and interviews, and analyzed to determine the impact that participation in the program had on the participants. The findings showed that in general the program was implemented successfully. Participating students reported an increased interest in science and technology, along with enhanced teamwork skills and gain of new math and science knowledge. Areas of concern include program sustainability due to uncertain funding and parent commitment to ensure sustained and timely participation of the children in the program activities, along with managing occasional disruptive behavior of participating 5th grade students.

Introduction

Program evaluation is an essential tool in the field of educational improvement (Roybal, 2011). In order for a program evaluation to be effective, it must accomplish two significant things: substantiate progress made and identify areas for sustained improvement (Jason, 2008). One evaluation model identified by Stufflebeam, Madaus, and Kellaghan (2000) to be effective in an educational environment is the improvement and accountability model intended to be able to prove a program's merit based on assessing the needs of the stakeholders as well as the outcome indicators. This type of evaluation is a summative assessment designed to determine the overall quality of a program and measure the program's performance in terms of its outcomes (Scriven, 1991; Bamberger, Rugh, & Mabry, 2012)

This narrative is the report of the summative evaluation based on an improvement and accountability approach of the Junior Rocket Owls Program at Citrus College.

Evaluation Model

Stufflebeam's (2003) Context, Input, Process, and Product (CIPP) Program Evaluation model was used to design the summative evaluation of the Junior Rocket Owls Program. This model is a well-established and widely used approach in evaluating educational programs (Guerra-Lopez, 2008; Roybal, 2011). The evaluator analyzed the Context, Input and Process components of the program to address the following aspects: concerns addressed by the program; what strategies were implemented and why; which resources were utilized; who were the participants. The Product component of the program was analyzed to determine whether program participation resulted in gaining skills that could help partakers in their future academic endeavors and careers.

Context

The main objective of the Context component of the CIPP model is to focus on the issues that the program is addressing. In this evaluation, the following question was addressed to help determine the Context:

> *What was the change in the level of students' interest in science, technology and mathematics as a result of participation in the Junior Rocket Owls program?*

Data Collection and Findings

The data collected to answer the above question was comprised of answers provided by the participants to Likert-scaled survey titled "Attitudes towards math, science and technology" administered to participating students electronically before and after participating in the program. The data collected is presented in Appendix A.

In summary, the results indicated the following, as a result of participation in the program:

- an increase of students' interest in science and technology
- an increase in the percentage of students reporting that science and technology are fun
- an increase in the percentage of students who are interested to take a physics course in High School

In addition to the above enhancements, the survey data also showed that students' interest in mathematics has not been enhanced by participating in the Junior Rocket Owls program.

Input

The Input component of the CIPP evaluation model involves an examination of the program's activities along with the resources utilized in the development of those activities. The guiding evaluation questions for the Input component of the program were:

1. *What were the strategies used for program implementation and why?*
2. *What resources were employed in the development and implementation of the Junior Rocket Owls program?*

Data Collection and Findings

In order to answer the first Input question, the evaluator collected data containing information related to the program's activities. The data collected revealed the information shown in Table 1 below.

Table 1

Program Strategies

Strategy	Value
Hands-on rocketry projects	Increase students' interest in and practical knowledge of science and enhance their teamwork skills and self-efficacy.
Interactive presentations on rocketry topics	Increase students' awareness and theoretical knowledge of rocketry-related topics and help them understand the importance to pursue a career in STEM.

The data collected to address the second Input question, is shown in Table 2 below.

Table 2

Program Resources

Resource	Description
Citrus College facilities	Physics and Computer labs
Materials and supplies	Innovation grant awarded to Dr. Riderer by the Citrus College Foundation along with funds received from anonymous donor.
Citrus College staff and number of contribution hours	Citrus Physics faculty (Dr. Riderer, 60 hours) Clerical, IT, and Campus Safety Citrus College staff (6 hours)
Citrus College Students and number of contribution hours per student	Citrus Rocket Owls team members (5 students; 60 hours per student)

Process

The Process component of the CIPP evaluation is an "ongoing check on a plan's implementation plus documentation of the process, including changes in the plan as well as key omissions and/or poor execution of certain procedures" (Stufflebeam, 2000, p. 294). The evaluator designed this evaluation component to examine whether the implementation process of the Junior Rocket Owls program was executed with fidelity. The following question related to Process was addressed:

What were the factors affecting the implementation of the program's strategies?

Data Collection and Results

The qualitative data collected via interviews with the participants' parents and the college students who facilitated the Junior Rocket Owls meetings to address the Process question disclosed the following factors that had a positive impact on the successful implementation of the program's strategies:

- adequate resources, including facilities and monetary funds
- young students' and their parents' willingness to partake in the experience
- college students' and faculty's enthusiasm and commitment to provide a positive experience for the 5th graders

In addition, the data collected also revealed the following factors that had a negative impact on the successful implementation of the program:

- too long duration of meetings
- disruptive behavior of some participating students (i.e. excessive talking during presentations, refusing to participate, not paying attention, etc.)
- some parents' failure to ensure their child's participation in all sessions

- some parents' failure to ensure that their child comes prepared to the monthly meetings (i.e. did his/her homework, has brought all necessary supplies, etc.)

All interviewees believed that, overall, the program was implemented successfully. However, they expressed concerns related to the program sustainability. The main themes that emerged regarding program sustainability were the uncertainty of future funding along with the commitment of participating students' parents to ensure that their children participate in all activities of future programs and come to Citrus College prepared for the monthly activities.

Product

The Product part of the Junior Rocket Owls program's evaluation was designed to allow the evaluator to collect data in order to determine the effectiveness of the program in terms of meeting the needs of the participants. This aspect of the evaluation was intended to "focus on assessing program results, based on participant learning" (McNeil, 2011, p.24) by addressing the main question: "Has this program made a difference?" (The Evaluation Forum, 2002, p. 9)

More specifically, the questions asked were:

1. *What skills and knowledge did participants gain from partaking in the program?*
2. *How did the students who participated in the program feel about their experience?*

Data Collection and Results

In order to answer the above question, participants completed a pre-, post- program participation Likert-scaled online survey centered on team work, and participated in structured interviews focused on what they learned and their experience in the program.

The quantitative data collected using the online survey is presented in Appendix B. In summary, this data showed a significant increase in students' team work skills with respect to

participating in their group's successful completion of tasks by: (1) offering information and opinions; (2) giving positive feedback, and (3) trying to help solve problems.

The qualitative data collected via in person interviews with the participating students indicated that most of the students have had a very good experience while participating in the program, and learning about the physics and mathematics of rocketry. Some of the interviewed students also indicated that they believe that participation in the Junior Rocket Owls program will help them be more successful in middle school and high school.

Summary and Recommendations

The CIPP evaluation model allowed a summative evaluation to be conducted on the Junior Rocket Owls program at Citrus College, using the Context, Input, Process and Product components. In order to answer each component's key questions, data was gathered using both qualitative and quantitative techniques. The qualitative data was examined for overarching themes, while the quantitative data was analyzed using descriptive statistics. Although most of the data collected were indicative of a successful program, implemented effectively, some of the data indicates areas of concern. The concerns along with the evaluator's recommendations on how to address them are shown in Table 3, below.

Table 3

Concerns and Recommendations

Concern	Recommendation
Lack of funding	Consider private funding
Duration of monthly sessions	Shorten the monthly sessions from 5 to 4 hours
Disruptive student behavior	Create and enforce behavior norms
Lack of commitment from parents	Interview all parents before accepting their children in the program
Deficient increase in student interest in mathematics	Redesign math activities to be more attractive and student friendly

Conclusion

It is difficult to create a sustained outreach program for elementary school students at a community college for a variety of reasons, including the lack of resources. However, the findings outlined in this evaluation narrative prove that Citrus College is ready for such a program. The implementation of the Junior Rocket Owls program has forced the college's faculty and students to proactively and collaboratively seek ways to continually learn how to generate opportunities to use their knowledge and enthusiasm to create a potent science, technology, engineering, and math (STEM) culture in the Glendora community.

References

Bamberger, M., Rugh, J., & Mabry, L. (2012). Real World evaluation: Working under budget, time, data, and political constraints. Thousand Oaks, CA: Sage.

Evaluation Forum (2002). *Outcomes For Success*! Seattle,WA: Organizational Research Services, Inc. and Clegg & Associates, Inc.

Guerra-Lopez, I.J. (2008). *Performance Evaluation: Proven Approaches for Improving Program and Organizational Performance.* San Francisco: Jossey-Bass.

Jason, M.H. (2008). *Evaluation programs to increase student achievement* (2nd ed.). Thousand Oaks, CA: Corwin Press.

McNeil, R. (2011). A Program Evaluation Model: Using Bloom's Taxonomy to Identify Outcome Indicators in Outcomes- Based Program Evaluations. *MPAEA Journal Of Adult Education*, *40*(2), 24-29.

Roybal, V. M. (2011). *A summative program evaluation of a comprehensive 9th grade transition program. ProQuest Dissertations and Theses.* Retrieved from http://search.proquest.com/docview/894263003?accountid=10051. (894263003).

Scriven, M., (1991). *Evaluation Thesaurus (4th Ed).* Sage Publications, Inc.

Stufflebeam, D.L. (2000). The CIPP model for evaluation. In D.L. Stufflebeam, G.F. Madaus, & T. Kellaghan (Eds.), *Evaluation models: Viewpoints on educational and human services evaluation* (pp279-317). Boston: Kluwer Academic Publishers.

Stufflebeam, D.L., Madaus, G.F., & Kellaghan, T. (Eds.). (2000). *Evaluation models: Viewpoints on educational and human services evaluation.* Boston: Kluwer Academic Publishers.

Stufflebeam, D.L. (2003). The CIPP model for evaluation. In T. Kellaghan, D.L. Stufflebeam, & L.A. Wingate (Eds.), *International handbook of educational evaluation* (31-62). Boston: Kluwer Academic Publishers

APPENDIX A

SURVEY 1:

Attitudes towards math, science and technology

Pre				Post			
Question 1	Please indicate how strongly you agree or disagree with the following statement: MATH IS FUN						
		%				%	
	Strongly disagree	7.14	1		Strongly disagree	11.11	1
	Disagree	7.14	1		Disagree	11.11	1
	Agree	42.86	6		Agree	66.67	6
	Strongly agree	42.86	6		Strongly agree	11.11	1
Question 2	Please indicate how strongly you agree or disagree with the following statement: SCIENCE IS FUN						
		%				%	
	Strongly disagree	0	0		Strongly disagree	0	0
	Disagree	0	0		Disagree	0	0
	Agree	35.71	5		Agree	11.11	1
	Strongly agree	64.29	9		Strongly agree	88.89	8
Question 3	Please indicate how strongly you agree or disagree with the following statement: TECHNOLOGY IS FUN						
		%				%	
	Strongly disagree	0	0		Strongly disagree	0	0
	Disagree	0	0		Disagree	0	0
	Agree	50	7		Agree	11.11	1
	Strongly agree	50	7		Strongly agree	88.89	8
Question 4	Please indicate how strongly you agree or disagree with the following statement: MATH IS INTERESTING						
		%	1 no answer			%	
	Strongly disagree	7.69	1		Strongly disagree	11.11	1
	Disagree	23.08	3		Disagree	22.22	2
	Agree	38.46	5		Agree	55.56	5

	Strongly agree	30.77	4	Strongly agree	11.11	1

Question 5 Please indicate how strongly you agree or disagree with the following statement: SCIENCE IS INTERESTING

	%			%	
Strongly disagree	0	0	Strongly disagree	0	0
Disagree	7.14	1	Disagree	0	0
Agree	35.71	5	Agree	11.11	1
Strongly agree	57.14	8	Strongly agree	88.89	8

Question 6 Please indicate how strongly you agree or disagree with the following statement: TECHNOLOGY INTERESTS ME

	%			%	
Strongly disagree	0	0	Strongly disagree	0	0
Disagree	14.29	2	Disagree	0	0
Agree	21.43	3	Agree	33.33	3
Strongly agree	64.29	9	Strongly agree	66.67	6

Question 7 Please indicate how strongly you agree or disagree with the following statement: If given a choice I will take an Algebra class in High School

	%	2 No answers		%	
Strongly disagree	25	3	Strongly disagree	33.33	3
Disagree	16.67	2	Disagree	11.11	1
Agree	41.67	5	Agree	44.44	4
Strongly agree	16.67	2	Strongly agree	11.11	1

Question 8 Please indicate how strongly you agree or disagree with the following statement: If given a choice I will take a Physics class in High School

	%			%	
Strongly disagree	0	0	Strongly disagree	11.11	1
Disagree	21.43	3	Disagree	0	0
Agree	42.86	6	Agree	33.33	3
Strongly agree	35.71	5	Strongly agree	55.56	5

Question 9 Please indicate how strongly you agree or disagree with the following statement: People who take Algebra and Physics in High School are more likely to get higher paying jobs

	%			%	
Strongly disagree	7.14	1	Strongly	0	0

				disagree			
	Disagree	7.14	1	Disagree	11.11	1	
	Agree	64.29	9	Agree	44.44	4	
	Strongly agree	21.43	3	Strongly agree	44.44	4	

APPENDIX B

SURVEY 2:

Team Work

Pre **Post**

Question 1 **I offer information and opinions**

	%			%	
Very frequently	14.29	2	Very frequently	37.5	3
Frequently	42.86	6	Frequently	37.5	3
Sometimes	21.43	3	Sometimes	25	2
Rarely	21.43	3	Rarely	0	0
Never	0	0	Never	0	0

Question 2 **When there is a problem I try to identify what is happening**

	%			%	
Very frequently	21.43	3	Very frequently	0	0
Frequently	28.57	4	Frequently	50	4
Sometimes	21.43	3	Sometimes	37.5	3
Rarely	14.29	2	Rarely	12.5	1
Never	14.29	2	Never	0	0

Question 3 **I start the group working.**

	%			%	
Very frequently	30.77	4	Very frequently	0	0
Frequently	15.39	2	Frequently	37.5	3
Sometimes	38.46	5	Sometimes	50	4
Rarely	7.69	1	Rarely	0	0
Never	7.69	1	Never	12.5	1

Question 4 I suggest directions the group can take

	%			%		
						1 No
Very frequently	0	0	Very frequently	0	0	answer
Frequently	35.71	5	Frequently	28.57	2	
Sometimes	50	7	Sometimes	71.43	5	
Rarely	7.14	1	Rarely	0	0	
Never	7.14	1	Never	0	0	

Question 5 I give positive feedback to other members of the group

	%			%	
Very frequently	7.69	1	1 No answer	Very frequently	12.5	1
Frequently	46.15	6		Frequently	50	4
Sometimes	38.46	5		Sometimes	12.5	1
Rarely	7.69	0		Rarely	25	2
Never		1		Never	0	0

Question 6 I compromise

	%			%	
Very frequently	7.14	1	Very frequently	0	0
Frequently	21.43	3	Frequently	25	2
Sometimes	64.29	9	Sometimes	75	6
Rarely	0	0	Rarely	0	0
Never	7.14	1	Never	0	0

Question 7 I talk

	%			%	
Very frequently	35.71	5	Very frequently	87.5	7
Frequently	28.57	4	Frequently	0	0
Sometimes	14.29	2	Sometimes	12.5	1
Rarely	7.14	1	Rarely	0	0
Never	14.29	2	Never	0	0

Question 8 I try to help solve problems

	%			%	
Very frequently	28.57	4	Very frequently	12.5	1

	Frequently	50	7	Frequently	25	2
	Sometimes	14.29	2	Sometimes	50	4
	Rarely	7.14	1	Rarely	12.5	1
	Never	0	0	Never	0	0
Question 9	**I take responsibility for ensuring that tasks are completed**					
		%			%	
	Very frequently	28.57	4	Very frequently	12.5	1
	Frequently	57.14	8	Frequently	25	2
	Sometimes	0	0	Sometimes	50	4
	Rarely	14.29	2	Rarely	12.5	1
	Never	0	0	Never	0	0