SUMMER SCIENCE CAMP INSTRUCTOR REFLECTIONS ON PERSONAL AND PROFESSIONAL DEVELOPMENT

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By
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Benjamin Lewis Freitag, candidate for the degree of Master of Education in Curriculum & Instruction, has presented a thesis titled, Summer Science Camp Instructor Reflections on Personal and Professional Development, in an oral examination held on June 21, 2018. The following committee members have found the thesis acceptable in form and content, and that the candidate demonstrated satisfactory knowledge of the subject material.

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Abstract

The purpose of this research was to ascertain how the summer job experiences at the EYES (Educating Youth in Engineering and Science) program impacted former instructors’ personal and professional development. Science, technology, engineering and math (STEM) educational research in a camp environment is mostly focused on student learning and achievement; my research instead focused on the impact on and outcomes for the program instructors, who develop and deliver the educational material for children. The EYES program is a not-for-profit organization based at the University of Regina. It has a mission of sparking curiosity and developing a lasting interest in science, engineering and technology for young people in southern Saskatchewan. The program is staffed by one year-round coordinator, a part time assistant coordinator and numerous summer students who are hired as instructors. My thesis describes the structure of the EYES program, my involvement as coordinator, a literature review of consulted sources, the methodology used, an overview of results of both the survey and interviews conducted and conclusions based on this work. The findings show that for many instructors this experience was a powerful, formative and meaningful. Many gained a better understanding of how to work with youth, teaching strategies, and the nature of science, while at the same time developing meaningful friendships with staff and engaging in staff mentorship. Finally, EYES also changed many instructors’ perceptions and understandings about poverty and sexism in Saskatchewan, after their experiences in EYES outreach programs with underrepresented groups.
Acknowledgments

I would like to acknowledge all the staff at EYES who made meaningful memories for their campers. It was incredible to see your creativity and determination at work. Thank you for all that you have done.

I would also like to thank my co-supervisor, Warren Wessel, who stopped me in the hallway at the University one day and asked why I wasn’t doing my Masters.

Lastly, thank you to my committee members, Jesse Bazzul, David deMontigny, and Nick Forsberg for their support, time, gracious feedback and general enthusiasm for this work.
Dedication

To Molly, you are the best part of my day, every day.
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CHAPTER 1: Introduction

1.1 EYES program background

EYES (Educating Youth in Engineering and Science) is a not-for-profit science education outreach organization based at the University of Regina within the Faculty of Engineering & Applied Science. It is an independent organization, but is part of the Actua’s Canadian network which consists of 33 member organizations, mostly operating through universities, that deliver barrier breaking science, technology, engineering and math (STEM) programs to over 250,000 youth across Canada each year. Actua’s goal is to make science, engineering and technology more accessible and engaging to youth in Canada, as well as encourage youth to consider future careers in STEM. Each program affiliated with Actua has a unique name, so EYES only exists at the University of Regina. EYES’ mission is to spark curiosity in boys and girls aged 6 to 14 (Grades 2-9) through interactive, hands-on, engaging activities. This is done through summer camps, in-school workshops and weekend clubs. The program provides engaging and positive STEM experiences for youth.

EYES was created in 1995 by University of Regina engineering students and enrolled 64 youth through Grades 4 to 9 in its first year. In the years that followed, programming expanded to include campers in Grades 2 and 3, community and school partnerships were established, and new programming was developed to include:

- in-school workshops, which take place from May to June;
- weekend club programs, which take place in fall and winter on Saturday afternoons; and,
- specialty camps, which take place in the summer and include the All-Girls program, outreach camps for low income youth, and technology based programs.
Expansions in programming and partnerships has led to EYES’ considerable growth over the last 23 years, with record breaking attendance on an almost annual basis peaking in 2015, and stabilizing in 2016 and 2017. The number of campers who returned to the EYES program increased from 35% in 2010 to over 51% in 2015. In that year, it reached over 18,000 students, through various workshops, clubs and camps in and outside of Regina. EYES brings over 1,000 youth to the University of Regina each year; and, EYES provides programming to many communities in southern Saskatchewan through satellite camps. For example, in 2015, nine week-long EYES camps were held in locations outside of Regina including Shaunavon, Swift Current, Assiniboia, Moose Jaw, Foam Lake, Balcarres, Esterhazy, Weyburn, and Estevan. In 2015, EYES delivered nearly 800 student workshops in over 111 schools in 58 different communities. EYES also provides seven weeks of specialized programming each summer for underrepresented groups in STEM fields such as young women and girls, low-income, Indigenous children and child newcomers to Canada. Examples of this type of programming includes: four weeks of all-girls programming in an attempt to increase women in engineering and science; free programming for youth attending Sacred Heart, Kitchener, Wascana, Albert, Thomson, and St. Augustine schools, which are located in lower income Regina neighbourhoods with high Indigenous populations; and, one week of programming for youth at the Regina Open Door Society. These programs are offered in partnership with Street Culture Kidz, Regina Public Schools, Regina Catholic Schools, and the Regina Open Door Society. In addition to these unique services, EYES provides a bursary fund for low-income youth to participate in programming at the University. Approximately twenty percent of EYES’ programming is delivered to youth at no cost to
them or their family. Sponsored donations from community businesses and organizations cover the costs of these outreach programs. These programs will be expanded in 2018 as the federal government has partnered with Actua to deliver outreach programming.

In terms of governance and operations, the EYES program has a volunteer advisory board and is partnered with the Faculty of Engineering & Applied Science, Faculty of Science and the Faculty of Education at the University of Regina. I personally served as the EYES Coordinator from 2009 to 2015, which is an Administrative, Professional and Technical union position within the Faculty of Engineering. I was responsible for program development, curriculum development, hiring and managing staff, fundraising, budget management, communications, reporting to the EYES Board, and maintaining health and safety. The Assistant EYES Coordinator is the other administrative position that supports the EYES Coordinator. This student position is part-time during the year and full time from May to August. During my time as Coordinator, it was a collective effort of responsibilities in the office, but in general the Assistant Coordinator was responsible for registration, parent and teacher communication, staff scheduling, and program development.

Approximately twenty instructors are hired annually from May to August. During May and June the staff deliver in-class student workshops at elementary schools in addition to developing programming for the summer day-camps in July and August. Feedback was received from the staff on nearly a daily basis. More formal feedback through online surveys, interviews and staff meetings also helped establish strong communication between instructors and the office, troubleshoot issues and build staff morale. As of 2017, the programming targets youth in Grades 2 to 9. Instructors are
university students from a range of disciplines; however, EYES primarily hires students with education, science, and engineering backgrounds. Some instructors who have worked in the summer are hired in the fall and winter semesters to facilitate the club programs. During my time at EYES we had a high retention of staff members. Most staff returned to the program the following year if they were still in school. Some teachers returned even after they found professional jobs. No instructor quit during my time there and no one was let go.

EYES’ has been publicly recognized for its success in delivering high quality educational programming to youth in Regina and Southern Saskatchewan. In 2010, EYES won the Actua and General Electric (GE) award for Leadership and Innovation. In 2016, I was honoured with the “Friend of the Profession” award by Association of Professional Engineers and GeoScientists of Saskatchewan (APEGS) for supporting the engineering profession.

1.2 My history and roles in EYES

My work with EYES began in 2009, serving as its first non-student coordinator. Many science camp programs in Canada have moved toward professional coordinator positions, as opposed to student positions. Student models have declined due to safety and liability concerns, program expansion and effectiveness issues. 2008 was the last year EYES operated under the student model. I left the program in 2015 for another opportunity.

I have a Bachelor of Science in Physics (2007) and a Bachelor of Education (2009), both from the University of Regina. Previous to the EYES Coordinator role, I worked at Lumsden Beach Camp for eight years during the summers while I pursued my
post-secondary education. It is an outdoor United Church camp. I have always loved science, working with youth and the camp environment. My interest in this research stems from my observation that camp programs are effective tools for engagement of and instruction to youth. My research supports this conclusion. Internal EYES camper surveys and parent surveys have consistently shown that youth enjoy and want to attend EYES. The programs were sold out nearly every week for seven years while I was coordinator, and during that time we significantly increased capacity each year. The data indicate that parents wanted their children to attend EYES camp, and the children wanted to be there too. However, while the program does have a positive effect on campers, I have personally observed some interesting effects on the instructors. The difference in approach to science engagement between a returning instructor and a new instructor is remarkable. I think the difference is not simply a consequence of having performed the job previously that makes returning instructors strong; rather I believe they have a changed approach and attitude to science education. The program has also impacted instructor’s lives in different ways. For example, one instructor, who volunteered for the program in 2009, changed his career path from research based physical science to pursuing a degree in science and education policy. Another instructor decided to pursue education after discovering a passion for teaching. Both persons credited their EYES experience for these changes.

I have a strong passion for the program and the people who have worked for it. I have become friends with many of my former colleagues, some of whom chose to partake in this study. I believe in the EYES program’s mission, and have joined the EYES volunteer advisory board to see that it continues to positively impact our
While I do not think everything is perfect with the program, I thought I should make clear to the readers my bias toward the program. This is also my story told through the instructor’s perspective. I do not want or intend for this work to be a marketing campaign for EYES, but note that my connection to EYES does not make me a purely objective observer.

While EYES was something I very much cared for and valued being a part of, and I eventually moved on to pursue other career opportunities, being part of the EYES program is a significant part of my identity. Additionally, I did not anticipate that when I began my Master’s program that I would ultimately move on from EYES. The surveys and interviews with instructors in this paper were conducted just prior to leaving, and subsequently, preparing this research has been a valuable opportunity to reflect on the work that I had done and the interactions I was fortunate to have had; I am proud of what EYES has become through my time there. The size of the program more than doubled. In 2015, my last year, the camp reached over 18,000 youth through workshops, clubs and camps. Programs were added for youth in Grades Two and Three. A computer based program was added and camps to rural and low income neighbourhoods tripled, as did our All-Girls program. Partnerships were established with File Hills Tribal Council and our funding expanded and was stable. While I count many successes in retrospect, I also consider areas for improvement. For example, I did not always have a full understanding of the social issues I was attempting to address, I often did what I thought would be a good idea with little research, and did not always engage stakeholders in meaningful dialogue. However, I am still proud of the direction EYES took during my time and am pleased to see how it has further strengthened and developed – particularly since the
program received significant federal investment.

1.3 Thesis research focus

The focus of my research is on understanding and describing the impact of the EYES experience on the personal and professional development of former instructors, from their own perspectives. I defined personal impact as a change of opinion, attitude or insight that did not have a direct impact on the professional lives from the instructor’s point of view. I defined professional impact as having had a direct influence on instructors’ careers. I have found little research on how camp based employment impacts instructors and I am interested in how instructors view their EYES experience after the program was finished. I want to know if this short term experience had a meaningful impact in their personal and professional lives. Based on my experience and my conversations with staff, I think that being an EYES instructor can have a meaningful impact on both personal and professional development. Former staff have told me this, and, over the years I have observed people develop as they worked at EYES. To explore this impact, I asked former instructors to reflect on their experience at EYES and to think about whether it impacted them personally and/or professionally. I gathered my data through online surveys and a series of interviews. The two research questions guiding my work are:

1) How did the EYES experience personally impact instructors?

2) How did the EYES experience professionally impact instructors?

I was interested in exploring their evolving views on education, science, and teamwork. The surveys and interviews were designed to elicit their thoughts and ideas about the effects, including their interactions with campers, other staff members and the program
itself. These questions were not mutually exclusive, as an experience can have both a professional and personal impact on any individual.
CHAPTER 2: Review of literature

2.1 Introduction

There is a variety of research on summer science camps, most of which falls into three categories. The first category of research focuses on and describes the science camp model that a particular organization is using. Specifically, it looks at the organizational structure of the science camp program, the types of activities used, the target audience, and additional local context. The second type of research is similar, but applies a social justice lens to its analysis. It can also include recommendations and/or analysis on different models that target underrepresented individuals in science, engineering, math, computer science, and medical fields, which include women, low income students, visible minorities, or English as an additional language learners. Often the impacts of such programs are shown in a qualitative fashion. The final category of science camp research focuses on the effectiveness of science camp programming. Specifically, these studies examine the impact that programs have on participants. The research typically uses pre and post surveys to gather results, and the majority of studies look at skills, attitudes and understanding, or future life choices.

When investigating summer science camps for youth, I located studies that examine science summer camps and other camps of various types including, year round youth science programming (clubs, after-school programs etc.). The majority of research on summer science camps are focused on the impact on the campers. I found very limited research examining the impact on instructors.

With respect to definitions in my research, I am defining the term camp as any short term intensive program where the campers’ time is mostly committed to
Some camps are a few days long while others may continue on for several weeks. A camp may include any STEM based program, and can be one of a variety of formats (such as duration, location, ages of campers and content). Camps do not include weekly clubs or after-school programs, these will be considered and referred to separately. The terms campers and students will be used interchangeably to refer to the participants in the science camps. The leaders of camps will be referred to as “instructors”. They are the individuals who are in direct contact with the campers and carry out camp programming. The term youth will be used to describe any camper in primary or secondary education.

2.2 Literature Review: The rise of science camps

Some context is needed to understand the rise of science camps in North America. The first science camps in Canada began only in the 1980s but quickly grew in the 1990s. Table 1 shows the foundation dates of some major science camps in Canada that I compiled from their websites.

<table>
<thead>
<tr>
<th>University</th>
<th>Science Camp started</th>
</tr>
</thead>
<tbody>
<tr>
<td>Université du Québec à Trois-Rivières: Genitrucs</td>
<td>1980</td>
</tr>
<tr>
<td>Queen’s University: Science Quest</td>
<td>1988</td>
</tr>
<tr>
<td>University of Saskatchewan: Sci-Fi</td>
<td>1990</td>
</tr>
<tr>
<td>University of Manitoba: WISE Kid-Netic Energy</td>
<td>1990</td>
</tr>
<tr>
<td>University of Victoria: Science Venture</td>
<td>1991</td>
</tr>
<tr>
<td>University of Western Ontario: Discovery Western</td>
<td>1991</td>
</tr>
<tr>
<td>University of Waterloo: Engineering Science Quest</td>
<td>1991</td>
</tr>
<tr>
<td>McMaster University: Venture Engineering and Science</td>
<td>1991</td>
</tr>
</tbody>
</table>
Table 1: Founding dates of science camps in Canada

<table>
<thead>
<tr>
<th>Institution</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>École Polytechnique de Montréal: Folie Technique</td>
<td>1991</td>
</tr>
<tr>
<td>Yukon College: Science Adventures</td>
<td>1992</td>
</tr>
<tr>
<td>University of Alberta: DiscoverE</td>
<td>1993</td>
</tr>
<tr>
<td>University of New Brunswick: Worlds UNBound</td>
<td>1993</td>
</tr>
<tr>
<td>Simon Fraser University: Science AL!VE</td>
<td>1994</td>
</tr>
<tr>
<td>Carlton University: Virtual Ventures</td>
<td>1994</td>
</tr>
<tr>
<td>Armand Frappier Museum: Centre d'interprétation des Biosciences</td>
<td>1994</td>
</tr>
<tr>
<td>University of British Colombia: Geering Up</td>
<td>1995</td>
</tr>
<tr>
<td>University of Regina: EYES</td>
<td>1995</td>
</tr>
<tr>
<td>University Calgary: Minds in Motion</td>
<td>1998</td>
</tr>
<tr>
<td>Lakehead University: Superior Science</td>
<td>1999</td>
</tr>
<tr>
<td>University of Lethbridge: Destination Exploration</td>
<td>2002</td>
</tr>
<tr>
<td>University of Winnipeg: Adventure Kids</td>
<td>2007</td>
</tr>
</tbody>
</table>

The recruitment of future students to science and engineering programs is likely the principle reason that universities began summer science camps. Between 1982 and 2000 Yoder (2012) describes a nearly 25% drop in undergraduate engineering enrolment in the United States. American engineering enrollment levels did not return to 1982 levels until 2009. (Yoder, 2012). The same phenomenon did not occur in Canada, where engineering enrollment levels were relatively stable in the early 1990s and began to rise consistently in the late 1990s and into the 2000s (Engineers Canada, 2013). Enrolments in the physical sciences increased in the 1990s and continued into the 2000s; the only exception being computer science which increased in the 1990s but declined in the 2000s (Association of Universities and Colleges of Canada, 2011).

In contrast to Canada’s consistent enrolment, global enrolment dropped. Japan
had declining numbers in the 1990s, as did the Netherlands, England and the United States (Lyon, 2006). These declines in enrolment caused global concerns about the state of science education and student interest and engagement. There was a genuine fear that science education was becoming irrelevant in the minds of students. For instance, one title of a study demonstrates this attitude at the time: *Mission impossible?: Can anything be done about attitudes to science?*. Ramsden (1998) did not have a concrete solution to the problem, but did state that:

… there is the widely held perception of science being difficult and not relevant to the lives of most people, of science causing social and environmental problems; that science is more attractive to males than females; that interest in science decreases over the years of secondary schooling.” (p. 125)

Osborne, Simon, and Collins, (2003) expand on the concern by stating that there is:

… now mounting evidence of a decline in the interest of young people in pursuing scientific careers … the falling numbers choosing to pursue the study of science has become a matter of considerable societal concern and debate. … Consequently the promotion of favourable attitudes towards science, scientists and learning science, which has always been a component of science education, is increasingly a matter of concern. (p. 1049).

In a Swedish study, Lindahl (2003) found that boredom with the course content was so prevalent that even students who initially aspired to careers involving science eventually decided that “science is so boring they have given it up” (p. 10). Osborne et al., (2003) found that high school science education was described as either boring or irrelevant in England, Australia, Sweden, Canada, Korea, Ireland, Germany, the Netherlands, Norway and the United States. He went on to say that “… criticisms of ‘boring and irrelevant’ science were used extensively in support of the Science, Technology and Society (STS) curriculum initiatives of the 1980s and 1990s” (Osborne et al., 2003, p. 602). The exact description of “what students actually mean when they
describe a subject in these terms [irrelevant and boring] has not always been clarified” (Osborne et al., 2003, p. 599). Regardless, an engagement issue had been identified in many studies around the world.

2.3 The effects of science camps

Studies show science camp experiences have a positive impact on campers from elementary to the undergraduate level. The camps studied covered a variety of STEM subjects, geographic locations and socioeconomic states of campers. The impacts reviewed varied by study but generally looked for scientific knowledge, motivation in STEM subjects, and attitudes, perceptions and intentions toward STEM studies.

In a Canadian study, Crombie, Walsh and Trinneer (2003) reviewed Actua summer science camps across Canada. While EYES is a member of Actua, it did not participate in this study. Pre and post surveys were given to 876 participants in Grades 4 to 9. The study concluded that:

… camps were perceived to be a very positive experience by 83% of campers. Significant positive changes were reported in confidence, values and future intentions. Results provide some of the first quantitative evidence, at a national level, for the effectiveness of science and technology summer camps that use a hands-on interactive approach” (p. 256)

An American study made a similar finding among African American high school students in Louisiana who participated in a science camp, (Bhattacharyya, Nathaniel, and Mead, 2009). Results showed differences from pre and post surveys carried out over a three year period:

Students' attitudes toward science did change positively after the camp. The percentage of students who agreed "on planning on taking as many science classes as possible in the future" more than doubled. After the camp, more than half of the students indicated that they wanted to take more science courses. The percent of students planning on majoring in science in college more than doubled after the camp. Despite the fact that students' attitude toward science changed
after attending the camp, the number of students wanting science as a career remained unchanged (p. 350)

While no change in career intentions was shown in this study, the camp seemed to influence future education. The students showed a positive impact on most of the study’s indicators.

Slaviero (2012) carried out a survey on 9000 alumni of an all-ages space camp. The results showed that 93% had taken more science courses and 91% had taken more math courses after attending the camp than they had originally intended.

Knox, Maynihan and Markowitz (2003) found that a summer camp experience for campers in Grades 9-12 did positively impact their desire to pursue STEM careers in the future. The study found that the camp was a “positive influence on their performance in advanced science courses as well as their desire to pursue a career in science” (p. 476). In addition, “students who attended the program felt more confident in their ability to use sophisticated laboratory skills and that the Summer Science Academy program provided a positive influence on their performance in advanced science courses” (p. 471).

A study performed in Buffalo, New York with Grade 5-8 campers included a self-evaluation, where about 90% of campers indicated an increased interest in science, and wanted to return to the camp the following year (Sheridan, Szczepankiewicz, Mekelburg, and Schwabel, 2011).

Metin and Leblebicioglu (2012) investigated youth’s perceptions on the tentative nature of science in Turkey. The study involved 24 Grade 6 and 7 students who participated in a ten day program. Pre and post surveys were conducted and showed, “that more children accepted the tentativeness of scientific knowledge at the end of the camp” (p. 164). Foster and Shiel-Rolle (2011) delivered a pilot camp in the Bahamas for eight
youth ages 9-19. The six-day camp was designed to enhance scientific literacy in rural communities in the Bahamas. Pre and post surveys were conducted show that more students were interested in science careers following their Caribbean camp experience.

Some science camps target low income communities. Basu and Barton (2007) did a qualitative study on an after school science program in a low income community in a large urban center in the northeastern United States. The authors took reflective notes, observations, conducted interviews and reviewed student’s work of 11 of the 20 afterschool participants. Their goal was to investigate the root causes of interest:

We found that youth developed a sustained interest in science when: (1) their science experiences connected with how they envision their own futures; (2) learning environments supported the kinds of social relationships students valued; and (3) science activities supported students’ sense of agency for enacting their views on the purpose of science. (p. 466)

Elam, Donham, and Solomon (2012) investigated a program targeted for low income youth in a rural location. There were 62 participants in Grades 5-11. The program was well received by both participants and parents, who stated that the most influential aspect of the camps was having hands-on activities, guided by informed mentors. Another two week science camp for low income youth was done in Fairfax, Virginia. Sixty Grade 6 participants completed pre and post surveys. The study found that youth had increased both scientific knowledge and skills, and were more open to and confident in asking questions as the camp progressed (Sterling, Matkins, Frazier, Logerwell, 2007).

Stanford University has a five week program for underrepresented visible minorities interested in entering the medical field as a profession. The program began in 1988 and has 24 high school students each year. A unique aspect of this program is that contact with the participants does not end after the camp’s completion. Communication
between the camp and alumni continues on as students complete high school and pursue post-secondary education. The program shows some impressive statistics:

One hundred percent of age-eligible participants have graduated from high school, and 99% have been admitted to college. Of those admitted to college (and not currently college students), 81% have earned a four-year college degree, the majority majoring in biological and physical sciences (57.1%). Among four-year college graduates, 52% are attending or have graduated from medical or graduate school. Many of the four-year college graduates (44.4%) are becoming or have become health professionals (Winkleby, 2007, p. 139).

Not all studies have shown a positive impact of science camps on campers. Bell, Blair, Crawford and Lederman (2003), studied ten Grade 10 and Grade 11 students who took part in an eight week program in the northwestern United States. The purpose of the study was to see if the campers changed their view on the nature of science and scientific inquiry. The study concluded that:

… students held conceptions about the nature of science and scientific inquiry that were inconsistent with those described in current reforms. ... Although most students did appear to gain knowledge about the processes of scientific inquiry, their conceptions about key aspects of the nature of science remained virtually unchanged. (p. 487)

Despite the eight week program, students’ understanding of and attitude toward scientific inquiry did not change.

Bachman, Bischoff, Gallagher, Labroo, and Schaumloffel (2008) conducted a study with 35 Grade 11 and 12 participants in the state of New York. The goal of the research was to measure any increased interest in attending university, but the study did not demonstrate this result. “The pre and post survey data are remarkably similar. There is no evidence that the camp is dramatically affecting the motivational disposition of the campers” (p. 37). Further to this point, they stated that, “we would be hard pressed to
state with confidence that the camp is motivating the unmotivated” (p. 37). The researchers did subsequently sent out a survey to participants from 2004, 2005 and 2006 and had an 85% response rate. These surveys found that “there is strong and consistent evidence in the alumni survey data that the camp was a high enjoyable experience and that the camp experience motivated them to think seriously about studying science in college” (p. 37). The two results seem to be in contradiction to each other, as the immediate post-tests did not match the alumni survey.

Williams, Ma, Prejean, Ford and Lai (2007) studied younger students in middle years for their analysis. The study investigated the impact that a summer robotics camp had on the understanding of physics content and scientific inquiry. The camp lasted two and half hours a day for two weeks. Twenty one students were studied using mixed methods, which included pre and post surveys. Williams et al. concluded that “the camp enhanced students’ physics content knowledge but failed to improve their skills in conducting scientific inquiry” (p. 201). Once again there are mixed results in this study as specific scientific content appears to be easier to influence, as opposed to scientific inquiry.

Despite a minority of mixed results studies, the majority of studies show that science camps have an impact on the campers they serve.

2.4 Age can be a factor in science camps

Primary and secondary education are pivotal times in science education as most youth are introduced to the subject in this time. “There is virtual consensus that K-12 science experience plays a crucial role in attracting or extinguishing further interest in science. … K-12 education is where attitudes and beliefs about science and scientists are
formed.” (Bhattacharyya, Nathaniel, & Mead, 2009, p. 345). The age or grade level at which camp experience is most helpful has also been studied. Woolnough (1994) found no connection between a participant’s attitude or interest in science and out-of-school science activities such as clubs, camps or after-school activities. His study involved students over the age of 16. Larson and Verma (1999) note that high school youth spend little time participating in out-of-school math and science activities, as much of this time is spent with friends or working. Osborne, Simon, and Collins (2003), point to out-of-school activities for elementary students as a potential key time for development. Gibson and Chase (2002) conducted a longitudinal study on the Summer Science Exploration Program (SSEP) targeting youth in Grade 6. They explored this program and other similar programs’ ability to increase the perception of science for middle years students and onward:

The long-term goal of SSEP was to increase students’ interest in science and science careers between middle and high school. The surveys and interviews found that increasing interest during this time period is very difficult to do and may be an unrealistic goal. At this age most students are losing interest in science. However, the data do show that SSEP was able to sustain students in middle school who have a high interest in science. These results suggest that attitudes toward science are developed early in a child’s education and are difficult to change once they reach middle school. Summer science programs, such as SSEP, are probably best suited to help support and sustain interest in science. (p. 704)

The perceived difficulty or even impossibility of increasing interest in STEM among middle years students is supported by Bhattacharyya, Nathaniel and Mead (2009), “… although children enjoy and have an interest toward science in their primary school years, they lose their motivation and start to dislike science classes in their middle-secondary school years as a result of perceiving science classes to be difficult.” (p. 346). These authors argue that the goal is not necessarily to increase science interest, but rather
maintain the current level of interest that students have as they move to high school and beyond.

Research shows that science camp experiences are not limited to youth in elementary and secondary school. Emory University in Atlanta provides a ten-week program for undergraduate students. The purpose of the program is to prepare undergraduate students for graduate research. The program began in 1990 and still exists. Junge, Quiñones, Kakietek, Teodorescu, and Marsteller (2010) reviewed post survey results from 822 participants in that program. Junge et al. found that participants felt more prepared in their research skills and developed an awareness of science based career options. One odd finding was that students’ interest in general research, as opposed to high level research, did not change. “We attribute the lack of significant change in general interest in scientific research to the fact that baseline interest level, at 72.4%, was already quite high, leaving less room for improvement” (p. 128). This lack of change or an interest could be attributed to older students having less plasticity in their personal beliefs.

2.5 Effects of science camp experiences on self-concept

Self-concept or self-assessment, meaning the perception of one’s own abilities in science is a factor examined in many studies. “The poor performance of science students is due at least in part, to a demonstrable lack of motivation to study science because of poor self-perceptions of their ability” (Bachman, et al., 2008, p.30). The research is not always a consistent correlation. Kifer (2002) suggested a negative relationship between self-concept and achievement in a review of TIMSS results. However, other researchers have found a positive correlation between achievement and a student's self-concept and
value. Simpkins, Davis-Ken, and Eccles (2006) summarized that student’s values and self-concepts can positively influence their achievement in math and science courses. As well, they found that good performance in science and math positively influences enrolment in those fields.

Additionally, there are correlations between continued science and math education, and a student’s interest and view of importance of the area:

Youths’ intentions to enroll in elective math and science courses were associated with their interest and belief about the importance of these domains. … The actual number of math and science courses adolescents took in high school was predicted by youths’ task values (e.g., interest, feelings of the importance)” (Osborne, Simon, and Collins, 2003, p. 71).

Youth achievement, self-concept, perceived value and interest all play a role in future educational pursuits of science. While high self-concept does not guarantee pursuit of a STEM education, low self-concept is not a likely motivator. Self-concept, interest, perceived value, achievement and continued studies are clearly related.

2.6 Out-of-school science based activities and STEM interest

Out-of-school activities are another factor correlated with STEM interest.

“Children who earn good grades in math and science are more likely to participate in [science-based] after-school activities and continue with coursework in these areas” (Simpkins, Davis-Kean, and Eccles, 2006, p. 80). This project conducted a longitudinal study of 227 participants in Grade 5, 6 and 10:

Youths’ participation in out-of-school math and science activities in 5th grade was positively associated with their expectancies–values in 6th and 10th grades, particularly for boys. Thus, if boys participated in high amounts of math and science activities in 5th grade, they were more likely to have higher beliefs in those domains 1 year later and even 5 years later. The correlations between girls’ activity participation and beliefs were positive but not statistically significant. (p. 75)
This investigation elucidated developmental relations between youths’ choices and beliefs in math and science. Specifically, participation in out-of-school activities at 5th grade predicted youths’ subsequent values and self-concepts of abilities. We also found that youth who believed they were skilled in a particular domain or had an interest in the domain were more likely to continue to pursue this endeavor during adolescence than their peers. In addition, these associations emerged above the predictive power of children’s achievement, parents’ education, and family income. (p. 78)

Similarly, “research suggests that math and science out-of-school activities are positively associated with youth’s interest in science and self-concept of abilities in these domains” (Osborne, Simon, and Collins, 2003, p. 71). Eccles and Templeton (2002) also found that participating in extracurricular activities of all types is “associated with both short- and long-term indicators of positive development, including school achievement and educational attainment.” (p. 122). Andrews (2001) argues that science based out-of-school experience determine whether or not children choose to continue on with science.

2.7 Women’s engagement in STEM fields through science camps

Stoet, Bailey, Moore, and Geary (2016) argue that “women’s participation in STEM subjects has increased [globally], although not to the level of boys’ and men’s participation. The exact reasons for this disparity in participation are currently unknown.” (p. 2). In another study, the stereotype that males are higher achievers in STEM fields is debunked. “Math and science school achievement and grades are usually not significantly different between boys and girls … and sometimes girls outperform boys in both subject areas” (Simpkins, Davis-Kean, & Eccles, 2006, p.73). Despite increases in both representation and course outcomes, women continue to pursue non-STEM careers in smaller numbers than men. “Women’s avoidance of science careers continues regardless of the increases in their participation and achievement in science courses” (Farland-Smith, 2012, p. 1).
One concern is how girls and young women relate to STEM fields. “Girls often do not identify strongly with science or science careers” (Fenichel and Schweingruber, 2010, p.120). In addition, “research has consistently shown that girls have lower math and science self-concepts than boys” (Simpkins, Davis-Kean, and Eccles, 2006, p. 73). An additional barrier is sex-stereotypical concepts and images of the scientific careers. Buck et al (2008) argues “Girls’ process in identifying a role model involved personal connections and their initial image of a scientist led them to believe they could not have such a connection with a scientist” (p. 688). Farland-Smith (2012) argues, “The most vulnerable population continues to be middle-school girls, as they are especially sensitive when constructing their own identities. It appears that negative perceptions surface in the fifth through eighth grades, often times limiting girls’ pursuit of career choices in the areas of science and technology” (p. 2). She argued “that girls desire a social interaction in science activities because they are not passive learners.” (p. 17). While engaging boys with hands-on activities at a young age appears to be an effective approach, this strategy does not appear to be as effective for engaging girls.

Many programs that are designed exclusively for girls have shown positive results. Farland-Smith (2012) describes an all-girls Grade 5-9 science camp that found:

… these young women related to scientists who actively engaged them in hands-on, problem-based activities and had a sense of humor while doing so. Girls closely identified with science fields that offer an opportunity for travel and for interaction with animals. In addition, it is evident that the girls’ personal and social interactions shaped their perceptions of scientists and helped them internalize their experiences as members of a science community in relation to their overall science identities (p.1)

Another all-girls program for youth in Grades 6-8 found that “evaluation comments have been overwhelmingly favorable.” (Dubetz, and Wilson, 2013, p. 44). Research of how
girls and woman pursue STEM careers is a widely studied field and full review of this research is beyond the scope of this work. This section is meant to only identify the issue and provide some brief context as the topic is too large to be thoroughly discussed here.

2.8 Additional factors that affect science education

In addition to what has been identified above, there are other additional factors that impact youth and science education. Fenichel and Schweingruber (2010) note that inadequate science instruction in elementary schools, standardized testing performance by non-dominant groups, and esoteric scientific language are three such factors.

Additional factors include teachers and parents, summer loss, and lack or degree of exposure to STEM careers (Elam, Donham, and Solomon, 2012).

2.9 Longitudinal studies

I located three longitudinal studies that show the potential impact of short-term science camp experience. Kong, Dabney and Tai 2014 tracked over 1500 students for two years:

Results indicate that students who participated in science summer camps before or in the first year of the study [Grade 6 or 7], compared to students who did not, are significantly more likely to report science and engineering as their future career field in the second year of the study. It appears that students who once participated in science summer camps were more likely to later report a career interest in the science and engineering fields.” (p. 54)

The study attempted to control for potential factors: gender, ethnicity, school, and initial career interest in science and engineering in the first year of the study. Kong et al. argue that two students who have the same level of interest in Grade 6, will not have the same level of interest in Grade 7 if only one of them attended a science camp in or before Grade 6. Another longitudinal study carried out by Simpkins, Davis-Kean, and Eccles (2006) followed 227 participants over four years. In this study, all participants did not
attend the same science camp; however, all attended some out-of-school science or math activity. The first participant survey was conducted in Grade 6, the second in Grade 7, and the final in Grade 10:

Results indicated youths’ math and science activity participation predicted their expectancies and values, which, in turn, predicted the number of high school courses above the predictive power of grades. (p. 70)

In a third longitudinal study, Gibson and Chase (2002) examined an additional variable. In their five year study, youth were tracked in three different categories, those who attended a science program in Grade 7 or 8, those that had applied but were rejected, and those who did not apply to or participate in the science program. While all students’ interest in science decreased over five years, the interest of those who attended the program diminished the least. The study also found that the students who applied but were not selected originally had a higher level of interest than those selected. Over time, this group’s level of interest decreased to same level of those who had not applied for the science program. Table 2 shows the study results. A major limitation of the results is the small sample size of the not-selected group. It began at 35 but concluded with only 8. An additional 22 control students were surveyed in the second testing in an attempt to compensate, but the 22 were not surveyed in first testing. Students’ interest in science careers mean score could range from 0 to 32. Scores in the range from 0 to 15 suggest a lower interest in a science career. Attitude were scored on a scale from −2 to +2 with positive scores indicated an interest in science.
<table>
<thead>
<tr>
<th></th>
<th>Number of Students</th>
<th>First testing:</th>
<th>Second testing:</th>
<th>First Testing</th>
<th>Second Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participated in program and were surveyed</td>
<td>79</td>
<td>21.79</td>
<td>19.30</td>
<td>0.96</td>
<td>0.78</td>
</tr>
<tr>
<td>Applied, not selected</td>
<td>8</td>
<td>21.63</td>
<td>8.93</td>
<td>1.38</td>
<td>0.49</td>
</tr>
<tr>
<td>Applied, not selected, surveyed only in second testing</td>
<td>22</td>
<td>NA</td>
<td>8.05</td>
<td>NA</td>
<td>0.44</td>
</tr>
<tr>
<td>Did not apply to the program, First Testing</td>
<td>638</td>
<td>13.65</td>
<td></td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>Did not apply to the program</td>
<td>333</td>
<td>10.23</td>
<td></td>
<td>-0.06</td>
<td></td>
</tr>
</tbody>
</table>

*Table 2: Science career and attitude results - adapted from Gibson and Chase (2002)*

Combined, these longitudinal studies show that a short term camp experience can have a lasting effect on campers. This is also the best evidence to suggest that the science camp experience could have a lasting impact on its instructors as well.

2.10 Impact on camp instructors

In my literature review, I located only one research study that specifically explored an impact of science camps on instructors. In this study, the instructors were preservice and in-service teachers (Sterling, Matkins, Frazier, and Logerwell, 2007). The researchers found that “for preservice teachers, science camp enhances their knowledge and experience working in a dynamic science-learning environment with economically disadvantaged students and middle school teachers” p. 147. Instructors were not the focus
of the study and there were only a few details of their experience were mentioned.

Forsythe, Matysik and Nelson (2004) carried out a study on 48 4-H club teen instructors in Wisconsin, and the impact of their experience as counsellors in youth programming.

While the 4-H cohort is slightly younger than EYES instructors and 4-H programming is agriculture and not science and engineering focused, there are similarities in reported experience between the two groups:

…results show that counselors reported significant life skill development as a result of their 4-H counseling experience. They also indicate that these skills will be used in their community involvement, as well as in a future career. The results provide reinforcement for educators to use in telling stakeholders about the benefits and effectiveness of the camp counselor role as a youth leadership experience. In addition, more than 90% of counselors found their experience to be fun and enjoyable, which indicates that the camp counseling experience is motivating as well as educational (p.9.)

In addition, the 4-H instructors noticed an improvement in many skills over the work term, including:

- Leadership - 36%
- People skills/working with youth - 27%
- Communication - 19%
- Patience/tolerance - 18%
- Responsibility - 17%
- Teamwork - 15%
- Problem solving - 11%
- Planning and organizing -11%

Expanding to informal science education outside of the camp environment such as museums and science centres, Adams and Gupta (2017) investigated three informal science institutions partnerships with preservice teachers. They found:

- the opportunity to teach the same topic to different audiences over and over each time revising, refining, and testing strategies;
- opportunities to try the same strategies on different and diverse learners thereby developing an intuitive understanding of what works for whom;
• learning alongside museum staff and seeing different styles of teaching, different approaches, and borrowing strategies from these different experts; and
• having opportunities for self-reflection in between the instances of teaching allowing the candidate to identify areas of weakness and strengths and focusing on those each time the science experience is iterated (p. 123).

2.11 Summary

Through this literature review, I found significant research available on camper perspectives, much of it suggesting that a short-term science camp experience can have a lasting effect on campers. This research also suggested that science camp impacted campers’ self-concept, understanding, achievement, and career paths. Finally, the research also suggested that the influence of short-term science camp experiences appears to decrease with age – so an earlier introduction to science camp is more likely to have a lasting impact on a camper, rather than a middle years introduction. Finally, through this review, I found that the research specifically focused on the experience of science camp instructors was highly limited.
CHAPTER 3: Methodology

The focus of my research was to determine how serving as an EYES instructor affected the individuals personally and professionally. As noted earlier, I was the EYES Coordinator from 2009 to 2015 and during that time I observed that the EYES program appeared to be impactful experience to both campers and instructors. Based on the literature review, my personal experience, and annual EYES camper and parent surveys, I am reasonably convinced that the EYES camp is beneficial to campers. Both the camper and parent surveys were generally positive and supportive of the program. Based on observations and verbal feedback from EYES instructors over the years, I think that the science camp experience effected them as well, yet, as noted in the literature review, only very limited data exists to support these thoughts. Therefore, the purpose of my research was to interact with past instructors in the EYES program to determine their understanding of benefits they have gained.

3.1 Instructors in the study
3.1.1 Recruitment and hiring

In a typical year, the recruitment process for EYES instructors began in February and hiring occurred in March. The applicants were required to be university students and preference was given to those pursuing education, science, and engineering degrees. The hiring process changed over my time there, but generally began with a resume and cover letter. Most applicants were selected to come to a group interview of approximately eight people. In that interview, team building and a presentation were conducted. Candidates who demonstrated a strong ability to work with others, strong presentation skills, and an engaging personality were selected for an individual interview. At this phase, candidates were asked to prepare a science demonstration for a Grade 4 audience and answered
traditional interview questions. The key to this part of the interview was to explain a science concept in a fun and captivating way at the appropriate grade level. Out of town candidates demonstrated the same activities through a video submission and a follow-up phone interview. In my later years at EYES, the final team consisted of about 20 instructors who had a diverse range of backgrounds and interests. I aimed to have representation from education, science, and engineering fields. Once our technology camp programs had been developed, we began to seek out instructors with computer based interests. In addition to their education, I looked for a range of personality types that would provide a healthy balance, in order for campers to feel secure and to be able to relate to their instructors. We were interested in both extraverted and introverted instructors, strong leaders and strong team players with recreational interests in sports, music, academics, volunteer work, gaming, and any other area, as well as candidates with international, Indigenous backgrounds and visual minorities. Effectively, I was looking for leadership skills, and leaders who could work well with a wide variety of backgrounds. I generally tried to avoid aggressive or dominant personalities. Instructors were generally in their late teens to early twenties, but we also hired older individuals who had returned to school in their 30s. The instructors’ terms lasted four months from May to August.

3.1.2 Team building and skills development

When the instructors arrived in the first week of May, we went on a three day overnight staff retreat. About half the time was dedicated to team building and the balance was helping them become more familiar with their role and responsibilities. Following the retreat there was more formal training: health and safety, emergency
preparedness, respectful workplace, cleaning procedures, and workshop training. Also
during this time in small groups instructors would plan two or three days of programming
for the summer, called “camp theme days.” Groups were given a theme to work with
such as bubbles, Carbon, or eggs and had to pitch their ideas for activities to me and the
Assistant Coordinator. We wanted them to experience the development of activities that
they would be using during the week long summer camps.

3.1.3 Workshops

Instructors began in-school workshops in their third week of employment at EYES. I selected the topics of the workshops prior to the instructor’s arrival but the
method of delivery was developed by the instructors. There were five different
workshops geared to different age groups, and intended to be 45 minutes long. A team of
two instructors went into each classroom, and presented a workshop selected by a
teacher. They would facilitate up to six workshops each day. The workshops were made
available to schools across southern Saskatchewan, so often a group of instructors was
required to travel several hours to a rural school. When instructors were not occupied
with workshops, they continued to work on camp theme days at the University.

3.1.4 Summer camps

Workshops concluded in the last week of June and instructors prepared and
learned the activities for the upcoming summer camp sessions held at the University and
satellite locations. The first week of July was normally a holiday break with camps
beginning the following week. During summer camps, two instructors were assigned to a
group of 16-22 campers. On Monday morning, parents drop off their children and meet
their instructors. Once all are assembled, I introduce them to the camp, get them excited,
review housekeeping and safety rules, and let them know what to expect. After the introduction, each group went to start their first activity. Each activity room was set up by the instructor who designed the activities for that day. The camp had four theme days (Monday to Thursday) for activities. Friday was a culmination of the week and consisted of a science competition, science show, pizza party, water fight, and parent show.

For the Grade 2 and 3 campers, each day had a theme, but their week was connected by a weeklong narrative. On the first day of camp, something would happen, for example me being kidnapped. Following the event the campers had to use science activities to move the plot along and uncover clues to solve the problem. The technology camps did not have theme days and were instead focused on a weeklong project, with campers selecting what projects they would work on (for example, game design, robot building, 3D printing, computer programming).

Once a week long camp concluded on a Friday, the whole experience would begin again on a Monday for a new cohort of campers, with tweaks and other developments incorporated based on the previous week’s experience.

3.2 Data collection

The data for my study were collected through surveys and interviews. I distributed an online survey to 37 former EYES instructors who were no longer employed with the program and did not intend to return. I was still the EYES coordinator when I began my research and did not want to create a conflict of interest for current staff members. After sending a reminder email, I received 21 responses out of 37 requests. The survey was anonymous and responses were collected in January and February of 2015. The survey questions consisted of demographics and educational background, initial
interest in the EYES instructor position, reflections on their STEM education experience, the design of the EYES program, relationships with other staff, new insights learned, impactful experiences, and positive and negative experiences. The survey questions can be found in Appendix A.

The survey presented an opportunity to volunteer for an in person interview. Eight of the 21 instructors who completed the survey volunteered to participate in an interview. The interview was separate from the survey so I was unable to connect the survey responses to the interview data. The interviews were conducted individually during April and May, 2015. Two instructors chose to do their interviews together, which I allowed because they were in a relationship together.

The interview had a flexible structure, with the initial questions focusing on the main take away experiences of the EYES program. I noted the themes from the responses to this question, and then proceeded by asking them more about each theme. As the interviews were more conversations, I did not include an interview protocol. The interviews were 10 to 20 minutes long and were digitally recorded. I later transcribed the majority of the interviews but did summarize stories and examples participants used to support their statements. I also ignored personal remarks that were not related to the interview such as introductions and goodbyes. After the transcripts were complete, I did not send them back to the participants to review as I did not think it was necessary. I followed up with one interviewee to clarify a statement, and she emailed me back with additional information.

Post experience surveys and/or interviews are a common tool in research and were used by multiple authors in my literature review. Post experience surveys were used

To review and analyse the survey data, I began by reading each respondent’s answers sequentially to gain a better understanding of their overall tone and to provide more context for their answers. After this step, I read all of the answers to each specific question in the survey to identify any trends or distinctions between instructors. A similar approach was used for the interviews. I listened to the recordings of the interviews and then tried to connect any themes to their responses.

I would also like to acknowledge the autoethnographical aspect of this work. My story is also part of this narrative as I cannot separate myself from this work. This approach is used by many other academics including Jones (2005), and Ellis and Bochner (2000).

In order to conduct this research, I submitted an application to the University of Regina’s Research Ethics Board prior to beginning data collection. An approval letter for the project was subsequently received and a copy of the letter and consent form for the interviews are in Appendix B.
CHAPTER 4: Analysis of the survey data

4.1 Demographics

The survey was sent to 37 former instructors and I received 21 responses. The shortest total word count for the 13 reflective questions was 162 words (12 words/question). The longest survey had a count of 7842 words (603 words/question). The average survey response had 1676 words (129 words/question) and the median response had 889 words (68 words/question).

Most instructors had worked at EYES in the three years previous to the survey. However, there were also instructors who had not worked at EYES for a longer period, the longest being 13 years. The respondent instructors identified as 8 males and 13 females. The group had a diverse range of educational backgrounds including science, education, arts, health studies, and engineering. All the participants were instructors when they were between the ages of 18-24. Table 3 shows the number of summers the respondents were instructors. A review of the instructors who only worked one summer at EYES showed positive experiences but less in depth responses. They recommend the position, and one even served on the EYES board for 10 years after completing just one summer.

<table>
<thead>
<tr>
<th>Years of Experience</th>
<th>1 year</th>
<th>2 years</th>
<th>3 years</th>
<th>4 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Respondents</td>
<td>3</td>
<td>10</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

*Table 3 Years of experience working at EYES*

Two survey participants worked for EYES before I began but the remainder worked with me during my time as the EYES Coordinator. Eight of the participants were still in university programs when they completed the survey.
Table 4 shows a summary of the reasons why the 21 respondents chose to apply as EYES instructor. The survey allowed for more than one reason to be selected.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Number of Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>I like working with children</td>
<td>20</td>
</tr>
<tr>
<td>I like science, engineering, and/or technology</td>
<td>19</td>
</tr>
<tr>
<td>I needed a summer job</td>
<td>18</td>
</tr>
<tr>
<td>I thought the experience would look good on a resume</td>
<td>15</td>
</tr>
<tr>
<td>It was connected to my degree</td>
<td>13</td>
</tr>
<tr>
<td>It helped me prepare for my future career</td>
<td>13</td>
</tr>
<tr>
<td>It was a decent wage</td>
<td>11</td>
</tr>
<tr>
<td>Someone told me I should</td>
<td>5</td>
</tr>
</tbody>
</table>

*Table 4: Reasons instructors stated for applying to EYES*

4.2 Instructors’ preferred grade levels

Survey Questions – *What age range did you like working with the most?*  
(Multiple choice) *Why did you enjoy working with that age group?* (Text response)

EYES has programming for youth in Grades 2 to 9, however programming for Grade 2 and 3 campers was only introduced in 2011. The survey divided programming into three age categories. Grades 2 and 3, Grades 4 to 6, and Grades 7 to 9. Table 5 shows instructor preferences for working with different grades of EYES Campers. Instructors were able to select multiple age categories.
<table>
<thead>
<tr>
<th>Grade Level Most Enjoyed</th>
<th>Female Respondents (13 females)</th>
<th>Male Respondents (8 males)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades 2 and 3</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Grades 4 to 6</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Grades 7 to 9</td>
<td>9</td>
<td>7</td>
<td>16</td>
</tr>
</tbody>
</table>

*Table 5: Camper grade level preference of instructors*

Most instructors enjoyed working with youth in Grades 7 to 9. One instructor stated, “the older kids were the most mature and could handle more in-depth concepts. In my opinion they are also more well-behaved and easier to joke around and have fun with.” The instructors found these campers easier to relate to because their mental maturity. They found humour could be added to the curriculum, and more complex science concepts were discussed. Campers were able to solve their own problems, and at that age range, they really wanted to be at camp. Some instructors found the older campers harder to engage as they could not “play” with them. As the Table 5 shows, this age group was the most popular overall with instructors.

The instructors who preferred working with youth in Grades 2 and 3 reported enjoyed the energy and excitement that the campers brought into the program. As one instructor responded, “I loved the juniors [Grades 2 and 3] the best because they were just constant balls of energy who were prone to submersing themselves into the complexity of the wonder we tried to create for them”. Leaders had the opportunity to be “silly” with students but were also respected. Another instructor said, “it’s a really nice feeling to have a group of kids who fervently believe you are the coolest person in the universe”. Some instructors reported that they did not prefer working with this age group, citing that they felt like they were doing more babysitting than science. “I found that it was
primarily arts and crafts time. Scientific investigation at this age was so far removed from
the majority of my science experience that I had a hard time connecting it to ‘authentic
learning’ in my heart, even though intellectually I know that this is what science is for
this age group.” Our programming for this younger age group began in 2011, and was
designed with a multidisciplinary approach to learning about science. We developed a
weeklong story that the campers were a part of, and science and engineering were needed
to advance the plot. While this style of programming is effective for the campers, not all
instructors liked working with younger children through this format.

Campers in Grade 4 to 6 (ages 9 -12) were the least popular age group with
instructors. As one instructor said:

This is an awkward age, I find. The kids are stuck between being adorable,
innocent youngsters and mature, intelligent youth. They have all the energy of the
younger grades, but more attitude and resistance to authority. If anything, I think I
found my wee weeks with this group to be the most exhausting and mentally
demanding.

Only three stated this age group was their favourite. Instructors who preferred this age
group liked the increased independence and found the campers still had excitement.

However, most instructors did find this age group to be challenging. The transition
sentiment was mentioned by several other instructors and was one of the primary reasons
why most instructors preferred working with other age groups.

4.3 Keys to working with children

Survey Question - If you can, describe an instance where you gained a better
understanding of how to work with children.

Few individuals could recall specific examples on this question, but they did
articulate nearly 30 different insights about gaining better understanding of children from
their EYES experience. The most frequent response (five instructors) was that each child/group is unique, and there is no single solution to every problem. As one respondent put it,

… while certain approaches might generally work, each situation and each camper was unique. Taking time to talk to them and understand what they were feeling or why they were behaving a certain way was always more effective than trying to stick to specific rules or approaches.

The insight of individualized methods were noted in the instructor's responses. The next most frequent insights were building relationships with the campers and developing patience, both were mentioned by three instructors. Learning from the campers and other instructors was mentioned twice, as was staying positive. There were other answers that were mentioned by only one instructor. These answers could be combined into a more general category of listening and learning.

4.4 Camps for underrepresented populations

Survey Question - *Were there specialized camps (All-Girls, satellite camps, off-campus programs, Open Door Society, Overnight camp, French camp, etc) that you were a part of, and what were your thoughts about those camps?*

EYES has multiple programs that target underrepresented populations in science and engineering. Instructors provided programming for rural youth (satellite camps), our All-Girls camp staff by women, outreach camps for low income populations in Regina which included a large percentage of Indigenous campers, and our partnership camp with the Open Door Society for newcomers to Canada. These programs were more independent in their design, and were often not held at the University of Regina campus. At the time of the interviews, satellite camps had been held in Shaunavon, Swift Current, Assiniboia, Moose Jaw, Foam Lake, Esterhazy, Balcarres, Weyburn and Estevan. The
camp locations changed each year depending on camper interest and location availability.

The instructors’ perspective of these camps were positive. One instructors commented:

I was also involved in a satellite camp in both of my years at EYES and I always looked forward to them. We were given the responsibility to run our own camp and carry out our activities based on our own schedule. It provided us with independence and leadership skills.

Instructors enjoyed the additional responsibility and independence of these camps.

Instructors also had a sense of stronger relationships as the environment was more isolated and the groups were smaller, allowing instructors to spend more time with the groups. The camps were usually held in a single classroom or gym with less than 20 campers and two instructors.

The All-Girls program had overwhelming positive feedback from the women who staffed the camps. As one instructors stated:

All-Girls- so so so much fun. As a female in STEM I feel that this program is so important for helping to foster an environment in which the girls feel comfortable enough to explore, make mistakes, and ask questions. I could really tell that the girls felt comfortable with each other and with their instructors. That is so important for facilitating positive learning experiences for girls. Also, being a female role model for girls in STEM was really important for me because it helped me to realize how important breaking down stereotypes about STEM is for girls.

Another instructors continues the positive report:

I was a part of the All-Girls camp twice and really enjoyed it. I thought having a group of girls who are able to freely engage and connect with both each other and the curriculum material was really rewarding. Not being from an education background, I was surprised how different the girls acted and responded when not having the boys in their group (as compared to those campers I had had in mixed groups).

Instructors valued that they provided opportunities for girls to meet and interact with both role models and fellow interested campers in a safe and positive environment.

As another instructor mentioned:
This camp is unreal. It's a really awesome atmosphere for female empowerment. Meeting other girls there that enjoy STEM activities, seeing female scientists and engineers, experiencing an all-female week at camp, all of those things are super important for young females to experience.

Instructors also reported that they noticed a difference in the girls’ behaviour without boys present. Specifically, the girls were able to be more relaxed and open up and share their thoughts in the all-girls environment.

Instructors reported that the outreach camps to low income neighbourhoods in Regina were challenging but built new or enhanced awareness and provided an ultimately rewarding experience. Prior to taking part in the outreach camps, many instructors were unaware of the daily realities that lower socioeconomic youth in Regina experience. “The experience was a different kind of challenge and helped me to see some of the incredible disparities within our city.” The importance of the outreach camps targeted at lower income and at-risk youth who might not otherwise have the opportunity was highlighted by many instructors including the three instructors cited below:

I feel particularly strongly about the importance of the camps held off-campus within Regina. While the camps could be challenging, the dedication of my coworkers and EYES as a whole to creating similar positive science and learning experiences for underserved youth was one of the reasons why I worked at EYES for as many summers as I could.

I also took part in outreach camps, which was amazing and eye-opening to say the least. This is by far the most important part about what we do, in my opinion.

This was my favourite and most challenging part of working for EYES. I found the camps to be most rewarding as the youth with whom we were engaging were the kids most underserved by the system. This had its challenges (specifically behaviourally) but also made it so that when things went well, I was so proud of the campers.

Instructors thought that these camps were difficult experiences, but were ultimately valuable to campers and instructors.
4.5 Curriculum development

Survey Question – How important was it that you were a part of designing the curriculum for the summer camp?

Something that distinguishes EYES from other science camps in Canada is that its curriculum changes and is recreated each year by the staff. Most camps in Canada recycle their curriculum from the previous year, which saves time and money. EYES is deliberately different to provide an engaging experience that also motivates campers to return each year. The instructors surveyed largely support this initiative. In addition to attracting campers, this approach made the staff feel connected and accountable for the curriculum – it provided a sense of ownership. One instructor stated:

I took a lot of pride in creating cool activities (and consequently a lot of frustration when things didn't work well). But it also helped me ‘own’ the camp. I felt like I played a really important role in how camp actually ran. Rather than being an instructor, I felt like a co-creator. Also helped me work on my teamwork skills and gave me excellent experience at creating content.

In addition to a sense of ownership, developing the curriculum and activities helped with team building and imparted a practical understanding of the activity’s purpose.

Instructors said this approach increased their enthusiasm and was an overall great experience. Only one respondent said that the process was not important, and that they were more interested in understanding how the program worked. Other instructors stated this development was the most important part of the program design:

I might have learned more from this than from anything. Meeting deadlines, having creative ideas, seeing your ideas fail and making decisions to put the work in to make them better or scrap them all together. Being able to work with someone who may not have the same ideas as you. All just really important real world skills.

I feel the curriculum design aspect was a positive learning experience for me. While my career path is not directly related to education, an understanding of
program design and the challenges of working as a team to produce a successful outcome are important skills for most areas.

Even those instructors who were not in teacher education programs reported that curriculum development was worth their time. They understood that the value of skills development, such as creativity, resourcefulness, planning, and creating and meeting deadlines, transcends all career paths. Ultimately, this approach to curriculum development was a valued experience for instructors and helped them both better understand and feel connected to the program.

4.6 Gaining an understanding of science, engineering and technology

Survey Questions – If you can, describe an instance where you gained a better understanding of a concept in science, engineering or technology. (Followed by) As a result of EYES, did you have a change in attitude towards science, engineering or technology?

Most EYES instructors gained a deeper understanding of different concepts and theories in science, engineering and technology through their work experience:

We created a game during my first year of EYES called “Bohr Ball”, and I was studying for the MCAT last summer and I was so confused about a concept and then I realized that it was talking about the concepts that we had gone through when creating Bohr ball and [that recall] helped me to understand it.

These insights about science concepts also came through interactions with campers:

Most often it is in answering questions about natural phenomena that I honestly haven't thought of before. ‘Why is snow white but ice is clear, both are just frozen water?’ is a good example of forcing me to think through my knowledge already and making connections between concepts I hadn't already made.

While specific knowledge was the most common response, many stated that no longer being scared of ignorance was an important personal development:

EYES made me less afraid to not understand. I always believed that science was
fact and that it meant understanding the world around me. During my time at EYES I came to the realization that I do not know everything, science does not know everything, we only know a small portion of the knowledge that is out there. It is okay not to know something, or not to know how to put something together, the true beauty is what you do to figure it out. Science requires a lot of creativity and imagination to find success.

A similar sentiment was echoed by two other instructors. The idea in this comment is that it is all right to be wrong, and not to know all answers all the time. Science is not answers, but the pursuit of answers. One instructor response provided insight into a common barrier to pursuing science education – the fear of being wrong and not being good enough to be involved in science.

I always liked [science], but I thought I wasn't smart enough to really learn more. EYES showed me that these things don't have to be difficult, and it's better when it's done in a fun and engaging way.

This instructor eventually came to understand that science was not just approachable and engaging, but could be fun as well. Below, two instructors in their final reflections commented on their understanding of science:

I've learned a ton of cool science tricks, and I will hopefully never lose the mindset that science is more than just theorems and formulas - it is just as much delicate experiments and pages of mathematics as it is a garbage can flying through the air, powered by a liquid nitrogen bomb.

EYES ingrained a sense of wonder about the world, the excitement of discovering new things, and the appreciation of the nature of science.

Most instructors did not experience a profound shift in their attitudes about science, and most came to EYES because they already had a strong positive impression of science, engineering and technology. Some reported becoming more comfortable in a science based environment, and others found science more enjoyable. One instructor realised that science is not just exclusive to the academic environment.
EYES helped me see the ways in science can be used as a tool to engage youth in learning in general and its importance beyond an academic/professional level. Science is cool and exciting; kids who come for the explosions may someday stay for the research, be it in science or in a different field entirely.

The instructor’s experience suggests that science camps can be used to get youth excited about learning in general, even if their interest leads them to different areas outside of science.

4.7 Positive staff relationships

Survey Questions – Describe the relationship you had with your fellow EYES colleagues. (Followed by) How did the staff relationships impact your experience?

All staff reported having a positive experience with their EYES colleagues, and many staff remained friends after their camp experience concluded. One instructor, whose last year with EYES was in 2002 stated, “I still keep in contact with many of them!! and that was a LONG TIME AGO!” One instructor shared how staff relationships were a meaningful benefit:

The fact that I am still very close with many of my former EYES colleagues is a testament to the strong relationships that EYES employees can build with each other. I think the employees are selected because they share an interest in science and/or education, and they are creative people who can work in teams. I found all the employees to be very intelligent as well, so mostly everyone was able to make their own unique contributions. Sometimes these contributions were in the form of an interesting idea for an activity, a creative way to present an existing activity, or a useful method of dealing with behaviour problems.

Another instructor reported that the group dynamics made the work easier:

I felt like I became such good friends with my EYES colleagues during the summers I worked there. I've never had a super big friend group, but at EYES I felt like I had met a group of people that all were so passionate about similar things. I cannot think of another group of people that I wanted to work with for 8 hours a day and then spend time with on the evenings and weekends. I was inspired by many of them, and some of them continue to be my closest friends today.
One instructor likened connections made with fellow staff members to family:

The initial years I was an instructor, the EYES group was like family. It was such an intense job that sometimes required groups to stay and work over time to get ready for the next day. When that happened there was always people that stayed and helped even when they did not have to, we would just pump the music and make it into a hangout time. I feel this kind of mentality is what made the difficult days easier, and helped us be efficient at solving problems.

Two respondents brought up friendship in their final overall reflections of the EYES program:

EYES has been an inspiration for me to be a better person in life. (most cliche thing I've ever said but true nonetheless) I have made lifelong friends through my time at EYES and I have no idea where I would be if I hadn't of applied here.

EYES has also given me some of the best friends I've ever had. People that I care about and make time in my busy days to meet up with.

For one instructor the experience was more introspective:

I learned that no kid is going to care how many hours you worked or how many colleagues let you down or how many science stores have crazy hours, as long as the product gets done. A ‘pity me’ attitude doesn't exist, so don't pretend to have one. I learned that I value working with kids much more above trying to impress my coworkers.

Finally, the staff relationships provided an opportunity for people with different backgrounds to interact which was inspirational for some instructors:

Having people from a wide variety of backgrounds, I was also able to learn a lot from them. Being in an atmosphere of intelligent, successful, and driven people has definitely made me more motivated to pursue my own academic and career goals with more vigour.

Many instructors mentioned the benefit of having a diverse team in other parts of the survey. The diversity of backgrounds gave exposure to a wide breadth of experiences and knowledge.

4.8 Instructors’ overall reflections

Survey Questions – Thinking back on your experience, what were some of the
Thinking back on your experiences, what were some of the least positive experiences?

Instructors were asked to reflect on their positive and negative experiences. Their responses can be grouped in two categories: positive experiences with other staff members and positive experiences with campers.

Building relationships and becoming friends with staff members was mentioned by 13 respondents. One instructor shared that “the road trips with coworkers were always a blast and a great way to get to know people. I loved our PD [social] events where we became closer as friends, not just coworkers.” Another instructor said that “developing a strong team, both on the retreats and throughout the summer, was a highlight of my experiences with EYES”. Four respondents felt they did more than their share of the work. They did not enjoy “weekends and evening spent working on activities with one or two team members when others were supposed to be helping us”. Within working conditions, long hours and cleaning up the camp rooms were both mentioned in a negative manner.

Positive experiences with campers were varied but still frequently reported in responses. Eighteen of the 21 respondents mentioned their time with campers as a positive highlight. Some instructors enjoyed the teaching aspect of EYES. “It is very rewarding to see campers take a strong interest in what you are teaching them”. Many comments mentioned positive experiences helping a camper to understand something, and visibly “seeing the ‘I got it!’ lightbulb turn on for campers”. One instructor recalled a moment that had a significant impact:

A camper whose mom was undergoing chemotherapy approached me and wanted to talk about what was happening to her mom. I explained how chemo would help
her mom using some of the concepts we had discussed on ‘human body day’ and it helped put her mind at ease. It was rewarding, and also so amazing that having knowledge helped the camper to feel more confident handling the situation that she and her family were experiencing. It was my first experience with empowerment through education.

The time spent working with children was a highlight reported by many instructors, but several expressed a broader appreciation for encouraging and fostering learning in science and engineering:

I think teaching kids about engineering and science at such an early age is so important. I am a female engineer, who works primarily in Oil and Gas. Although times have changed and there are more women in Engineering, it is still a very male driven field. However, irrelevant to the woman/man discussion, I see so many kids that think they are "bad at math" or "think science is boring"...then you see them at a camp like EYES and they don't even realize they are learning....now THAT is brilliant!

Other instructors noted the EYES programs that targeted at under-represented groups, such as the girl’s program, satellite camps and outreach camps. The positive impact on instructors resulted from both the time spent with the youth, and the intent of those camps to reach under-represented groups.

For negative experiences, unengaged campers could be difficult for staff. As one instructor mentioned:

The least positive experiences came when some kids just were not having a good time. Even when we tried everything we possibly could to help them have a good time it just was not cut out for them. It was very difficult to not take that personally and get upset about it, because you put so much effort into their experience.

The challenge for instructors did not stop with unengaged campers but also included behavioural issues with campers.

When an outreach camper was harassed at the university by an on-campus camper. He cried all day but wouldn't tell us what happened. It was so sad to see a kid who was so tough be so hurt by his experience. This underlined the importance of offering the experiences we do.
Another theme of the instructors’ challenges came from interpersonal relationships, both with other instructors and campers. There were some structural issues mentioned, such as long hours and cleaning, but most challenges came from instructors trying to engage uninterested and unhappy youth and dealing with uncooperative staff members.

4.9 Instructor skill development

Survey Question – *Did you learn or improve any skills that are currently beneficial to your current profession?*

A wide range of responses were given, summarised in Table 6.

<table>
<thead>
<tr>
<th>Skill Gained by Instructors</th>
<th>Number of times mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>How to interact with children</td>
<td>11</td>
</tr>
<tr>
<td>Explaining a concept/teaching</td>
<td>8</td>
</tr>
<tr>
<td>Lesson planning</td>
<td>6</td>
</tr>
<tr>
<td>Organization/Planning</td>
<td>6</td>
</tr>
<tr>
<td>Team work</td>
<td>5</td>
</tr>
<tr>
<td>Creativity</td>
<td>4</td>
</tr>
<tr>
<td>Presenting</td>
<td>4</td>
</tr>
<tr>
<td>Classroom management</td>
<td>4</td>
</tr>
<tr>
<td>Patience</td>
<td>3</td>
</tr>
<tr>
<td>Communication</td>
<td>3</td>
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<tr>
<td>Safety</td>
<td>2</td>
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<tr>
<td>Research</td>
<td>2</td>
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<td>Time management</td>
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<td>Leadership</td>
<td>2</td>
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<tr>
<td>Confidence</td>
<td>1</td>
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<tr>
<td>Trying new things</td>
<td>1</td>
</tr>
<tr>
<td>Interacting with parents</td>
<td>1</td>
</tr>
</tbody>
</table>

*Table 6: Skills gained by instructor*

The list in Table 6 was limited to skills question in the survey and similar responses were
grouped together. The complete list of skills mentioned in all survey questions can be found in Appendix C.

Some instructors described situations where the skills they developed while at EYES have been useful in different circumstances outside of the program, including in their professional lives. One instructor mentioned, “There have been so many times when I haven't known how to do something at work and I think ‘How would we have done this at EYES?’” A second instructor pursuing a career in the health field said, “The ability to translate science into digestible portions is also a key skill, whether it is complex theories made fun for children or health messages made understandable for the public”. In an interesting response, a third instructor said:

… explaining science to children and politicians is pretty much the same... But actually learning where to start in an explanation, what your audience might know and might not know and how to build a coherent scientific explanation for a non-scientific audience was very helpful.

Finally an instructor stated the EYES experience had a significant impact on her:

I think the interaction with such a broad range of campers from such diverse backgrounds gave me some unique insights into the gaps within society and helps to inform and develop some of the areas that I am really interested in improving in my career. Of special note would be the interactions with rural and remote students and those living in lower-income areas in the urban areas.

These insights show that serving as an EYES instructor had a strong impact on skill development for most instructors, that they were able to use them in other personal and professional settings.

4.10 Professional impact on instructors

Survey Question – Please consider your experiences at EYES, and describe how they impacted you personally and/or professionally.

The survey demonstrated that the EYES experience had varying impacts on
instructors’ professional development and in some cases it actually influenced their choices in pursuing a certain career path. In other cases, while the experience at EYES did not determine a career path, it did serve to broaden perspectives and assist in important skills development, including leadership, presenting to diverse audiences, planning, resourcefulness, teamwork, and managing relationships. In terms of motivating career choices, one instructor stated:

I can 100% say that EYES changed my direction. Because of my experiences at EYES I have become passionate about Aboriginal education and advocating for youth that are underserved by the traditional system. EYES challenged me, pushed my boundaries and showed me how to use my skills to have a positive influence.

Another instructor reported that:

Working at EYES helped cement my desire to work directly with people and with children in particular. My experience working at off-campus camps was particularly important in shaping my career goals. Intellectually, I was aware of the challenges facing at-risk youth but working in community schools more directly exposed me to the realities of their lives. While my career will not involve educating youth, my research and future goals involve the health of young people. I always liked kids, but working at EYES was one factor that influenced my desire to work towards a career in improving quality of life of children, particularly for at-risk populations.

In terms of strong positive impact, a third instructor provided the following insight:

While EYES has not changed my career choice to be involved in the sciences, it has given me a broader appreciation of all the different types of sciences. Occasionally when I learn a new scientific concept, either in school or not, I will unconsciously try to think of how I might explain it in a different way, or even a kind of activity that could go along with it. I think it has also improved my confidence in speaking in front of a group of people, which I do a few times on a weekly basis. I definitely enjoy working with children (older ones), although I haven't adjusted my career path to be one where I work with children.

Similarly, another stated:

While EYES didn't exactly determine my career path, I can't help but think it affected it somehow as I was making some of the most influential decisions of my life at the time. It also taught me many extremely useful skills that allow me to be a better pharmacist and a better person.
EYES had a positive impact on instructors pursuing a career as teachers. The quotations below describe how their experience at EYES has impacted their teaching abilities:

EYES made me the teacher I am today. The experiences I had through EYES lead me to design and build a STEM curriculum from the ground up, in only my 2nd year of teaching. In my own school I've become the go-to science and technology guy, mostly because of the learning that was sparked when I worked with EYES.

Although I don't see myself ever going back to work for EYES in a summer, I know I wouldn't be seeing the success I see in my current position [teacher] if it weren't for my time with EYES.

I improved my teaching by becoming more involved in Science, planning more, constantly having to use classroom management, and understanding what it means to have fun doing Science.

My experience with EYES confirmed that I wanted to work with children for my career. It introduced me to all of the challenges that education provided, and armed me with resources and experience needed to develop a strong foundation entering the field as a science teacher.

It definitely reinforced my desire to become a teacher and work with children. Professionally, it taught me that engagement is a HUGE part of student learning. All of my university courses talked about the concept of engagement, but EYES showed me what that really looked like.

There's not a single day where my experience and skills from EYES don't play a part in what I do.

Each quotation powerfully shows how meaningful the EYES experience was on instructor development. Most notably, future or current teachers were able to articulate the impact EYES had on their professional development. They believed it imparted to them examples of teaching success and other key lessons and insights for their profession.

This chapter presented findings from survey data that was anonymously submitted. The following chapter analyzes the data recorded from eight personal interviews with former EYES instructors.
CHAPTER 5: Analysis of the interview data

5.1 Emma’s interview

Emma worked at EYES for two years. At the time of the interview, she was completing her Bachelor of Arts in English and then planning to pursue law, after teaching English in China for one year. She is presently completing her second year of Law School. I have worked with Emma both at EYES and Lumsden Beach Camp, where she was a cabin leader counsellor. While Emma did not have a strong science background relative to other instructors, she was highly resourceful, possessed an excellent attitude and was able to gain confidence by helping in other areas, such as developing creative learning methods and programming options.

Emma initially thought that she would prefer working with the older campers at EYES, but through her experience, discovered that she preferred working with the youngest campers (Grades 2 and 3) in their science story adventures:

That was a surprise that I like junior camper the most but it was outrageously fun …Those kids are the most imaginative and creative little monsters that you will ever see in your entire live. And just the pure joy of their faces when you told them this made up stories and how much they believed it and would go on with it. How much they actually cared for Ben after just meeting him for a few minutes and that he was captured by pirates, it was all worth it and I would do Junior every week for many summers if I could.

Emma explains here how she gained confidence and initiative during her time at EYES:

Working with kids, confidence comes you needed to quiet everyone down, I swear, once every minute or something along those lines with juniors. So the repetitiveness of that just really helped with the, not necessarily second guessing myself but just jumping into a leadership role right away, because if the counsellors stand around and say, we need to quiet them down, how are we going to do this? It wouldn’t work. So I would just automatically yell, politely, but with authority and so I think that helped.
Confidence also came from a vulnerable state and being compelled to do a good job. I was probably the least qualified to be on science show because my experience with chemicals was much less than the others that I actually worked with but nonetheless I think I did most of the talking at the shows because of what I lacked in chemistry knowledge I made up for in loud voice and I felt I was compelled to do that because if I felt I wasn’t pulling my weight in one aspect that I could make up for in the other and so I kind of drove that even more leadership/confidence … What I lacked in knowledge right away I could easily research and make up for with hard work.

I feel if I have something to say in a large group, especially group work when working with others. I don’t hesitate, I don’t automatically second guess my ideas and see if they are stupid or not and I’m very quick to explore everything and have my ideas heard … I think in just an overall perspective, even if I am not doing group work, I just feel more compelled to do things. Instead of second guess myself in any situation … I find myself not lulling on it [decisions] and am more prone to acting.

Emma gained a new understanding of engineering.

I think before I started with EYES, my idea of engineering, to be kind of honest, a little bit of stereotyping, most of the people who I knew who were in engineering were not very nice guys who were very cocky about being in the program, and so my view of the engineering faculty as a whole was kind of like, they kind of put down arts majors, I don’t know if I really like engineering that much. … Engineering is so much more than we think it is … My concept of it is more wonder now instead of ‘Ah, those guys are so mean.’

Emma had a meaningful experience with the outreach programs to lower income schools.

I think I was helped much more than I helped the kids, because it kind of opened my eyes to a whole other side of the city that I had no idea about.

We had a fantastic group of 12 kids that would keep coming back everyday, and they lived in a bad part of town, but they were incredibly happy all the time, just optimistic, to see how intelligent they were at activities, while also realizing that they might not have the privilege to go on with it, say at University, not be able to afford tuition.

We also got an insightful view into a couple of the domestic disputes that go around on that side of town. It is eye opening to see what they have to view on a daily basis and how much that would actually affect their lifestyle. It was great and I feel if more people like myself would see this on a more daily basis or not even on a daily basis but more in general than we would definitely be more prone to be advocating programs like EYES.
It was probably the number one impactful experience of the two years that I worked there.

As Emma talked about her outreach experience, I could tell she was having a strong emotional reaction to the memories she had. Her words became slower and her breath more controlled.

During her time at EYES, Emma developed a deeper awareness of the experience of those in low income communities, including in Regina. She also changed her perceptions of engineering, realized she enjoyed working with younger children, and gained more confidence in herself to become a leader.

5.2 Olivia’s interview

Olivia was an instructor for two years and had not worked for EYES in the five years prior to the interview. At the time of the interview, she had an Education degree, was working on her Master of Education, and was employed as a high school science teacher in Regina. Olivia’s primary observations about her experience at EYES was that it was helpful in developing her teaching philosophy and practice, as well as introduced her to some of the disadvantages that exist for youth in the education system.

Olivia talked about the All-Girls program:

At the time, I didn’t really understand because I was that person who had been comfortable around males and females and I had been my whole life. The more I work with students I find isn’t always that comfortability between the genders. These girls felt free be themselves and take chances without the idea of a guy being there. … It sounds weird that a young kid would do that but it was very evident in the schools and is a big factor.

Balancing gender slowly translated that part into my career as well. I try to put equal number of pictures of males and females in my notes. Showing that subliminal message that females can do science.

Olivia also reflected on her experience with the outreach camps:
The inner city camp was a real eye opener about the disadvantages that some people face ... These science concepts, these ideas are not the most important thing in their life

For me once again, the relationship building, has directly translated to career. The camp experience was my first real look at how others see the world. Not that I truly understand. I deal with students similar to that inner city camp on a daily basis and I think that is were my teaching style comes from. The idea that not all of them are going to be scientists, and that is ok.

She also spoke about her understanding of the importance of school and her professional development:

As a teacher and an education student, I was the kid that always liked school. My mom and dad are still together, I have two younger brothers, I always did ok, I always had three meals. It was pretty easy for me to do ok in school. You just showed up and the grades happened. Whereas these kids have so many other adversities to face before they get there. As a teacher, it is really important that you recognise that they have lives outside of your classroom. And I think that a lot of teachers forgot that sometimes. They think that school needs to be the most important thing, and for some kids it is not ... I recognized that maybe not everyone views school like I do.

It changed how I viewed Science Education ... I can focus a lot on critical thinking, decision making, real world situations, some background knowledge, I don’t have to worry about so much content. I can step back have fun and build that relationship and go from there. View their needs, and that is my starting point

A lot of times in education courses we are just practice planning. We never get to implement your planning and at EYES that is exactly what you did. We got to implement what we planned so we got to see what type of activities worked, what didn’t work. What things students liked within each activity and allowed us to build sort of like a planner.

I think EYES has made me the teacher I was at least when I started. I would not have been as capable as a first even second year teacher as I think I was without EYES...I learned, the ability to be flexible, to think, to plan for actually students.

There are a lot of teachers in their first year that get bogged down because things don’t go according to plan … As a teacher, I feel you have to think on your feet and adapt … Getting thrown into [EYES], and having a group of kids you don’t know their ability, you don’t know their background, you are trying to get your point across so you can get an activity going, have some fun. It isn’t always going to go the way you think.
I tell everyone that they should go into EYES. I am the biggest supporter of EYES around because of my experience with it.

EYES introduced Olivia to some of the disparities that exist in education in Regina and developed a better understanding of root causes that prevent students from achieving in the system. It broadened and changed her understanding of students and their diverse perspectives on and experiences in school and learning and it also made her more aware of the advantages she had going through the education system. She reported that developing this awareness has helped her as a teacher. At EYES, she was able to apply and practice her education and learning skills and reported that her EYES experience made her more prepared to enter the workforce as a teacher.

5.3 Sophia’s interview

Sophia commented that coming from a science background, she did not have a great deal of experience working with children. She worked with several age groups during her time at EYES. Additionally, Sophia noted that she grew up in Regina and had not spent much time outside the city. However, with EYES she travelled to small towns across southern Saskatchewan. During her time at EYES, Sophia was the youngest instructor in her group and the only science student in a group of education students. Sophia was a general Science student in the Faculty of Science during the two summers she served as an EYES instructor. She graduated and has been a pharmacist for three years. Sophia worked at EYES before my time, so I had not met her before her interview. Although we had not worked together, she volunteered to complete a survey and be interviewed for this research project.

Sophia comments on working with young children, learning patience and dealing with failure:
That was a big eye opener. I got experience on how to handle younger children, older children, working with children, learning how to keep them engaged. [I learned] patience; learning again my ideas aren’t going to work for everybody. Learning how to deal with difficult children, or children with learning disabilities. I notice it with my nephew now, I probably more patient then I would have ever been before. It could be pull your hair out frustrating, but that is where I learnt to be most flexible, think on my feet the most. I learned, that when something isn’t working, we try to revamp it this way.

[In the outreach camps] You couldn’t structure the day the same way. They just weren’t used to a very structured day to begin with ... We had to restructure how own day went. If we were not flexible, we could have a very frustrating day. I learned to be flexible and to have a backup plan instead of throwing all my eggs into one basket.

This camp was special to me, it just opened up a world of opportunities to these kids, who go to these schools.

Sophia commented that her EYES workshop experience exposed her to some of the sexism that exists in science:

I remember walking into one school in some small town. Some of the attitudes you get in there are hilarious. It was big farming and oil town. [former EYES Coordinator] was really big an pushing we are always going to have a guy and a girl presenting or have two girls, so that we would always have a female role model. This little boy puts up his hand and says, ‘My dad told me that science is kind of more of a blue colour and that boys do blue things and girls do pink things, like laundry and cleaning. Here in this classroom with 30 kids. 1) You want to laugh, 2) You want to slap his dad. How do you handle that situation? You learn to think quickly on your feet. Open my eyes a bit about some prejudices that were still out there. Pushing girls to be involved.

I always thought, ‘There is no discrimination, there is no issue. I am going to apply for sciences. I am sure every other girl thinks she can apply for sciences or go do whatever. I was kind of blind to the fact that there still were some prejudices out there.

One unique aspect to her experience was being young, which carried over to her professional life:

That has come a long way in my profession, especially graduating at 23 years. I was in a pharmacy setting. I was a leader of that team whether the technicians or other pharmacists are in their 50s, or the same age as you. I had to step up and lead them. EYES definitely helped me step up to that leadership role. I learned to
earn respect despite my young appearance.

She also gained confidence that helped her in her professional life:

It [Gaining confidence] was one of things I was most thankful for. I got experience southern Saskatchewan. I had to go to all these places most people have never heard of, or have never been to in their lives and also experienced the hospitality of those people.

Sophia commented about the overall EYES experience:

There were some frustrations when dealing with a group of people that are all outgoing, and all have a lot of ideas, and they all want to put them forward. Overall, I remember having so much laughter, so much fun.

Sophia described several benefits that she gained from her summers as an instructor at EYES. She gained valuable experience learning how to work with children and youth while at EYES, and described several skills that she used as a pharmacist. As well she learned more about the rural environment and people in Saskatchewan.

5.4 Emily’s interview

Emily worked at EYES for three summers while pursuing her undergraduate and graduate degrees. At the time of the interview, she had not been with EYES for two years. Emily has completed a Master’s Degree in Public Health and had recently started Medical School at the time of the interview. Prior to EYES, Emily not have extensive experience working with children.

A main take-away for Emily during her time at EYES was discovering an interest in working with children

I was impressed with my coworkers who had more experience working with kids than I did and I enjoyed seeing how they interacted with them, and how meaningful their interactions could be, how they could make this the best day ever.

She shared a story about one camper forgetting his bathing suit and was so disappointed
that he could not participate in the water fight that day:

It wasn’t just him missing the water fight. It was absolutely devastating. By recognizing that this was something real to him, even though I thought it was kind of silly, as an adult I thought it was silly, recognizing how important that was to him and helping him reframe it in a way that made his day the best day ever was something I really enjoyed.

I learned that I wanted to work with kids. I always liked kids. I always liked being around kids, but I never really considered working around kids as a career option for me. I hope to pursue a career in pediatrics. I think EYES opened my mind to that possibility.

Emily also reported on developing high-functioning team dynamics at EYES:

I also think I learned a lot at EYES about what makes a team function well and how to sort of strong leadership can help build a highly functioning team or a more properly functioning team. We had a lot of fun at EYES. We did work well as a team while it wasn’t always perfect, I think we had a lot of fun and were really successful in what we were supposed to do. I think that is something that is applicable, no matter where you are working or were your life ends up. Learning how to be both part of a team and watching the ways, that you and Mark [the assistant coordinator] sort of helped guide our team in team building, and different team activities, even the way you selected your staff. I think a bunch of learned about how that could be applied more broadly in our own lives.

I really appreciated how much effort you put into making sure we identified as a team. Whether it was with the PD days or social events or the team building at the start of the summer. That was something that was different than any other job I’d ever had, even ones that were team oriented. I think the fact that we both took ownership of the camp through designing our own things and having responsibilities for specific days. It wasn’t just that we were employees, doing our job we had a stake in how the day went. If the day didn’t go well, it wasn’t just a bad day, it was your day that was a bad day. I think that that, I know it motivated me work harder than I normally might have otherwise, I think that is something applies to a lot of different aspects of life, I also think that the fact that we all got along because there was effort put into forming friendships between us and forming relationships with the staff, even if we were working ten hours a day it was ok, because we were essentially with our friends. I think in an environment where it is based on having fun, we want the kids to have fun, if the instructors are having fun I think it is a lot more successful.

I think one of the reasons I had such a good experience with EYES, and I was sad to leave it when I had to. I found that our team leadership functioned on a variety of different levels. I think the office provided the head of leadership, especially at the start of the summer, and at the start of the camp you played a really active role
in. We knew what was expected of us. Providing a base for us to work from. And check in with us to see if we needed support or anything, but at the same time, I think that part of that leadership was allowing us to also work not unsupervised but relatively freely. Which I again I think increased our ability to work as a team and to develop leadership within our own staff … It is ok to let other people take charge and that is part of being a team is recognizing, that depending on the situation different leaders have different strengths.

EYES helped Emily discover an interest in working with children, something she hopes to focus on in her medical career through pediatrics. Emily also commented on the strengths of the teamwork she observed and participated in at EYES. She reported that the focus on building a team fostered strong personal relationships and leadership skills, which created a positive environment for everyone. It also created an environment of ownership, high performance and initiative, all of which are skills that are applicable in all professional settings.

5.5 Thomas’ interview

Thomas has a Bachelor’s degree in Math Education and teaches in an elementary school in Regina. He worked for EYES for two years when he was an Education student. After becoming a teacher, he continued to work for two more years, subbing in for a few weeks of his summer break.

Thomas remarked on how EYES impacted him professionally:

In EYES we got thrown in the fire which I think is one of the best ways to learn. You had to stand up in front of a bunch of kids you have never seen and get them excited and do your routine and the best part was that after that 45 minutes. You did it again. You did it again. And then you did it again. So over the course of those three four years. You probably did that 100s of times. How do you get good at something? You do it over and over and over. From the time that I got to actually having - taking control of my classroom. My internship. Other placements and eventually my job. That was second nature to me, I didn’t have to struggle with that, so many teachers do in those first few years. I still struggle with it at times, but am not afraid … As a teacher now that was huge. I wouldn’t be where I am today if it wasn’t for that.
I have learned how to develop curriculum that is engaging. Find interesting ways to get through boring concepts which I try to do every single day. Get that knowledge in my brain to theirs in a creative fun way.

I had to teach a course called STEM, Science Tech Engineering & Math all-encompassing for grade nines. We did 3D printing, we did a mini unit on Arduinos, we did hands-on maker science, as part of the science or STEM curriculum at the time. Had I not been exposed to the technology program at EYES, I am sure I would have been interested, I wouldn’t have been the go to person, as a second year teacher. I was the guy who knew how to use it, I was the guy who knew how to trouble shoot it. Had I not had that opportunity through EYES to get my hands dirty and try things with people who didn’t know what was going on I would not have gotten to that level comfortably.

I don’t think I would be where I am today. I am seeing a lot more success. Not to sound cocky, but I think I see a lot more success around my level of my career, as a teacher than other people who hadn’t had the same experience, at the same level. Most of the other teachers I know from EYES were right on the same pace. People who haven’t done it, have to figure all that stuff out – what we learned in EYES on their own. Without support, without the fun element, on their own time.

Thomas also reflected on his experience in EYES’s collaborative environment:

What was also useful was learning how to collaborate with people. A lot of time teaching is – you are social all day, you are with kids all day but you never get time to collaborate. We had time to work together. Plan together. Develop together. I hadn’t seen the true power of that until we got to that with EYES. Yah it was frustrating at times, but we were able to actually accomplish a lot. The sum is greater than its parts.

You find a way to sit down with that person and find a way to work with them. We did have a lot of similar interests but sometimes there is different personalities and approaches, ideologies on how to do this kind of stuff. You had to find a way to make it work. At the end of the day, there were kids coming to the camp. And there had to be stuff ready for them. The bar was set pretty high for us. I don’t think it was an unrealistic bar but it was a bar that we had to work together and you weren’t going to get there by yourself.

It was really neat to me as a teacher to collaborate with engineers and health people and other teachers from other fields. There were a few people who weren’t even science or math or whatever. Seeing their perspectives and tapping into their knowledge was something that I didn’t get to do a lot of outside of EYES ever. You are so “siloed” in everything you do, we barely reach across disciplines or sub-disciplines within disciplines. You are limited to who you do collaborate with and now I know I can reach out to people to engineer how I can bring this into the classroom.
Thomas believed that his time at EYES helped prepare him to be successful at the start of his teaching career. Through EYES, he had opportunities to teach in a classroom and experiment with new teaching ideas and concepts and then refine and adapt them for different students. He reflected on the importance of learning to work with different people. Thomas also valued the opportunity to collaborate with EYES instructors in other educational fields, something he did not get to do in his education program. He believes that learning from others helped to broaden his perspectives as a teacher.

5.6 Isabella’s interview

Isabella came from a Health Science undergraduate background and worked with EYES for two years. She was pursuing a Master of Health in Administration degree at the time of the interview and is currently employed with the Government of Saskatchewan. She had limited education or teaching experience prior to working at EYES.

Isabella commented on teamwork and leadership skills she observed at EYES:

I don’t have an education background. For me I think the biggest take-aways are more along the lines of soft skills. Things like effective teamwork – That in itself was huge. Especially my first year coming in, not knowing anybody and coming in from Calgary, not being from an education background, immediately connecting with 19 other instructors who all had very different backgrounds. Managing that for myself, being initially very intimidated, sort of feeling quite a bit out of my element. Over the period of those first three days remember so clearly getting to know these people so well and understanding the unique skills they each had. I think moving forward, especially those first few weeks, you are working really long hours, you really got to know one another, I think that ability to rely on another person and build that trust was a huge benefit of that program and the way it was arranged.

The other aspect of the whole teamwork and dependence piece, learning how to manage when teammates didn’t necessarily pull their own weight. Trying to manage those challenges effectively. I found especially in the second year, that you are sort of, given that you know the outcome and you have gained a bit more of that familiarity of what that program is going to achieve and start taking on more of leadership role. I played a little bit of leadership role in my first year too,
taking more of an ownership of the program, understanding what the program is trying to accomplish and taking more of an ownership over the outcomes as well.

Isabella shared her perspectives on adapting material to different audiences:

I guess the other soft skills I took away was adaptability. When you are working with diverse kids every single day. Different group every week. Sometimes you are working with outreach kids and sometimes you are working with All-Girls that really teaches you how to adapt your own work habits and your own approaches to problem solving and delivery of various materials to that group. Initially it put me out of my comfort zone, it forced me to look at other people for examples. To really draw on their experiences. I think it was really valuable I would say especially, working with some of the more underprivileged kids. It gives you that exposure to different areas that you wouldn’t necessary have exposure to otherwise.

Isabella remarked on her experiences with the All-Girls and Outreach camps:

The one experience I always think back to is actually the All-Girls camp. I thought it was a hugely important thing to be a part of. Especially as a female instructor, not to say we don’t have equality among instructors but it gives you that opportunity to connect with the girls. They get quite excited about your own experience. I found that really rewarding.

Outreach camp exposes you to a bunch of different challenges. You have a whole different set of kids and a whole different set of experiences and opportunities in their lives and really tailoring their experience to what you understand their experience to be. It isn’t necessarily about producing the most fantastic structure they can with these kids, it is more so providing them a really fun experience, that they may not have had otherwise. Not to say that they can’t the same kind of educational outcomes that other kids can. For some, it is more about that opportunity to hang out in a fun environment with the kids and try different things … I still remember those kids, what they look like. It is a different connection.

Isabella also shared her perspective on the importance of leadership development:

This isn’t me sucking up to you, but thinking about myself and my professional career and thinking about moving into management. Working so many long hard hours with EYES, and being motivated to do my best, even when it sucked, I feel like you have to have effective management for that sort of attitude to be continuous. I felt like a lot of EYES people felt that way. Having worked with other managers, if there is not that same level of respect. There is something about it, there has to be that effective leadership that otherwise that sort of program just can’t function. There is something there, I can’t put a finger on what it is.

For clarification, I asked Isabella what she meant by effective leadership:
I think you always took a very democratic, participatory, and forthcoming approach to leading the EYES program. You always involved us, as a team, in what was going on with the program and ensure that if there were challenges ahead, we were informed (to the best of your abilities) what we needed to prepare for. ... You also were able to anticipate what the team needs would be, and armed yourself with as many supports to pass along to us as physically possible. ... You always sought out feedback from us directly, and made sure to check the pulse of the team frequently. Not in a micro-managerial way, but in a way that made each person on the team (at least from my perspective) feel supported. You were always open and honest with us, and you created an expectation that we should do the same in return.

Isabella reported that her experience at EYES helped her to identify a model for strong leadership. She noted that clear communication of expectations and valuing information from the team, not just management, made Isabella feel supported in her role, and also formed the basis of her definition of effective management. Her experience with leadership at EYES has helped her form strong expectations of effective management in herself and those around her in her career. Isabella also gained more experience in working with different people and perspectives and was able to make a connection with campers.

5.7 Liam’s interview

Liam initially began his undergraduate career in Fine Arts, but eventually switched to Science, having an interest in both subject areas. He applied for a position at EYES during this transition. Liam served as an instructor for three summers and also participated in the winter club program. At the time of the interview, he was working at a software firm as a programmer. He attended EYES as a camper in his youth and had a positive experience that he wanted to share with others.

Liam remarked on his experience in designing camp activities:
I appreciated the different ways to communicate these difficult concepts in interesting ways. You take something that can be difficult to understand, a scientific or engineering concept, there are so many different ways you can teach that concept and you try to do it in an hands-on interesting way. It is a problem solving thing. Your problem is you have to present this in an interesting way. There are tons of possible ways to do it and you need to pick the best one … You have to make it interesting, and something where you use your hands. I think that sometimes that is the best way to learn, is to actually be doing something interactive.

… you teach them a scientific concept, usually at the start of the lesson. You would give a short little lecture just about some concept, you don’t want to spend a lot of time talking about. You want to get them as involved as possible. You present some sort of idea. You make sure that they have this idea and then you do the activity. Then they get to see the idea in action. They get to make the idea, construct the idea. … They are seeing the scientific theory in action. I think that is a big part of what makes it interesting

Liam also shared his experiences in classroom management:

You can’t lose your cool, you need to stay calm. I think I was bad at that in my first year. Having a few really bad kids, I realized that ok, I can’t just panic. I need to stay calm. Otherwise, I am going to make it even worse. I think that was big one, just learning to be patient. Learning to deal with tough situations and staying calm and not freaking out by every little thing that doesn’t go right. Understanding that the activities that you do, they are not always going to live up to your expectations, when you initially plan it. … It is balancing act, between getting as much as you want done and making sure the kids are actually enjoying it.

… the few kids who kind of ruin it for the other ones. Rambunctious ones, that are always making noise, a bit wild, dealing with those ones, how you deal with those ones, you are trying to explain the activity, but they are bugging someone else. They are throwing something or just making noise. If they are not listening, you want to try to get them involved. Get them as a volunteer. There have been a few I have had where everything I have tried. Sometimes it just wouldn’t work. Those were the tougher days

… just not really worrying about every little thing. Not really looking the other way, sort of, if it wasn’t a big deal. I just kind of relaxed my definition of what I considered a big deal. Maybe my first year, if someone was looking the other way or drawing or something, I would tell them to stop. I found find that every two minutes I am telling someone to stop doing something. After that I would realize, I can’t do that. Otherwise, I am just going to be yelling at these kids every two minutes and no one is going to have a good time. All these kids are going to hear are yelling. I am not going to be able to teach anything and they are not going to
be able to have any fun. I remember just relaxing my idea of what I considered bad behaviour.

Liam valued the opportunity to take time to design activities as this process improved his creativity and problem solving skills. He also remarked on observing an activity leave an impression on youth – helping them truly understand something new. Liam also developed patience when working with children, which included learning how to adjust his expectations of what he wanted to accomplish, recognizing that plans can change, but an overall goal can remain the same if he was willing to be flexible on the route to getting there.

5.8 Charlotte’s interview

Charlotte worked at EYES for three years and I was her supervisor for two of those years. Prior to entering Education, Charlotte had an Arts background. She wanted to join EYES because she aimed to get into the Education program, and thought EYES would improve her resume. Charlotte is now a high school teacher and she attributes getting her first teaching job in a small town because of her EYES experience. EYES gave her experience teaching a wide variety of ages, and her first job was in a kindergarten to Grade 12 school.

Charlotte commented on developing planning skills and flexibility:

I think the experience really helped me learn to plan. I liked the concept of being to plan for multiple ages. I wanted to be a science teacher. I know when you are hired as a teacher, you are hired as a teacher not specifically the area you want to be in. I thought it was really important to know how to teach little kids and older kids. I had no experience with little kids. That really helped me.

I also took away from it, the idea of how to be completely flexible in my daily and professional life. I learned very quickly that even though we had a schedule and a plan and a concept of what would happen. Things would always come up and as an extremely type A personality. That was something I needed to overcome. I was able to. It may me a better educator and a better person in general.
Charlotte shared her experience with campers:

The all girls camp was the best. The best in their own way. I absolutely loved being able to connect with those kids on a different level. A lot of girls, even in today’s society. Where there are so many girls in even as a teacher now, girls still feel hesitant to take on that kind of career path or that interest. It is still not seen as super cool. The ideas and confidence that they had like really shown. Now every kid is different, there were times when I would have a coed group and some girl would be really into it and didn’t care about what other people thought, but All-Girls was the only time where I saw all the girls get their hands dirty and really get involved.

The satellite camps were amazing because those kids don’t have those opportunities. I remember going out to Swift Current and Estevan. They were so excited to be there with us regardless of what we were doing. We could have sat in a room and talked about stuff and they would have been excited. They were so excited to do science.

I think the biggest thing I learnt from the stress issue was that it wasn’t about me and it wasn’t about the other person, it was what was best for the kids. Despite how I felt, or how the other person felt. What was important was the kids. We had to do what we had to do for the kids. And that was a huge lesson.

Charlotte remarked on how her colleagues became friends:

Because of those retreats, for colleagues not to be just work people. We hung out and we shared things. I think that made me a better friend in long run. It made me feel more accepted. I use to have a really big wall. I use to not let people in and not be around a lot of people. I think that solved that. It was one of the only jobs I had that involved a team mentality

If you didn’t function as a team member, you didn’t do it properly. You were not getting anywhere. You had to collaborate. Yes it has obvious professional implications, but it has more important personal ones.

Charlotte gained an ability to handle stress and adapt to her situation. She noticed the impact that specialty camps had on campers and worked hard to ensure that all campers had a positive experience. She was able to develop personally through the friendships she made in the program and learned how teamwork functioned.

The interviews were an excellent complement to the survey which provided a
wide range of talking points but did not have the depth provided in the interviews.

Allowing participants to speak uninterrupted and then to ask them to explain what they meant by their first response proved to be an effective method. I was able to gain a better perspective of their situation through two or three questions.
CHAPTER 6: Summary of findings

The purpose of my research was to investigate the personal and professional development that occurred during an instructor’s time at EYES. I reviewed the surveys and interviews and categorised the responses. The results include previously stated quotations and can be found in Appendix D. The distinction between personal and professional development was at times possible on an individual level but less so in the summarized format. Additionally, the impact on instructors seemed similar regardless of the personal or professional result. For example, everyone appeared to gain a better understanding of how to work with youth – some instructors who became educators regarded this as professional development, while other instructors who did not become educators regarded this as personal development. Either way, most considered this an accomplishment. An impact was sometimes personal and professional and at times it was difficult to categorise the impact. To gain a richer understanding of each theme, personal and professional impact were merged into the same categories. Personal and professional impact may have been helpful in triggering responses from instructors, however the distinction between what is personal and what is professional was often ambiguous and an unnecessary dichotomy.

Being an EYES instructor was powerful, meaningful, formative, and memorable experience for many instructors. These impact Overall, instructors gained a better understanding of working with children, teaching, the nature of science, and teamwork. They gained confidence in their abilities and leadership skills while developing personal friendships with their colleagues. For some instructors, EYES influenced their career path, while for others, it strongly confirmed their chosen direction.
6.1 Working with Youth

When working with youth, instructors generally stated the most effective tool was to view children as distinct individuals who could not be worked with in a singular or general approach. Instructors stated that there was not a single solution to every problem and they made a deliberate effort to learn the campers’ perspectives. This was mentioned by several instructors, who found they needed to adapt to the different situations. One instructor had to let go of some control and not allow smaller issues to impact their overall goals. Other instructors had to change how they solved problems to meet the student’s needs. For many instructors, understanding the camper’s problem from the camper’s perspective was key. This was not always easy as many of the problems seemed trivial from the instructor’s point of view. Connecting on an emotional level helped the instructors relate to the students.

The structure of EYES made instructors learn how to quickly build relationships with students. Their camp groups changed each week so many instructors made a habit of building relationships with each camper on the first day. This could be through games or questions. Instructors built a relationship and trust and used these to find solutions when problems arose. As one instructor summarized, “getting down to the kid's level of comfort and building relationships with them is key and that is something that I learned more from my time at EYES.”

6.2 Teaching Skills

EYES helped shape some instructors’ teaching philosophy and gave them a head start to future educators. Many instructors credit the EYES experience for making them the teachers they became, especially in their first few years. The practical experience in a
variety of formats helped some become more flexible and adaptive in their teaching practice and classroom management. They learned how to think and plan for students in more than just a theoretical environment. The experience built their scientific knowledge and their confidence to teach. For some instructors EYES altered their idea of science education. They discovered that science could be fun, especially in a hands-on format. One instructors credits EYES for learning how to handle stressful situations and value of putting the students first despite personal challenges. Most instructors who became professional educators reported that EYES helped shape them into the teachers they are today. The EYES experience also confirmed that they had made the right decision in their career path.

6.3 Science

Some EYES instructors developed a better understanding of science. They stated that science could be fun and exciting, but at the same time frustrating when planned activities did not work. Instructors discovered that science is not a set regiment of facts, but a demanding and ever changing understanding of the world. Some instructors saw the world around them in a different light with increased wonder and awe. It built a desire to be scientifically literate and value in that for others. Instructors stated that patience, creativity, and imagination are needed for a discovery and that failure is natural counterpart to excitement of that discovery. Some instructors felt more comfortable exploring and understanding science while noting that it is not always easy. The survey and interviews reported that instructors gained confidence in teaching and science and found that science was for everyone regardless of their academic ability. It made one instructors less afraid to not understand. To them, science was not about knowing
everything but trying to understand even when we are wrong. The “true beauty is what
you do to figure it out”. For many, science became more than book work and became an
experience. The experience was not always positive, but it was meaningful to them.

6.4 Mentorship

Instructors expressed gratitude the internal mentorship they experienced from
peers. This aspect was not specifically addressed in the survey design. Fostering internal
mentorship among colleagues was not a primary goal when hiring staff for EYES. The
focus was rather on attracting and retaining a diverse range of educational backgrounds in
science, engineering, and education for curricular development. We also wanted a range
of personalities so that campers could relate to different instructors. Instructors worked in
pairs and had a different teammate each day for workshops and each week for camps.

While serving as program coordinator, I was aware that the staff developed strong
friendships and these friendships are mentioned frequently in the survey and interviews.
However, many of the remarks indicate more than just friendship. One instructor
mentions, “I got to work with an outstanding group of people that had some amazing
skills and abilities”. Another, “EYES surrounded me with people that were better than
me. Being around them made me want to be smarter, funnier, successful, more social,
etc”. Finally,

Over the period of those first three days [training] remember so clearly getting to
know these people so well and understanding the unique skills they each had. I
think moving forward, especially those first few weeks, you are working really
long hours, you really got to know one another, I think that ability to rely on
another person and build that trust was a huge benefit of that program and the way
it was arranged.

The level of respect instructors cultivated for their peers and the co-learning they
experienced was beyond what I imagined. Instructors were required to work with
different types of people, but shared a common goal and sense of purpose. Instructors were ultimately able to learn from others and incorporate that learning into their work. This mentorship process was an unintended, but highly advantageous and positive, consequence of the EYES experience on instructors.

6.5 Speciality Camps

The social justice components to EYES programming were the most meaningful experience the instructors had a different lived reality than theirs. They were surprised by socioeconomic and gender gaps in our own community and the exposure in some cases motivated instructors to make changes, at EYES and later in their careers, to try to enable positive social change. As previously noted, EYES had several avenues to support underrepresented youth: outreach camps to low income neighbourhoods in Regina, immigrant youth through the Open Door Society, All-Girls camps, satellite camps to rural areas, and bursary funds. The quotation below shed light on how instructor learned more about socioeconomic diversity and discrepancies in Regina.

We also got a nice little view into a couple of the domestic disputes that go around on that side of town. It is eye opening to see what they have to view on a daily basis and how much that would actually affect their lifestyle. It was great and I feel if more people like myself would see this on a more daily basis or not even on a daily basis but more in general than we would definitely be more prone to be driving programs like that. [Emma]

Emma’s quotation summarizes many of the impacts experienced by other instructors who also had limited or no exposure to poverty. She notes that exposing “people like myself” to these realities, would help fund and provide other resources to EYES and similar types of programs. In another part of the interview, Emma also noted that she was surprised that her group of 12 kids “lived in a bad part of town, but they were incredibly happy all
the time”. She became discouraged when she realized that they may not be able to continue their education in university. She wanted more programs to be available so that these students would “have a fair chance” to continue on in their education. Because of all of this, she said the outreach camp “was probably the number one [impactful] experience of the two years that I worked there.”

In Olivia’s interview she talked about how this camp affected her worldview as a current educator. She was able to summarize her experience with the quotation below.

I don’t think until that point, there have been many over my career that have been eye openers, but that was the first time that I recognized that maybe not everyone views school like I do. Maybe more programs like EYES, like inner city camps, need to take place more often. It changed how I viewed Science Education

Olivia had her first experience with poverty at EYES. It was not only eye opening, but it changed her worldview which in turn changed her teaching philosophy. School had been easy for her because it could be the most important thing in her life. She discovered that for many students, school is simply not a major priority given all of the other challenges they encounter and must endure on a daily basis.

No other EYES camp program had this level of impact, especially for instructors who had not worked in low income neighbourhoods. There is shock, revelations and even career inspiration. Most instructors only had a one week camp experience in a year, but this one week was significantly meaningful to them. For some instructors the outreach camps seemed to match their values of social justice and equity and were seen as key components to the program. They stated that the experience was challenging, but also rewarding, and for some instructors, it was actually a motivating force to work at EYES.

The All-Girls program was often a sought after assignment for instructors because it was the smoothest running program EYES offered. In general, the woman instructors
loved the All-Girls program and working at one of these camps was considered a privilege. The girls in the program were able to build relationships with fellow campers in a more relaxed and comfortable environment. This enabled the girls to participate more openly in the group. The fact that there was a change between the mixed groups and the All-Girls groups was a surprise to one instructor, who thought that there would be no difference. For other instructors, it was the first time they realised sexism still existed.

6.6 My Impressions

I expected instructors to gain a better understanding of science, teaching and working with youth. I knew that staff had strong friendships with each other but I was surprised at the impact mentorship had on the staff. The diverse skill sets and experiences benefited the team and was a pleasant discovery. I was also surprised by the impact the outreach programs had on the staff. Exposure to other lived realities in Regina and other southern Saskatchewan communities, for low income, Indigenous and visible minority, newcomer and female youth was illuminating and helped shape the worldview of many EYES instructors. These were meaningful and unique program experiences that reordered their internal schemas and exposed their privilege in society. While most of the staff seemed intellectually aware of poverty, racism and sexism, they were, as a consequence of their own circumstances, emotionally distant from these issues. Instructors made a personal connection with youth from different backgrounds than their own and these short term experiences had long term consequences for the staff.

6.7 Social Justice

Upon further reading of science education and social justice, EYES may not have been a definition “social justice” program. Gutstine (2002) defines social justice as
having three main components: “helping students develop sociopolitical consciousness, a sense of agency, and positive social and cultural identities.” (p. 40). Sociopolitical consciousness is “helping students understand, formulate, and address questions and develop analyses of their society” (p. 40). EYES helped students understand the natural world around them, but did not include an intentional focus on socio-political critical analysis as part of the program. However, EYES did help students gain a sense of agency by instilling “a belief in themselves as people who can make a difference in the world” (p.40). EYES believed that everyone is a scientist and worked to help students discover their own curiosity and develop an awareness of the natural world. From this vantage point, EYES may have contributed to equipping youth with critical thinking, an important skill in today’s world. Gutstine’s final component of social justice is “helping students develop positive social and cultural identities by validating their language and culture and helping them uncover and understand their history (p. 40).” EYES did little to validate language and, while it did target programs for Indigenous and new comer youth, it not explicitly focus on culture and rarely looked at students’ history.

Gutiérrez (2008) has a similar definition to social justice as she describes four dimensions of equity in mathematics:

- access (resources available to engage with quality mathematics)
- achievement (standardized test scores, participation rates, math pipeline)
- identity (maintaining cultural/linguistic/familial connections)
- power (agency to affect change in school or society) (p.360)

EYES focused largely on access with less consideration for the other three. Gutiérrez’s concern is that studies that focus on the first two are “gap gazing” which focus on the disparities between two groups and the belief that the solution is technical (teacher knowledge, pedagogical moves), while ignoring the larger social factors such as
educational investment and working conditions for educators. This type of focus can also lead to a deficit model of thinking where marginalized students, families and communities are seen as less capable, less motivated and more likely to fail (Dunac & Demire, 2017). Conversely, an asset-based perspective sees the students already equipped with resources from their community and prior knowledge that is relevant and can provide a welcoming environment for the students (Dunac & Demire, 2017). An assets-based approach can help mediate the deficit model and provide a positive and challenging environment that counters the exclusive nature of science that many students perceive (Gonsalves, Rahm, & Carvalho, 2013). The exclusive nature of science was also mentioned by EYES instructors in her survey as she felt she was not smart enough to succeed in science. Bazzul (2014) finds that “estrangement occurs when science teaching and learning relies too heavily on the reproduction of formulaic conceptions, whereby students lose touch with their everyday lifeworlds (p. 498).” Tolbert and Knox (2016) investigated not only culturally diverse classrooms but linguistically diverse as well. They found that:

Situating science instruction within more meaningful context in linguistically diverse classrooms can lead to improved student outcomes, including increased participation and engagement in science, improved science understanding, more positive attitudes towards science and increased consideration of science as a career goal (p. 1133).

Bettez, Anguilar-Valdez, Carlone and Cooper (2011) argue that:

… culturally relevant teacher acknowledge that the system is racist, identify various cultures within the classroom, publicly acknowledge students’ cultures, and not only view but also affirm diversity as an asset (943).

Strong (2015) expands on this idea stating:

… it is also essential to move beyond considerations that only focus on race or gender when attempting to engage youth in science. This does not mean that
structures such as race and socioeconomic status are case aside, but our efforts to engage such youth in science need to be in conjunction with the identities that youth assign to themselves. … such as ‘basketball player,’ ‘dancer’, and ‘violinist’ (p. 381).

Rahm and Moore (2015) conclude that:

although access and achievement are important, effort should not stop there. Students need access to ongoing quality science instruction driven by high expectations that build on their worlds and thereby make science personal and locally relevant and conducive towards participation in public debates around science and community action (p. 769).

Gutiérrez (2008) points out “a drive for excellence, not parity with Whites, is at the heart of most program that have produced substantial gains in marginalized students’ learning” (p. 359).

EYES instructors found that approaching students individually was the best way to understand their needs. EYES curriculum was meant to be relevant and interactive but also flexible – so that it could be easily adapted to the audience. Lastly, EYES believed that everyone is already a scientist, rather than a foreign concept that needs to be earned through years of training and investment. These principles align with a social justice perspective. However, I think that EYES could benefit from the adoption of an assets-based model training overall, but especially for the outreach programs. Some instructors seem to have had a deficit model worldview. Gutierrez (2008) states that:

A single curricular activity might serve as a ‘mirror’ for some students while opening up a ‘window’ to a different world for others. For example, attending to social justice issues might offer a mirror for students who have been marginalized by society and simultaneously serve as a window for students who benefit from the status quo (p. 360).

The reflections from instructors show many window moments for them but fewer mirror experiences for the campers. EYES could improve their cultural engagement.
6.8 Recommendations

Based on my research, I recommend that the EYES camp continue to build a diverse team of instructors, which, I believe will help them learn from each other and broaden their perspectives. I recommend EYES define target groups of underrepresented populations, build a positive recruitment process to encourage increased application and success for underrepresented groups, and thoughtfully incorporate mentorship into the team structure. I also recommend that the outreach programming to underrepresented populations be continued because in addition to serving underrepresented groups, it also provided some of the most meaningful experiences for instructors during their time at EYES. Employing more evidence based training for staff on how to develop programming for target populations would be beneficial. Assets-based model training and incorporating student knowledge into the program would be an excellent start. Building friendships and establishing a strong team culture, especially at the beginning of the program will help staff work together and learn from each other.

The Faculty of Engineering deserves significant credit for its extensive support of EYES programming. Along with the resource and expertise support, the Faculty’s engagement is also beneficial to the engineering students who gain confidence, presentation skills and project management experience when working at EYES. EYES is also an effective recruitment tool for the Faculty. I recommend that the Faculty continue its support of EYES.

The Faculty of Education also deserves thanks for its support of EYES. The use of the Faculty’s lab space and lab equipment made the camp more engaging, safer and easier to manage. The camp provides an excellent experience for future educators in
different environments while working with other staff from different educational backgrounds. I recommend that the Faculty of Education continue to support EYES. I also recommend that the Faculty of Education investigate enhancing partnership with EYES to provide informal science experiences for elementary educators who are not employed with the program. It may also be opportunity to share best practice and theory for teaching and education – including around social justice, gender and inclusion.

I recommend increased support for EYES from the Faculty of Science. Increased engagement from the Faculty would facilitate excellent practical and teaching experiences for science students, and like Engineering, EYES could serve as a recruitment tool for future science students.

I recommend continued support of EYES on the part of the University of Regina. It is an effective educational tool for both campers and instructors, as demonstrated in significant research on the impacts on campers, and more limitedly on instructors. Further, the outreach components of EYES match many of the University’s strategic plan goals with respect to social justice and gender equity.

6.9 Further Research

Continued and strengthened analysis on the impact on instructors is an area for future research. This field is largely un-researched and there seems to be a meaningful impact on employees from their work. Particularly, the change of perspective for individuals who are exposed to the realities that they were unfamiliar with or unaware of. The impact of the EYES experience on first year teachers has potential as many instructors believed it was key in their early career success.
Investigating the effectiveness of engaging girls, low income, rural, newcomers to Canada, and Indigenous youth in a camp environment would be beneficial for the campers and the instructors. This could help bridge differences, build understanding between different groups, and allow instructors to better organize and deliver programs. It could also help build stronger, more effective programs that are more thoughtful in design. I also recommend increased research into any informal STEM engagement for Indigenous students and newcomers to Canada. I was not able to find any academic studies that involved camp settings with these groups.
BIBLIOGRAPHY


APPENDIX A: Survey invitation email and survey questionnaire

Email Invitation

Hello EYES Alumni,

I hope you are doing well and I am sorry to trouble you, but I would appreciate it if you could take a few minutes to review my request. I am working on my Masters in Education with Warren Wessel and I am curious about your thoughts regarding your time in the EYES program. If you are willing to share your reflections anonymously, I have a link to a survey. I expect it would take between 10-20 minutes. If you’d like to describe your experiences even further once completing the survey, you can also participate in a 10-20 minute face-to-face interview by indicating your interest in a reply email. The interview would not be anonymous, as it would be face-to-face with me. If you are interested, please fill out this survey:

(Link)

If you would also like to do an interview, please reply to this email expressing your interest. I’ll send you a reminder in one week, as I would like this done in the next two weeks.

Thank you for your time,

Ben Freitag

Survey Questionnaire

Thank you for taking the time to help me with my research. By submitting your answers, you are providing me with your consent to use your information in my research. Once you have submitted your answers, they cannot be withdrawn from the data. Participation in the survey is voluntary. Below is more information about the project.
Project Title: EYES Instructor Investigation

Researcher: Benjamin Freitag, Graduate Student, Education, University of Regina, 306-530-####, Benjamin.Freitag@uregina.ca

Supervisor: Dr. Warren Wessel, Education, 306-585-#### Warren.Wessel@uregina.ca

Purpose and Objective of the Research:

The purpose of the research is to perform a qualitative study on former EYES (Educating Youth in Engineering & Science) instructors to investigate any potential impact that the position had on their personal or/and professional beliefs.

Procedures:

Former EYES instructors will be asked to fill out an anonymous and confidential online survey that asks the participant to reflect on their experiences as an EYES instructors. The survey will take approximately 10 - 20 minutes to complete.

Potential Risks:

There are no known or anticipated risks to you by participating in this research.

Confidentiality:

The survey will be anonymous and confidential, stored electronically with password protection. There is a possible risk that the researcher may be able to identify participants based on the survey responses due to his familiarity with former EYES Staff. Any physical copies of the records created will be destroyed after their use.

Follow up:

To obtain results from the study, please contact Ben Freitag at Benjamin.Freitag@uregina.ca with the request. An email summary of the results will be sent to you.

Questions or Concerns:

Should you haven any questions or concerns, please contact the researcher at Benjamin.Freitag@uregina.ca.

This project has been approved on ethical grounds by the U of R Research Ethics Board on January 6th, 2015. Any questions regarding your rights as a participant may be addressed to the committee at 306-585-4775 or research.ethics@uregina.ca. Out of town participants may call collect.
Demographics

Gender
- Female
- Male
- Undefined

What was your age when working at EYES?

How many summers did you work at EYES? *Required
- 1
- 2
- 3
- More than 3

What year was your last summer?

What degree(s) were you pursuing when working at EYES?

Prior to EYES, please describe any previous experience you had working with youth.

What degree(s) have you completed or are currently working on?

What is your current profession?

How long have you been working in this profession?

Did you change your career or career path at any time? If so, please describe why you made the change.

Reflections

Why did you apply for EYES? Check all that apply
- I needed a summer job
- I like working with children
- I like science, engineering, and/or technology
• It was connected to my degree
• I thought the experience would look good on a resume
• It helped me prepare for my future career
• It was a decent wage
• It was the best wage I could find
• Someone told me I should
• Other:

What age range did you primarily work with?

• Grade 2 & 3
• Grade 4-6
• Grade 7-9
• I worked with all ages
• Other:

Which age group did you like working with the most?

• Grade 2 & 3
• Grade 4-6
• Grade 7-9
• Other:

Why did you enjoy working with that age group?

Which age group did you like working with the least?

• Grade 2 & 3
• Grade 4-6
• Grade 7-9
• Other:

Why did you not enjoy working with that age group?

How important was it that you were a part of designing the curriculum for the summer camp?

Were there specialized camps (All-Girls, satellite camps, off-campus programs, Open Door Society, Overnight camp, French camp, etc) that you were a part of and what were your thoughts about those camps?

Describe the relationship you had with your fellow EYES colleagues

How did the staff relationship impact your experience?
Thinking back on your experience, what were some of the most positive experiences?

Thinking back on your experience, what were some of the least positive experiences?

Did you learn or improve any skills that are currently beneficial to your current profession?

If you can, describe an instance where you gained a better understanding of a concept in science, engineering or technology.

As a result of EYES, did you have a change in attitude towards science, engineering or technology?

If you can, describe an instance where you gained a better understanding of how to work with children.

Please consider your experiences at EYES, and describe how they impacted you personally and/or professionally. You might consider things such as working with children or not, teaching or not, continued science/engineering education or study.

Thank you for participating in the survey.

If you are willing to participate in a 15-30 minute interview regarding your time at EYES, please send an email to Benjamin.Freitag@uregina.ca indicating your willingness to participate. If you would like a summary of the results of this research, please send an email to Benjamin.Freitag@uregina.ca with the request.
APPENDIX B: REB approval letter and interview consent form

Research Ethics Board
Certificate of Approval

PRINCIPAL INVESTIGATOR
Benjamin Freitag
#21 - 2022 Lorne Street
Regina, SK S4P 2N1

DEPARTMENT
Engineering and Applied Science

REB# 2014-214

SUPERVISOR
Dr. Warren Wessel – Faculty of Education Graduate Student Supervisor

FUNDER(S)
Unfunded

TITLE
EYES Instructor Investigation

APPROVAL OF
Application for Behavioural Research Ethics Review
E-Mail to EYES Alumni
Interview Question List
Consent Form
Online Survey

APPROVED ON
January 6, 2015

RENEWAL DATE
January 6, 2016

CERTIFICATION
The University of Regina Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol, consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

ONGOING REVIEW REQUIREMENTS
In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions: http://www.uregina.ca/research/REB/main.shtml

Dr. Larena Hoeber, Chair
University of Regina
Research Ethics Board

Please send all correspondence to:
Office for Research, Innovation and Partnership
University of Regina
Research and Innovation Centre 109
Regina, SK S4P 0A2
Telephone: (306) 585-4775  Fax: (306) 585-4803  research.ethics@uregina.ca
Participant Consent Form

Project Title: EYES Instructor Investigation
Researcher: Benjamin Freitag, Graduate Student, Education, University of Regina, 306-530-####, Benjamin.Freitag@uregina.ca

Supervisor: Dr. Warren Wessel, Education, 306-585-#### Warren.Wessel@uregina.ca

Purpose and Objective of the Research:
- The purpose of the research is to do a qualitative study on former EYES (Educating Youth in Engineering & Science) instructors to investigate any potential impact the position had on their personal and/or professional beliefs.

Procedures:
- If you wished to participate in an interview, you will send an email to Benjamin.Freitag@uregina.ca.
- A mutually agreed time and place will be arranged for the interview which will include an audio recording. The interview is expected to last ten to twenty minutes, which will be based on a series of open ended questions.
- Please feel free to ask any questions regarding the procedures and goals of the study or your role.

Potential Risks:
- There are no known or anticipated risks to you by participating in this research

Confidentiality:
- Names and identifying remarks would be altered for anonymity in any written content.
- Interviewer will not be anonymous to Benjamin Freitag

Storage of Data:
- The recordings will be stored digitally, in DropBox and Google Drive, which will be password protected. The recordings are no longer needed they will be destroyed.
Right to Withdraw:
- Your participation is voluntary and you can answer only those questions that you are comfortable with. You may withdraw from the research project for any reason, at any time without explanation or penalty of any sort.
- Should you wish to withdraw, all recordings and notes will be destroyed.
- Your right to withdraw data from the study will apply until results have been disseminated. After this time, it is possible that some form of research dissemination will have already occurred and it may not be possible to withdraw your data.

Follow up:
- To obtain results from the study, please email Benjamin.Freitag@uregina.ca with the request. An email summary of the results will be sent to you.

Questions or Concerns:
- Contact the researcher using the information at the top of page 1;
- This project has been approved on ethical grounds by the U of R Research Ethics Board on (insert date). Any questions regarding your rights as a participant may be addressed to the committee at (306-585-4775 or research.ethics@uregina.ca). Out of town participants may call collect.

Consent

Your signature below indicates that you have read and understand the description provided; I have had an opportunity to ask questions and my/our questions have been answered. I consent to participate in the research project. A copy of this Consent Form has been given to me for my records.

<table>
<thead>
<tr>
<th>Name of Participant</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

Researcher's Signature ______________ Date ______________

A copy of this consent will be left with you, and a copy will be taken by the researcher.
APPENDIX C: Self-declared skill development listing from both surveys and interviews

These answers were taken from every question in the survey and not limited to the questions that specifically asked about skills. These are the instructor's words which were either listed or had little context associated with them. In this section, I did not interpret longer sections of text or group similar ideas unless directly stated.

- Become more outgoing
- Classroom management skills
- Communication
- Collaboration
- Creative
- Dealing with kids for entire days
- Explaining concepts
- How to be a good role model
- How to be an ear for someone in need
- How to be excited
- How to be fun
- How to deal with children
- How to interact with parents
- How to keep a positive attitude
- How to motivate kids
- How to manage kids
- Intelligent
- Interaction skills
- Lab safety
- Leadership
- Love of science and engineering
- Meeting children’s needs as a friend and instructor
- Meeting deadlines
- More social
- Open to trying new things I am not as confident/familiar with
- Organizing
- Patience
- Planning
- Planning lessons
- Resourceful
- Risk Assessment
- Speaking in front of a crowd
- Step into a classroom not knowing anyone and make something interesting happen
- Teaching
- Teamwork
- Understanding
- What made a good camp activity
- Working with groups of students
APPENDIX D: Categorised evidence of personal and professional development

Working with Youth

Coming into EYES with zero experience with kids resulted in a huge learning curve for me. I feel infinitely more confident with kids just because I feel like I understand them better, and have had experiences dealing with them in states ranging from pure trauma to pure happiness.

My first year at EYES was my first experience working with a large group of children. It was a very fun summer, but I remember being quite uptight as an instructor compared to my later years. I would get stressed over small things that the campers would do that would get on my nerves, and this would build up, making me less effective as an instructor. Towards the end of that first summer and by the start of my second summer I realized that there were lots of things I didn't need to stress about, and I was able to ignore these petty annoyances. This allowed me to focus on running the activity in a good mood, to the benefit of the campers and also myself.

EYES showed me that one way of teaching or managing or engaging with one child will not necessarily work for another. As an employee who was not an education student and who initially had limited experiencing working with children, this greatly improved my ability to have fun and successful groups. While certain approaches might generally work, each situation and each camper was unique. Taking time to talk to them and understand what they were feeling or why they were behaving a certain way was always more effective than trying to stick to specific rules or approaches.

All children have different quarks so with every new group of campers I was gaining a better understanding of how to cater to them.

Your ideas aren’t going to work for everybody. [Sophia]

When you are working with diverse kids every single day. Different group every week. Sometimes you are working with outreach kids and sometimes you are working with All-Girls that really teaches you how to adapt your own work habits and your own approaches to problem solving and delivery of various materials to that group. Initially it put me out of my comfort zone. [Isabella]

One specific instance I remember clearly is when a young camper became deeply upset that his partner had gone back on an earlier promise to follow a specific marshmallow launcher design. While the three of us worked out a solution easily, the experience taught me that the concerns of children, despite seeming silly to me, are very real to them. Taking those concerns seriously and not minimizing them goes a long way to showing them that you respect them.
EYES forces you to not only work with other instructors, so you have to build relationships there, but it forces you to get to know your group. That first day when you are playing games with them. Playing cards with them or asking them questions. That practice or that habit that I got into just carried over into teaching. [Olivia]

…pushed me to build a relationship with students quickly and I use these same techniques in my classrooms now.

**Teaching**

There's not a single day where my experience and skills from EYES don't play a part in what I do.

… learned, the ability to be flexible, to think, to plan for actually students, to people, it made a huge difference, in my career.” [Olivia]

EYES made me the teacher I am today. The experiences I had through EYES lead me to design and build a STEM curriculum from the ground up, in only my 2nd year of teaching. In my own school I've become the go-to science and technology guy, mostly because of the learning that was sparked when I worked with EYES.

I think EYES has turned me into a well-rounded teacher. I was always better at the arts/writing than I was at the science/math. Now, I feel confident in doing it all, and that's because of EYES. Working at EYES has helped show me that all children want to learn in an engaging/fun/hands-on way. That's something I will always take away from EYES.

I increased my level of teaching by becoming more involved in Science, planning more, constantly having to use classroom management, and understanding what it means to have fun doing Science.

I was taught that teaching is 90% planning and 10% execution and I never really understood that until EYES. If you understand your plan, you have a very laid out plan, you can then be completely flexible. So if you walk into the experiment and it is a complete disaster. A) the kids hate it or the kids don’t get it or it takes ten minutes instead of an hour. Because you had this solid plan, and backup plans. It was much easier to be flexible. [September]

There were time when we would all be stressed, and managing that stress and working with somebody despite it. I think the biggest thing I learnt from the stress issue was that it wasn’t about me and it wasn’t about the other person, it was what was best for the kids. Despite how I felt, or how the other person felt. What was important was the kids. We had to do what we had to do for the kids. And that was a huge lesson. [September]
I learned that I value working with kids much more above trying to impress my coworkers.

… would recommend it to any student pursuing a job that involves working with children/youth.

**Changed Attitudes Toward Teaching and Engineering**

Working at EYES greatly increased my respect for teachers and more fully understand the importance of what they do. I am currently studying in a field than involves school-based health policy and research. I believe having a fuller understanding of some of the challenges facing educators is of benefit to my work.

On a personal level, I now have an incredible appreciation for the work of teachers and have a better understanding of how our education system could be improved or revised.

I think before I started with EYES, my idea of engineering, to be kind of honest, a little bit of stereotyping, most of the people who I knew who were in engineering were not very nice guys who were very cocky about being in the program and so my view of the engineering faculty as a whole was kind of like, they kind of put down arts majors, I don’t know if I really like engineering that much. But obviously that is going to change if I work at an engineering camp. To see, I can’t believe how creative and incredibly intelligent so many of the campers were when we did basic engineering activities. … My concept of it is more wonder now instead of “Ah, those guys are so mean”. [Emma]

**Understanding of Science**

I have always loved science but I now have more of an appreciation for the true enjoyment that should come from doing science. I want my students to see that science is fun and exciting and that was definitely heightened by my experience with EYES.

EYES ingrained a sense of wonder about the world, the excitement of discovering new things, and the appreciation of the nature of science.

[EYES] showed me that science and engineering can be fun and exciting – a lot of times people get caught up in the nitty gritty of theorems and formulas and whatnot, and they forget that science can do awesome things like blow up a watermelon or let you breathe fire. gave me a unique insight into the exciting and entertaining side of science and engineering, which will be very beneficial to future scientific endeavours of mine … I will hopefully never lose the mindset that science is more than just theorems and formulas.
I was exposed to how cool STEM is, and how important it is that everyone is scientifically literate. I developed an appreciation and an awe for science and truly developed a sense of STEM's importance in 21st-century life.

I always liked science, but I thought I wasn't smart enough to really learn more. EYES showed me that these things don't have to be difficult, and it's better when it's done in a fun and engaging way.

EYES made me less afraid to not understand. I always believed that science was fact and that it meant understanding the world around me. During my time at EYES I came to the realization that I do not know everything, science does not know everything, we only know a small portion of the knowledge that is out there. It is okay not to know something, or not to know how to put something together, the true beauty is what you do to figure it out. Science requires a lot of creativity and imagination to find success.

…the true beauty is what you do to figure it out.

I learned that it is important to have patience when trying to get something working. Just because some activity worked for somebody on the internet, that doesn't necessarily mean it's going to work for you. It takes a lot of patience to endure all the difficulties you can come across when trying to apply science also gained an appreciation for how hard science can actually be. I think a big part of science is accepting that the world is not as simple as we'd like it to be, and science doesn't yet have the answer for all the physical phenomena in the world. It is ridiculously complicated to understand the actual reasons that a plane is able to stay in the air, and scientists are still unsure of why ice is slippery. Things like this might seem obvious after doing some elementary reading on the topics, but then you find out that an intuitive and simple explanation is insufficient. The point of science is not to try and bend physical phenomena to fit in with our perception, but to try and understand it, no matter how hard it might be. Most of the time this involves accepting that we are wrong.

**Staff Relationships**

“Easily one of the best things is the friendships that I've come out of EYES with.”

“I have made lifelong friends through my time at EYES and I have no idea where I would be if I hadn't of applied here.”

“EYES has also given me some of the best friends I've ever had. People that I care about and make time in my busy days to meet up with.”

“I consider some of the people that I worked with at EYES to be lifelong friends.”
It was a support system as well. So when you have that family feeling, you feel you can put yourself out there, you can try new things and adapt, even if it fails, you still have the support system. [Olivia]

They are contacts that I still keep loosely in contact with now.

I still keep in contact with many of them!! and that was a LONG TIME AGO! :)

…taught me how to collaborate ideas with other colleagues.

… being able to work with someone who may not have the same ideas as you. All just really important real world skills.

… developing a strong team, both on the retreats and throughout the summer, was a highlight of my experiences with EYES.

Confidence and Leadership

Learning how, when looking young and be an authority figure, in a classroom where I have these grade eight boys who are five inches taller than me and think they know what is going on. That has come a long way in my profession, especially graduating. 23 you are put into a pharmacy setting. You are the leader of that team whether the technicians or other pharmacists are in their 50s or the same age as you. You have to step up and lead them. That definitely helped me with that in that leadership role. I learned to earn respect despite my appearance. [Sophia]

I feel like I left with more confidence than I began with. I feel like I am much more comfortable talking in front of large groups of people, than the average person. Mostly because trying to get kids to calm down requires a loud voice and if you look weak they will trample all over you. So definitely more confidence. I think I also have more confidence in my leadership ability, not only with kids, but with working with others ... I felt I wasn’t pulling my weight in one aspect that I could make up for in the other and so I kind of drove that even more leadership/confidence. [Emma]

I think that made me a better friend in long run. It made me feel more accepted. I use to have a really big wall. I use to not let people in and not be around a lot of people. I think that solved that. It was one of the only job I had that involved a team mentality. [September]

Career Impacts

When I began my degree I had intended to go into medicine. But my years at EYES helped me to realize that I have a true passion for Aboriginal education...
decided not to be a doctor, and have recently been admitted to teacher’s college in Aboriginal education and plan to devote my life to working with youth and promoting change within the system to foster more equitable educational opportunities for Aboriginal youth, both rural and urban alike. I can 100% say that EYES changed my direction. Because of my experiences at EYES I have become passionate about Aboriginal education and advocating for youth that are underserved by the traditional system. EYES challenged me, pushed my boundaries and showed me how to use my skills to have a positive influence.

I was initially interested in doing physics research as a career. Then, 1) I learned how frustrating I found lab research and 2) I found that I was actually more interested in broader questions of how to use science and technology to make the lives of people better. EYES was the experience that showed me that perhaps lab research wasn't my path.

Through my work with EYES and in other aspects of my life, I learned that I enjoyed working with people and wanted a career that would allow me to get out the lab and shape policies in a more direct fashion. As such, pursuing a health related career made more sense than philosophy.

While EYES didn't exactly determine my career path, I can't help but think it effected it somehow as I was making some of the most influential decisions of my life at the time. It also taught me many extremely useful skills that allow me to be a better pharmacist and a better person.

Working with EYES made me reconsider education as a career path due to the extremely positive work environment and co workers.

EYES solidified my desire to teach. It confirmed that teaching Grade 4-6 is in fact the career path I want to take.

My experience with EYES confirmed that I wanted to work with children for my career. It introduced me to all of the challenges that education provided, and armed me with resources and experience needed to develop a strong foundation entering the field as a science teacher.

It definitely reinforced my desire to become a teacher and work with children.

It helped me reinforce the fact that I wanted to be a teacher and work with students.

It reinforced my choice in career. I knew that working with kids is what I wanted to do.
I love science but I'm not sure it is the field for me. I don't think I had a change of attitude but I never really had an experience that sparks my interest so much that I though "wow! That's so cool! I want to do that for the rest of my life!"

**Mentorship**

My first workshop with EYES was an eye-opener. I was working with an experienced EYES instructor who is also a teacher. I observed how he interacted with the class and observed how engaged the students were in him. I realized that the reason why the kids were so engaged (other than it being a cool activity) was that he was so engaged.

I do know that I gained an incredible amount of knowledge from my colleagues. They were teaching me something every single day, whether small or large.

Most of my learning here came from watching my fellow counselors work.

Having people from a wide variety of backgrounds, I was also able to learn a lot from them. [How did the staff relationship impact your experience?]

I got to work with an outstanding group of people that had some amazing skills and abilities. I worked with friends and I worked for outstanding coordinators that made our jobs very easy and manageable.

Our process of discussing the activities as a group and figuring out where to go with it to make it more difficult or accommodate the needs of our campers was beneficial in developing a better understanding of how to work with children.

It was also great experience to co-plan. It helped me open up to other ways of doing things- a vital skill for teachers to have.

You have ideas but you want to bounce them off someone or make it better. The coolest thing too with EYES is that everyone comes from a different background.” [Olivia]

What was also useful was learning how to collaborate with people. A lot of time teaching is – you are social all day, you are with kids all day but you never get time to collaborate. We had time to work together. Plan together. Develop together. I hadn’t seen the true power of that until we got to that with EYES. Yah it was frustrating at times, but we were able to actually accomplish a lot. The sum is greater than its part [Thomas]

Over the period of those first three days [training] remember so clearly getting to know these people so well and understanding the unique skills they each had. I think moving forward, especially those first few weeks, you are working really long hours, you really got to know one another, I think that ability to rely on
another person and build that trust was a huge benefit of that program and they way it was arranged.

EYES surrounded me with people that were better than me. Being around them made me want to be smarter, funnier, successful, more social, etc. So I guess staff relations impacted my experience at EYES in a very positive way.

**Outreach Camps**

I was also part of the Sacred Heart outreach camp. The experience was a different kind of challenge and helped me to see some of the incredible disparities within our city.

I also took part in outreach camps, which was amazing and eye-opening to say the least. This is by far the most important part about what we do, in my opinion.

I was involved in an outreach camp my first year and I enjoyed it a lot. The kids there would come and go as they pleased so it was a very different dynamic but at the same time you got kids that came because they wanted to try something new or build something and they wanted to be involved in Science. It was an eye-opening experience in terms of the lack of opportunities that some kids get. I think we really made their week.

I think the interaction with such a broad range of campers from such diverse backgrounds gave me some unique insights into the gaps within society.

I feel particularly strongly about the importance of the camps held off-campus within Regina. While the camps could be challenging, the dedication of my coworkers and EYES as a whole to creating similar positive science and learning experiences for underserved youth was one of the reasons why I worked at EYES for as many summers as I could.

Inner-city day camp at Thompson school: probably the most challenging but likely the most valuable. Opened a world of opportunities to children who would not otherwise get to experience them. Also provided relief to parents who may not have otherwise been able to have child care or afford to send their kids to camp. Kept kids busy and out of trouble.

Outreach camp -- This was my favourite and most challenging part of working for EYES. I found the camps to be most rewarding as the youth with whom we were engaging were the kids most underserved by the system. This had its challenges
(specifically behaviourally) but also made it so that when things went well, I was so proud of the campers.

Working at EYES helped cement my desire to work directly with people and with children in particular. My experience working at off-campus camps was particularly important in shaping my career goals. Intellectually, I was aware of the challenges facing at-risk youth but working in community schools more directly exposed me to the realities of their lives. While my career will not involve educating youth, my research and future goals involve the health of young people. I always liked kids, but working at EYES was one factor that influenced my desire to work towards a career in improving quality of life of children, particularly for at-risk populations.

This camp was special to me, just opened up a world of opportunities to these kids, who go to these schools. “My parents could never send me there” And even getting them across to the street to the school was a struggle, it’s free. I remember mornings, going to so and so house, and knocking on doors, and ‘Are you coming today?’ The mom or dad doesn’t care. We would bring them out, yep come along. So even getting them there, you had to throw all rules out the window … The Thomson camp was great. I really enjoyed being there. It could be pull your hair out frustrating, but that is where I learnt to be most flexible, think on my feet. [Sophia]

We also got a nice little view into a couple of the domestic disputes that go around on that side of town. It is eye opening to see what they have to view on a daily basis and how much that would actually affect their lifestyle. It was great and I feel if more people like myself would see this on a more daily basis or not even on a daily basis but more in general than we would definitely be more prone to be driving programs like that. [Emma]

The inner city camp was a real eye opener about the advantages and disadvantages that some people face ... These science concepts, these ideas are not the most important thing in their life [Olivia]

For me once again, the relationship building, has directly translated to career. The camp experience was my first real look at how others see the world. Not that I truly understand. I deal with students similar to that inner city camp on a daily basis and I think that is were my teaching style comes from. Is the idea that not all of them are going to be scientists, and that is ok. [Olivia]

As a teacher and an education student, I was the kid that always liked school. My mom and dad are still together, I have two younger brothers, I always did ok, I always had three meals. It was pretty easy for me to do ok in school. You just showed up and the grades happened. Whereas these kids have so many other adversities to face before they get there. As a teacher, it is really important that you recognise that they have lives outside of your classroom. And I think that a
lot of teachers forgot that sometimes. They think that school needs to be the most important thing, and for some kids it is not ... I recognized that maybe not everyone views school like I do. [Olivia]

All-Girls

I was a part of the All-Girls camp twice and really enjoyed it. I thought having a group of girls who are able to freely engage and connect with both each other and the curriculum material was really rewarding. Not being from an education background, I was surprised how different the girls acted and responded to not having the boys in their group (as compared to those campers I had had in mixed groups).

I enjoyed the All-Girls camp. I feel it’s important for girls to have role models in the science field. The All-Girls camp provided an atmosphere where all girls felt safe and confident in their abilities and because of this I believe their participation level increased.

Even as a teacher now, girls still feel hesitant to take on that kind of career path or that interest. It is still not seen as super cool

All-Girls was the only time where I saw all the girls get their hands dirty and really get involved. [September]

I always thought, ‘There is no discrimination. There is no issue. I am going to apply for sciences. I am sure every other girl thinks they can apply for sciences or go do whatever.’ I was kind of blind to the fact that there still were some prejudices out there … This little boy puts up his hand and says, ‘My dad told me that science is kind of more of a blue colour and that boys do blue things and girls do pink things, like laundry and cleaning.’ … Open my eyes a bit about some prejudices that were still out there [Sophia]

At the time, I didn’t really understand because I was that person who had been comfortable around males and females and I had been my whole life. The more I work with students there isn’t always that comfortability between the genders. These girls felt free be themselves and take chances without the idea of a guy being there. They didn’t have to impress. It sounds weird that a young kid would do that but it was very evident in the schools that is a big factor. [Olivia]