

University of Louisville

ThinkIR: The University of Louisville's Institutional Repository

Electronic Theses and Dissertations

8-2017

Former students discuss middle school science journalism : a qualitative study of personally meaningful disciplinary writing.

Marsha R. Buerger
University of Louisville

Follow this and additional works at: <https://ir.library.louisville.edu/etd>



Part of the [Curriculum and Instruction Commons](#)

Recommended Citation

Buerger, Marsha R., "Former students discuss middle school science journalism : a qualitative study of personally meaningful disciplinary writing." (2017). *Electronic Theses and Dissertations*. Paper 2765.
<https://doi.org/10.18297/etd/2765>

This Doctoral Dissertation is brought to you for free and open access by ThinkIR: The University of Louisville's Institutional Repository. It has been accepted for inclusion in Electronic Theses and Dissertations by an authorized administrator of ThinkIR: The University of Louisville's Institutional Repository. This title appears here courtesy of the author, who has retained all other copyrights. For more information, please contact thinkir@louisville.edu.

FORMER STUDENTS DISCUSS MIDDLE SCHOOL SCIENCE
JOURNALISM: A QUALITATIVE STUDY OF PERSONALLY
MEANINGFUL DISCIPLINARY WRITING

By

Marsha R. Buerger
B.A., University of Louisville
M.A., University of Louisville

A Dissertation
Submitted to the Faculty of
The College of Education and Human Development
in Partial Fulfillment of the Requirements
for the Degree of

Doctor of Philosophy in
Curriculum and Instruction

Department of Middle and Secondary Education
University of Louisville
Louisville, Kentucky

August, 2017

Copyright 2017 by Marsha R. Buerger

All rights reserved

FORMER STUDENTS DISCUSS MIDDLE SCHOOL SCIENCE JOURNALISM: A
QUALITATIVE STUDY OF PERSONALLY MEANINGFUL DISCIPLINARY
WRITING

By

Marsha R. Buerger

B.A., University of Louisville

M.A. University of Louisville

A Dissertation Approved on

July 18, 2017

by the following Dissertation Committee:

Dissertation Director
Dr. Lori Norton-Meier

Dr. James Chisholm

Dr. Penny Howell

Dr. Justin McFadden

Ms. Jean Wolph

Dr. Wendy Saul

ACKNOWLEDGMENTS

I would like to thank my dissertation director, Dr. Lori Norton-Meier, for her depth of understanding and dedication to science literacy and her patience and guidance during this journey. I would also like to thank my committee members, Dr. James Chisholm, Dr. Penny Howell, Dr. Justin McFadden, Ms. Jean Wolph – KWP Director, and Dr. Wendy Saul for their insight, comments, and assistance – without you, I would not have persevered.

The disciplinary approach to science literacy that is SciJourn would not be possible without Dr. Wendy Saul and Dr. Alan Newman. They have continued to be an inspiration to me and my students. Dr. Saul has visited Kentucky many times to add her voice and wisdom to our planning and presentation of SciJourn to teachers. Dr. Newman continues to edit articles for SciJourn.org and has been instrumental in both my development as a teacher and a writer. Thank you both.

Jean Wolph suggested that I start this adventure and has continued to be my mentor and friend. Over many years, no one has pushed me harder to get out of my comfort zone and share my ideas and expertise with others. I would not be who I am today without you.

I would also like to express my appreciation for my husband, Dr. David Buerger, as well as my children and grandchildren for their patience and understanding – I know this was a challenge and I deeply understand the sacrifices that you made for me.

ABSTRACT

FORMER STUDENTS DISCUSS MIDDLE SCHOOL SCIENCE JOURNALISM: A QUALITATIVE STUDY OF PERSONALLY MEANINGFUL DISCIPLINARY WRITING

Marsha R. Buerger

July 18, 2017

This qualitative research study explores the experiences of six middle school students with science news writing (SciJourn) after they have transitioned to high school. The qualitative method of case study was used with the data analyzed through the method of constructivist grounded theory. SciJourn is a disciplinary approach to science literacy that allows students to choose and research their own topic, interact with experts in the field, construct their own knowledge, and have the opportunity to publish in an on-line science newspaper (Scijourner.org).

Theoretically, this research draws on science as social practice where literacy learning is cognitively complex, is situated in the social character of human understanding, and involves social co-participation situated in a learning community.

With the renewed focus on science literacy and an emphasis on Writing in the Disciplines (WID), research has shown that a shift from general to disciplinary literacy strategies has significantly increased students' skill and achievement with both higher and lower achieving students.

The six case study students who participated in SciJourn in middle school wrote reflective letters, were interviewed twice, and three participated in a group interview/group activity. Data analysis using the constant comparative method of grounded theory revealed the themes of Learning Language (increased knowledge of writing process and structure), Learning through Language (interest in science content and knowledge of science practice), and Living Language (students found meaning in their experience).

Analysis showed the significance of including authentic disciplinary literacy assignments in all content area classrooms. The following appear to be the essential elements that increase the meaning and value of the SciJourn experience for the students: Choosing own topic, having a connection, having a partner, interacting with the outside world (family, editor, experts, audience), and the opportunity to publish.

In addition, the key understanding of Negotiation with self and others (peers, family, the editor, experts, and/or an audience) revealed an emotional experience that contributed to increased engagement in the writing process and supported the development of confidence in their ability to complete an authentic writing assignment to a publishable piece.

TABLE OF CONTENTS

	PAGE
ACKNOWLEDGMENTS	iii
ABSTRACT	iv
LIST OF TABLES	xi
CHAPTER I – INTRODUCTION.....	1
What is SciJourn?	2
Study Purpose and Questions	6
The Call for Science Literacy	7
Writing to learn to meet Demand for Science Literacy	10
Theoretical Framework	12
Summary of Chapter I	14
Overview of Chapters	15
CHAPTER II -- REVIEW OF RELATED LITERATURE	17
Introduction	17
The Common Core State Standards (CCSS)	19
A Framework for K-12 Science Education	20
The Next Generation Science Standards	21
What is: Science Literacy?	22
Content Area Literacy?	26
Writing to Learn?	28
Writing to Learn or Writing in the Disciplines?	29

SciJourn – The Science Literacy Approach of Writing to Learn by Learning to Write in the Disciplines	33
Summary of Chapter II	35
CHAPTER III -- METHOD	37
Methodological Traditions -- Case Study and Constructivist Grounded Theory	38
Context	39
Sample of Participants – Overview	40
Participants for Group Interview/Group Activity	43
Statement of Positionality	43
Data Collection	44
Data Sources:	46
Existing Data: Reflective Writing Documents	46
Face-to-Face Interviews	48
First Interview	49
Second interview	49
Focus Group Interviews	50
Group Peer Review Activity	51
Researcher Role	52
Data Analysis and Reduction	53
Motivating Theory	56
Limitations	57
Non-Limitations:	57
Purposeful Sample	57

Teacher Researcher – Inquiry as Stance	58
Trustworthiness	59
Procedures to Ensure Ethical Considerations in Research of Human Subjects	60
Summary of Chapter III	61
CHAPTER IV – FINDINGS	63
Introduction	63
Interview Structure	64
Chapter Overview	65
Background on Reflections	67
Case Study 1 – Brandi	73
Eighth Grade Reflection Letter	73
First Interview	75
Second Interview	81
Case Studies 2 and 3 – Diane and Robin	85
Diane’s Seventh Grade Reflection Letter	86
First Interview	88
Second Interview	93
Robin’s Seventh Grade Reflection Letter	97
First Interview	99
Second Interview	100
Case Study 4 – Helena	103
Eighth Grade Reflection Letter	104
First Interview	105
Second Interview	110
Case Study 5 – Jordan	117

Eight Grade Reflection Letter	117
First Interview	118
Second Interview	122
Case Study 6 – Sam and Parent	126
Seventh Grade Reflection Letter	126
Eighth Grade Reflection Letter	128
First Interview	129
Second Interview	139
Review	144
Group Interview – Diane, Robin, Sam	147
Group Activity: Peer Review	150
Summary of Chapter IV	154
CHAPTER V – DISCUSSION	156
Introduction	156
Model Presentation	157
Emotion	162
Negotiation with Teacher	165
SciJour Approach to Literacy	166
So...What is Learning?	168
Future Research	170
My Journey	171
REFERENCES	174
APPENDICES	187
Appendix A – Questions for First Interview	187
Appendix B – Questions for Second Interview	188
Appendix C – Questions for Group Interview	190

Appendix D – Exempt IRB Approval University of Louisville DRMS Approval – JCPS	191
Appendix E -- Example of Published Student Article	194
Appendix F – Brandi’s Data	195
Appendix G – Diane’s Data	206
Appendix H -- Robin’s Data	216
Appendix I – Helena’s Data	222
Appendix J -- Jordan’s Data	234
Appendix K – Sam’s Data.....	244
Appendix L – Group Interview Data	260
Appendix M – Group Practice Activity Data	265
Appendix N – Example of Interview Coding	276
CURRICULUM VITA	277

LIST OF TABLES

TABLE	PAGE
1. Research Participants	41
2. Data Collection Timetable of Research Study Tasks	45
3. Connection between Research Questions and Data Sources	52
4. Participant Information	64
5. Participants with Abbreviated Results	69
6. Brandi's First Interview – Negotiation with Self	78
7. Brandi's First Interview – Negotiation with Self	78
8. Brandi's First Interview – Negotiation with Self	79
9. Brandi's First Interview – Negotiation with Family	79
10. Brandi's First Interview – Negotiation with Self, Family, Audience ...	80
11. Brandi's Second Interview – Negotiation with Self	82
12. Brandi's Second Interview – Negotiation with Editor	82
13. Brandi's Second interview – Negotiation with Audience	83
14. Brandi's Second Interview – Negotiation with Self, Peers, Audience ...	84
15. Diane's First Interview – Negotiation with Self	89
16. Diane's First Interview – Negotiation with Self	90
17. Diane's First Interview – Negotiation with Family, Audience	91
18. Diane's First Interview – Negotiation with Experts	92
19. Diane's First Interview – Negotiation with Self, Peers, Experts	92

20. Diane’s First Interview – Confidence, Interest in Science, Identity as Scientist	93
21. Diane’s First Interview – Negotiation with Self	94
22. Diane’s Second interview – Negotiation with Experts	95
23. Diane’s Second Interview: Significance of Publishing	96
24. Robin’s First Interview – Negotiation with Self	99
25. Robin’s First Interview – Negotiation with Self, Peers, Audience	100
26. Robin and Diane’s Interaction	101
27. Robin’s Second Interview – Negotiation with Self	102
28. Helena’s First Interview – Negotiation with Self	107
29. Helena’s First Interview – Negotiation with Peers	107
30. Helena’s First Interview – Negotiation with Family	108
31. Helena’s First Interview – Negotiation with Editor	109
32. Helena’s First Interview: Negotiation with Audience	109
33. Helena’s Second Interview – Negotiation with Self	111
34. Helena’s Second Interview – Negotiation with Peers	112
35. Helena’s Second Interview – Negotiation with Family	113
36. Helena’s Second Interview – Negotiation with Editor	114
37. Helena’s Second Interview – Negotiation with Audience	115
38. Jordan’s First Interview – Negotiation with Self	119
39. Jordan’s First Interview – Negotiation with Self	120
40. Jordan’s First Interview – Negotiation with Peers	121
41. Jordan’s First Interview – Negotiation with Family	122
42. Jordan’s Second Interview – Negotiation with Self	123

43. Jordan's Second Interview – Negotiation with Self	124
44. Jordan's Second Interview – Negotiation with Audience	125
45. Sam's First Interview – Negotiation with Self	131
46. Sam's First Interview – Negotiation with Self	132
47. Sam's First Interview – Negotiation with Peers	133
48. Sam's First Interview – Negotiation with Family	134
49. Sam's First Interview – Negotiation with Family	135
50. Sam's First Interview – Negotiation with Editor	136
51. Sam's First Interview – Negotiation with Self, Peers, Audience	137
52. Sam's Second Interview – Negotiation with Self	140
53. Sam's Second Interview – Negotiation with Self	140
54. Sam's Second Interview – Negotiation with Peers	141
55. Sam's Second Interview – Negotiation with Audience	142
56. Sam's Second Interview – Negotiation with Self, Peers, Audience	143
57. Sam's Second Interview – Seeing Value	144
58. Group Interview – Introduction	148
59. Group Interview – Communication	149
60. Group Activity – Analysis of Peer Article	151
61. Group Activity – Active Participation	152

CHAPTER I

INTRODUCTION

Steven's face was animated as he rushed up to me in class. He stated,

You should see the article on the new ALS research I found last night! The reporter does a really good job of breaking it down. I can't tell you how excited I was to read that article! This could be a cure for ALS and it could also be used for Alzheimer's and Parkinson's disease!

Steven, currently a student in my seventh-grade science class, is writing a science news article about ALS (Lou Gehrig's Disease) because he has a personal interest in learning more about this disease -- his uncle was diagnosed with ALS and he has been watching him rapidly go downhill over the past year. Steven typifies students who write "SciJourn" articles in my classroom; he was encouraged to write about something he had an interest in, he became engaged and excited about researching and writing, he is learning about credible sources, he is understanding the science behind ALS, and he is connecting to a larger audience with the opportunity to publish for an authentic audience on a science publishing site, SciJourn.org.

Sam, a former student in my seventh- and eighth-grade science class, reflects from her current position as a ninth-grader on her experience with SciJourn. In the seventh grade, she wrote and revised her article, was published on the SciJourn.org site, and has received approximately 4,000 hits on her article in less than one year.

Researcher: *So, when you were able to become part of the science community with your published article...did that make it feel a little more real?*

Student: *Yes. Because in most things in science you have to create your hypothesis of it, and you have to present your idea on paper, and this was doing so -- it was presenting your information, describing it, backing it up, and that's what science is.*

Sam discovered that publishing her article helped her to connect her research and writing with science practice – the way that science “works.” This dissertation is about students like Sam and Steven (pseudonyms). In this qualitative research study, I ask the question – “What is going on here?” As Steven and Sam’s teacher, I take this opportunity to explore an essential question to the act of teaching and learning – “What is it about the design of this writing experience that contributes to the learning of my students?” Throughout this dissertation, I will situate this research in a larger educational context, deeply describe my research question, research design, theoretical framework, relevant literature, and then introduce you to six case study students, ending this dissertation with an authentic assignment model for consideration along with implications for future research and practice.

But first, in this chapter and to situate the context for this study, I explore the SciJourn experience -- what it is, how I became involved, what it does for teachers and learners, and why it should be researched.

What is SciJourn?

I was introduced to the science news writing process of SciJourn in the summer of 2011. The “Science Literacy through Science Journalism” project was in the third year of a four-year, NSF-funded grant based at the University of Missouri-St. Louis College of Education. During each of the previous two summers, approximately 15 high school teachers from the St. Louis area had been invited to a two-week professional development opportunity where they were given specific instruction on how to include

science journalism activities into their classrooms. The purpose of the grant was to discover if “the teaching of science journalism using an apprenticeship model, reliable data sources and science-specific writing standards improve high school students’ understanding of and literate engagement in science” (University of Missouri – St. Louis, College of Education website). Many high school students were published in the hard copy of the SciJourney Magazine as well as the on-line site, Scijourner.org. During the third year, it was decided that several middle school teachers would be invited to attend this training to explore whether middle school students would also be capable of producing science news articles in their science classrooms. I was one of those fortunate teachers and quickly found my mind opened to an authentic writing assignment that captures students’ enthusiasm and interest and helps them not only to learn science content, but also to understand that science is an ever-evolving subject. (Please see SciJourney.org for examples of the student publication website and Appendix E for a specific example of a published seventh-grade article.)

After experiencing the wonder that is SciJourn in my classes and getting feedback from my students, I began sharing this with other teachers. I have provided professional development (PD) in many different structures to elementary, middle, and high school teachers. These sessions varied from a funded opportunity in which teachers were given stipends to attend a weekend SciJourn training retreat complete with follow-up sessions to (more typically) three- to five-day summer workshops, as well as 90-minute presentations that simply introduced the process.

Initially as a researcher, I was interested in the teachers. I wanted to know why few teachers managed the publication of a finished science news article, even though they

reported high interest in including this writing approach in their classes. In fact, after six years of working with students and teachers on SciJourn and reading the literature on teacher change, I have grappled with disillusionment about the possibility of teacher transformation through SciJourn. It is apparent that many factors are behind teachers' struggles to incorporate this type of long-term writing assignment into their curriculum (Buerger, 2016). Obviously, there are many pressures on teachers to cover their content, pass the "test," control their classes, fill out mountains of forms, and figure out how to manage the process of writing – the research, the editing, the revisions, the understanding of the writing process. These barriers are prevalent and even though teachers are encouraged or even required to include "writing-to-learn" assignments in their classes, they are taught to use simple writing inclusion tools such as Venn diagrams, T-charts, short responses to prompts in science notebooks, lab reports (without deep reflection), or "exit slips" that ask students to describe what they learned that day. These assignments are then used to meet the requirement of writing in science. Writing a science news article seems to take time away from content and to require giving up some control in the classroom; furthermore, it may overwhelm teachers who do not know how to or are scared of the revision process in extended writing. However, as a SciJourn teacher, *I have found that the inclusion of this type of disciplinary writing has spurred students' interest in science, improved their understanding of science content, and increased their confidence in tackling longer writing assignments.* Although studying teachers involved in the SciJourn process may have provided new insights into teacher transformation, I developed an interest in the SciJourn students and their experiences both during the time they were in my class and after they leave middle school. With this in mind, I engaged in

this research study wanting to understand the individual student's experience with the science news writing assignment *and to learn the essential elements of learning, language, and science understanding that make this approach beneficial to both students and teachers.*

Why do I believe this is an important line of research? The SciJourn approach to science literacy allows students to choose and research their own topic and while doing so, they must read, digest, question, comprehend, and synthesize complex amounts of reading in order to write their article. In addition, they interact with experts in their field, construct their own knowledge, have the opportunity to publish in an on-line science newspaper (SciJourney.org), and in so doing, take ownership of their learning while developing knowledge of the research and writing processes needed for their future. When students are given authority over the way they create, present, and learn science concepts in a meaningful context, their learning and retention increases and they “like” science much better because they actually understand and enjoy learning it (Barber, Catz, & Arya, 2006; Fang, Lamme, & Pringle, 2010). In a study by Ainley and Ainley, (2011) enjoyment was found to be a central predictor for students' current participation with and continued interest in science. They found that when students experience personal relevance and meaning they are “more likely to experience enjoyment and interest from engaging with science content” (p. 11). Extending disciplinary writing assignments by switching the audience from the teacher to an authentic audience of their peers (Ford, 2008; Gunel, Hand, & McDermott, 2009) and including the possibility of publication for their writing, appears to significantly increase student engagement and retention of content knowledge.

Study Purpose and Questions

The purpose of this study is to explore student voice as it relates to the experience of disciplinary writing of science news articles (SciJourn) in my seventh and/or eighth grade science class after students have transitioned to high school. Including student voice in this study is significant in that talking with students can enhance our thinking about and development of practice and provide insight and understanding to their personal experiences (Fielding, 2006; Messiou, 2006). In addition, the purpose is to discover the essential elements of learning, language, and science as students negotiate with themselves and others and reflect on the understanding of their learning as experienced through this approach. These students agreed to meet several times during their ninth-grade year and were interviewed individually and in groups in order to discover the elements of learning, language, and science voiced by students as they reflect on their SciJourn experience in their seventh and/or eighth grade year.

With the above purpose in mind, the research questions driving this research study are these:

- What are the essential elements of learning, language, and science understanding that are voiced by previous SciJourn students?
- How do students voice what it means to learn, to write and to engage in science after the SciJourn experience?
 - How does negotiation with self and others over time and space develop their understanding of their experience?

In this chapter I began with two examples of student voice -- one who is currently in my middle school classroom and one who is reflecting back on her experience after

transitioning to high school. From these two students we begin to see their negotiated learning with the SciJourn experience. We hear from Steven who is not only learning how to research a health topic connected to his family but who is also reading an article with the intent of understanding the science behind ALS and the new possible cure. We then hear from Sam who is reflecting back on the meaning she places on her success in publishing her article. It is from these students that we can understand how, in those moments, students are continually negotiating with self over time and space and their ever changing identities as learners, writers, and as scientists.

The Call for Science Literacy

In order to reveal the learning expectations for today's students and the forces that affect teaching and learning in this country, it is essential to understand the current political context and the state of our current curriculum structure. According to the Committee on Science, Engineering and Public Policy (COSEPUP, 2007), students in the United States are not keeping up with their counterparts in other countries and the lack of preparation will reduce the ability of the U.S. to compete in the 21st Century where a literate population will be needed. The National Assessment of Educational Progress (NAEP, 2011) found that only 27% of students in the eighth and ninth grade performed at or above the proficient level in writing. On the 2013 NAEP assessment, there were slight gains between 2011 and 2013 in reading, however, only 36% of eighth graders performed at or above proficient levels.

According to the 2008 Science and Engineering Indicators (National Science Board, 2008), adults in selected countries correctly answering questions related to basic science concepts is quite low (less than 40%). Gross (2006) (as quoted in Chinn, Hand,

& Yore, 2008) reports a 17% science literacy rate among adults in the United States (science literacy will be discussed later).

A Framework for K-12 Science Education (National Research Council, 2012) states that in order for the U.S. to face the challenges of the future related to science and engineering, an informed populace is essential for America to be competitive but it is also essential to the quality of life. An ever larger number of jobs require skills in science and engineering along with those in language arts and mathematics. There is a need for world-class scientists and engineers and the U.S. educational system must develop a workforce that is literate in mathematics and science (COSEPUP, 2007). Additionally, COSEPUP emphasizes that without basic science literacy, adults cannot participate effectively in a world increasingly shaped by science and technology (p. 112).

Science literacy knowledge (which includes content area writing, writing-to-learn, and disciplinary writing, all of which will be discussed and defined later) is increasingly important in today's society. It not only provides students a path to understanding how science works, a way to get involved, and ownership of their work, but also, a path to provide the knowledge needed in all areas of their lives. In addition, I am interested in the expanded view of literacy – that writing knowledge can be applied not only in science but also in all other content areas – especially as it relates to high school and college. While this study explicitly explores science writing, there is an indication that disciplinary writing helps provide students with knowledge of the writing process and structure knowledge needed in any content area where research and inquiry intersect. Writing in the content areas (specifically disciplinary writing) may be the catalyst for real authentic reading and writing skills that complement the other content areas.

Though the standards call for inclusion of science literacy practices, finding a literacy approach that meets the standards, helps students with content knowledge, and engages students is often difficult (Shanahan & Shanahan, 2012). Science content has traditionally been a static, boring endeavor full of memorizing often unrelated facts and/or doing labs that have a “right” answer involving little creative thinking (Roberts, 2007). Students also state that science is hard, the vocabulary is confusing, they can’t understand it, and are, therefore, uninterested in learning and/or engaging in the learning of it (Lemke, 1990). Finding a solution to helping all students learn and retain content knowledge, cognitively engage with that knowledge, and come to class looking forward to being there are reasons for including the authentic writing of SciJourn in science content classes. This writing approach provides students with a purpose to learn and understand science and clearly indicates that science is relevant to their lives. Those students who comprehend the importance of using credible sources not only for their science writing but also for use in their daily lives, begin to understand that science is an ever-evolving, current, and essential component of understanding the world outside their realm and within their personal lives (Polman, Newman, Saul, & Farrar, 2014). This is what science literacy is – being able to use science to improve our understanding of the world around us and to improve our lives by being able to transverse the multitudes of information we are exposed to on a daily basis that may or may not be “true”.

Science literacy is important for all students not just those two percent who may go into a scientific field (Snyder & Dillow, 2015). Science literacy provides a foundation for living in the world where information is flying through varying, emerging, and overwhelming conduits of megabytes and gigabytes of data. Informed citizens need to

navigate those bytes of knowledge to make informed decisions about their own and their family's health, as well as decisions on the political and environmental aspects of science that impact their lives (Framework, 2012). The writing to learn, disciplinary writing approach of SciJourn was developed to meet the call for increasing science literacy for all students (Polman et al., 2014) and is discussed below and expanded upon in the literature review in Chapter II.

“Writing to Learn” to Meet Demand for Science Literacy

SciJourn is a writing to learn assignment based in the discipline of science. Writing to learn often involves specific writing strategies (such as writing prompts, graphic organizers, etc.) designed to stimulate student thinking and content understanding (Applebee & Langer, 2013). The studies discussed below indicate that writing to learn assignments that focus on the importance of student use of language have proven to increase student knowledge of science content. For example, a three-year, mixed method study by Hand, Norton-Meier, Gunel, and Akkus (2015) that included 32 elementary teachers from six school districts and over 700 students each year demonstrated that, “critical embedded language opportunities contribute to an increase in student Iowa Tests of Basic Skills (ITBS) scores in science and language based on level of implementation particularly for elementary students who receive free and reduced lunch (an indicator of living at poverty level)” (Hand et al., 2015, abstract). The use of the Science Writing Heuristic (SWH) in this study and in previous studies with grade five students (Cavagnetto, Hand, & Norton-Meier, 2011) and with younger students in kindergarten through third grade (Linebarger & Norton-Meier, 2016) have also indicated an increase in the understanding of challenging science content.

In addition, having experienced several different types of writing to learn projects in my classroom, I've found the SciJourn approach to writing to learn has unique advantages: science news writing changes the audience of a science research report from the teacher to their peers (as well as people from all over the world), it insists that the writing be creative and unique, it gives students a choice in their presentation, it includes the presentation of their project to their peers, it provides a reason to connect with experts in the science field, and it includes the possibility of publication. In my classes, I observed a significant increase in student engagement and retention of science content knowledge as well as recognition of the reasons why science and science literacy is valuable to each and every one of them. The students learn that learning, literacy, and communication are socio-cultural endeavors that promote a community of learners versus an individualistic notion of learning where one "sits and gets" in isolation from any discourse, interaction, synthesis, or engagement (Lave & Wenger, 1991).

It appears that one of the driving factors for increased student engagement and understanding involves the change in audience that SciJourn provides. Several studies have indicated that writing-to-learn approaches that include a change in audience have significant, positive results. For example, Gunel, Hand, and McDermott (2009), in their study of writing for different audiences in a high school biology class, found that writing to a younger audience (translation) places cognitive demands on the writers and leads to conceptual growth where writing for the teacher (replication) does not. This shift in audience places writers into a place of authority where they need to understand the concepts before they can explain (translate) them to their audience rather than repeating concepts (replication) to the authority (the teacher) (Ford, 2008). In this context, there is

an assumption that the audience is uninformed and therefore in need of a clear and concise explanation of the science -- the students are not writing for the teacher where explanation of the science and science terms is deemed unnecessary. This change in audience that is provided in the SciJourn approach creates urgency and steps up the assignment to one of authenticity and rigor (Polman et al., 2014)

As students negotiate their understanding of what it means to learn, write and engage in science through the writing-to-learn approach of SciJourn, they become immersed in the “practice” of science. They do so by researching and writing about current science news and topics, but not in isolation staring at a computer with the teacher as their only audience -- they “pitch” their ideas to the class, email experts in the science field, and are provided a platform with an audience that has ranged into the thousands. This social practice approach provides meaning for their writing and appears to fuel their engagement and increased understanding of science literacy.

Theoretical Framework

Science news writing (SciJourn) provides an opportunity to create a positive and engaging learning environment informed by the framework of literacy as a social practice. This immersive orientation to science inquiry learning is not only an example of literacy as a social practice, but it also involves the complex use of language. This approach recognizes that literacy learning is an endeavor that is cognitively complex and is situated in the social character of human understanding, and where social co-participation is situated in a learning community (Fang, 2013, Lave & Wenger, 1991). Literacy is not a stagnant, technical, neutral skill (Carter, 2006). The literacy practices of reading and writing are always embedded in social practices that provide meaning to the

construction of knowledge and a link to broader cultural and social meaning (Street, 2003). In addition, Barton and Hamilton (2000) emphasize that literacy as a situated practice is “what people do with literacy” and that it involves “values, attitudes, feelings, and social relationships internal to the individual; at the same time practices are the social processes that connect people with one another” (p. 7).

In grounding this study in literacy as a social practice paradigm, it is important to discover how students use language to learn in science. Halliday (1993) states that a “distinctive characteristic of human learning is that it is a process of making meaning” and that “meaning is at once both doing and understanding” (p. 93). He posits that all learning whether learning language, learning about language, or learning through language involves learning to understand in more than one way. Ardasheva, Norton-Meier, and Hand (2015) take this one step further and discuss the development of the Science Writing Heuristic as a learning approach that involves learning the language of science, learning about the language of science, and living the language of science. This same immersive orientation is embedded in the SciJourn science literacy approach as discussed below.

Science journalism is directly related to the science-as-a-social-practice approach as a way to connect students to a larger community of scientists by involving them in finding current science research from credible sources on a topic of their interest and in learning how scientists construct knowledge (in many cases connecting these students through email to these scientists), and by providing them the opportunity to publish for an authentic audience. This science journalism assignment results in the fuller, richer

engagement of students in their learning that includes “purpose, interest, motivation, and identity” (Fang, 2012, p. 104).

Summary of Chapter I

Through my study of disciplinary writing in my middle school science classroom, I found that taking a journalistic stance is changing the way my students engage in science literacy. They are understanding the importance of using credible sources, they are conducting research, they are connecting to professionals in emails, they are increasing their tenacity as writers, they have an authentic task and audience, they are getting published, they fight me to continue writing, and their engagement is high and contagious. In order to understand the connections between science and literacy, theorists, researchers, and educational policymakers have been helping to construct our understanding of science literacy through standards, policy and curriculum related to writing-to-learn approaches, content area reading, and disciplinary literacy practices. The development of literacy knowledge through authentic writing opportunities in the science classroom provides a gateway to increased engagement in science, an understanding of science practice, and an increased confidence in the writing process. The purpose of this study is to explore and examine the SciJournal approach to science literacy as voiced by students who participated in SciJournal experience in middle school and to learn how they continue to use that experience in high school to shape their thinking about learning, writing, and science. SciJournal is a literacy approach deeply embedded in the social practice of science.

Overview of Chapters

In the next chapter (Chapter II), the literature is discussed concerning the standards that are driving the inclusion of literacy skills in all content areas and, specifically, science. The standards represent the current political context and policy surrounding the decisions made in the classroom during the era of No Child Left Behind (NCLB). These standards impact what teachers do in the classroom and although I was including SciJournal in my classes prior to the adoption of the CCSS, the expectations of the Common Core Standards for Literacy in History/Social Studies, Science, and Technical Subjects have nevertheless helped support this inclusion with respect to other teachers and administrators. In addition, discussing the standards provides an understanding that classroom instruction is always being shaped by the current policies and decisions being made around it.

Since these standards call for literacy in science, it is important to understand the development of the meaning of science literacy and its implications for student learning. In addition, there are several strategies that have been proposed in order to include science literacy writing in the content areas. These are presented and indicate the shifts required to connect standards, literacy, and science writing to improve student understanding and learning as well as provide a positive learning experience. SciJournal (science news writing) is then discussed as one approach that could meet the standards and provide knowledge students need for their future education and career development, as well as to become informed citizens.

In Chapter III, this proposal's qualitative method of case study is discussed and connected to the purpose of this study. A "case" may illuminate a phenomenon that is

bounded by context and may involve studying a small group and/or a process (Miles, Huberman, & Saldana, 2013). This study's case involves the social practice of SciJourn and the students whose voices will be heard and analyzed through the lens of Constructivist Grounded Theory (Charmaz, 2008). The procedures for the analysis of the data will be explained in detail. The context, participants, data sources and collection, researcher's role, and the limitations/non-limitations of this study will be discussed and connected with the theoretical framework.

Chapter IV presents six case studies of student voice as related to their experience with the SciJourn approach to science literacy which includes the data sources and analysis of student reflection documents, first and second interviews, a group interview, and a group practice activity. Chapter V provides a model that captures the essential elements and negotiations that emerged from my analysis, visually pulls together the findings, and inter-relates the central categories of the analysis (Creswell, 2013). In addition, it examines the findings of this research study and relates them to the research questions and the literature. Furthermore, implications for teachers, teacher education, and researchers are discussed.

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

The following is a brief excerpt from an interview with Jordan – a ninth grade student who was previously in my eighth-grade science class. She is responding to questions concerning her understanding of the impact that the SciJourn process had on her preparation for high school and college and on her choice of career.

J: *Yes! I loved it. I love learning new information and I thought it was really good knowing how to do all that because it really does prepare you for high school knowing how to set up a writing piece because you are going to be doing writing pieces through high school and college and knowing how to research, and put in information, and just learning about the information was just awesome, I loved it a lot!*

J: *Yes! I actually majored in science this year. When scheduling I declared science.*

R: *Do you think that had any influence from the SciJourn experience?*

J: *Actually, yeah, because I don't know, I find it really interesting to go deeper in health because I want to be a nurse [practitioner] anyway and I like learning about the body and I thought it was interesting in going back and seeing how our brains worked and how our bodies can do stuff that I didn't even know they could do. I just found it interesting that anything science related -- I didn't even know that it was science related. So I did major in science.*

As Jordan reveals in her interview, SciJourn and disciplinary literacy practices were crucial for the success she is now having in high school and for her dreams of being a nurse practitioner. She is improving as a writer, meeting the standards, becoming scientifically literate, and enjoying it in the process.

As I have stated in the proposed structure for Chapter II, it is important to understand the standards that are driving the inclusion of literacy, and specifically science literacy, for all students. Discussing the standards provides an understanding that classroom instruction is always being shaped by the current policies and decisions being made around it. It follows that if these standards call for literacy in science, it would be important to understand the development of the meaning of science literacy and its implications for student learning. In addition, there are several literacy strategies that have been proposed in order to include writing in the content areas. These are discussed and indicate the shifts required to connect standards, literacy, and science writing to improve student understanding and learning as well as provide a positive learning experience. SciJourn (science news writing) is then discussed as one disciplinary literacy approach that could meet the standards as well as provide learning that students will need for their future education and career development, and to become informed citizens.

Literacy in the secondary science content area has often been discussed and promoted but rarely has it reached a structured application phase where teachers are expected and required to include literacy strategies in their content classrooms (Fang, 2014). Two recent publications – *Common Core State Standards* (CCSS) (National Governors Association for Best Practices and Council of Chief State School Officers, 2010) and *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas* (National Research Council, NRC, 2012) -- lay the foundation for science and literacy standards and call for increased professional development to impact teacher practice and student achievement. These new standards are a tremendous opportunity for public education in the United States to move forward with specific common goals that

are anticipated to dramatically improve our schools (CCSS, 2010). Both the CCSS and the Framework call for the acceleration of students' literacy development (Calkins, Ehrenworth, & Lehman, 2012, p. 14). The CCSS drive instruction by setting goals for what content should be taught but not how teachers are to teach it.

This literature review begins with an overview of the Standards that are driving literacy development in science literacy education currently in the United States. Science literacy is then expanded upon and reviewed with the evolution of its definition and a review of research studies that informed our current understanding of classroom efforts to connect science, language, and literacy practices. As there has been a shift from teaching language skills to including content area literacy in all classes, content area writing (which includes writing-to-learn) is reviewed. In addition, the change in emphasis from Content Literacy to Writing in the Disciplines (WID) is explored as a shift to a disciplinary literacy approach that is founded on the social practice concept of learning – students are socialized into the literacy practices of specific disciplines (Ford, 2008).

The Common Core State Standards (CCSS)

The Common Core State Standards (CCSS, 2010) for mathematics and English language arts and literacy have been adopted by 45 states in the United States. With fewer, clearer, and higher standards (Phillips & Wong, 2010) the CCCS attempt to move away from disjointed and varying state standards and content assessment to common learning goals that help ensure that all students are college and career ready no later than the end of high school (Calkins, Ehrenworth, & Lehman 2012; CCCS, 2010; Phillips & Wong, 2010; Porter, McMaken, Hwang, & Yang, 2011). The CCCS set requirements for English language arts (ELA) and for literacy in the subject areas of History/Social

Studies, Science, and Technical Subjects. The document states that the literacy skills of reading, writing, speaking, listening, and language are essential for college and career readiness in the twenty-first-century and that teachers must use their content area expertise to develop these skills. This document is unique in that the standards are designed to build on previous knowledge from the elementary through secondary grades. According to Porter et al., (2011) the CCSS address the problem of a curriculum that is too broad and not deep enough and explicitly focuses on what students are to learn (the content), and not on how it is to be taught (pedagogy and curriculum). By increasing students' literacy skills and building those skills on prior knowledge, the Common Core Standards are designed to move students toward higher order cognitive skills.

A Framework for K-12 Science Education

The National Research Council (2012) in its *Framework for K-12 Science Education* is capitalizing on the opportunity that exists today wherein many states are adopting the CCCS and are also ready to consider adoption of common standards for K-12 science education (Foreword, p. ix). The Framework builds on previous studies that include *Science for All Americans*, *Benchmarks for Science Literacy* (1993) and Project 2061 which were developed by the American Association for the Advancement of Science (AAAS), and the National Research Council which created the *National Science Education Standards* (1996) (National Research Council, NRC, 2012). The National Science Teachers Association also contributed with their 2009 Anchors projects. The current Framework for K-12 Science Education recommends that science education in grades K-12 center on the three dimensions of: scientific and engineering practices (versus skills), crosscutting concepts, and core ideas in the disciplinary areas of: physical,

life, earth and space sciences, and engineering, technology and applications of science. In these areas (like the CCSS) conceptual development is to progress from one year to the next in a student's academic life. This Framework notes that coherence across different subjects within a grade or grade band contributes to increased student learning because it provides opportunities for reinforcement and additional uses of practices in each area.

The developers of the Framework state that it is especially important that the standards for science and engineering align with the Common Core State Standards in mathematics and English/language arts. The Framework recognizes that the literacy skills of reading and writing as defined in the CCSS are essential to science. Science simply cannot advance if scientists are unable to communicate their findings clearly and persuasively. In addition, given the incredible amount of information available instantly in today's global information highway, it is important for science educators to teach content in order that students can later "evaluate and select reliable sources of scientific information and allow them to continue their development well beyond their K-12 school years" (p. 31).

The Next Generation Science Standards

The Next Generation Science Standards (NGSS), based on the above Framework, extends rigorous science education standards to include three dimensions: disciplinary core ideas, scientific and engineering practices, and crosscutting concepts (Bybee, 2013). These standards focus on understanding the nature of science -- how science is practiced by providing experiences for a deeper understanding of science concepts and practices. As Bybee states, science is a way of knowing; it is a human endeavor. A shift in science learning is indicated:

- from learning to explaining;
- from science as a single discipline to science and engineering knowledge;
- from a body of knowledge to a way of knowing – the nature of science as an extension of practices and cross cutting concepts; and
- from science as a stand-alone discipline to science connected to experiences that incorporate the CCSS of science reading and writing.

The Framework and NGSS standards have the potential to influence all the fundamental components of science education (Bybee, 2013). Bybee refers to these fundamental components as school programs, teacher practices, teacher education and certification, and state standards and assessments. CCSS, the Framework, and the NGSS support providing effective literacy approaches in order to meet the standards they propose. They support the inclusion of purposeful, meaningful literacy practices in order to promote student understanding of themselves as learners, writers, and scientists, and to develop “thinking, productive citizens” (Moje, 2015, p. 259).

What is Science Literacy?

With standards that are demanding that teachers not only know their content but also to understand on a deep level what helps students gain the knowledge and skills needed for their future and the 21st Century, professional development must focus on content and how to integrate those skills and required literacy strategies into their content areas. However, there is a disagreement as to which literacy strategies should be included and even what constitutes science literacy in the science content area as discussed below.

The definition of literacy has evolved over time. The United National Educational, Scientific and Cultural Organization's (UNESCO) definitions have evolved from 1958 through 2005 (UNESCO, 1958, 1978, 2005) from a person's simplistic ability to read and write to a notion of literacy that involves a continuum of learning enabling an individual to achieve his or her goals, develop his or her knowledge and potential, and participate fully in community and wider society (UNESCO, 2005). In order to meet the needs of students in this expanded definition of literacy, the meaning of literacy has moved to one in which "literacy lives" and is deeply situated in a community of practice (Carter, 2006).

Science literacy has focused on knowing basic facts and concepts and having an understanding of how science works (AAAS, 1993; NSF, 2008; Roberts, 2007). This definition works if the science concepts haven't changed and the world that we live in has remained stationary and limited. However, the skill sets that students need in this rapidly changing society and the way they receive information has exponentially changed in recent years (Framework, 2012; Luke, 2000).

Researchers describe a need to change the focus of science literacy to reflect how technology has changed the ground rules governing how students receive, interpret and communicate scientific information (Ahmed, 2011; Brossard & Shanahan, 2006; O'Neill & Polman, 2004; Sadler & Zeidler, 2009). More importantly, evolving technologies demand that science education more efficiently prepare students to fill the growing need for technical workers and a scientifically literate populace (Cavagnetto, 2011; Liu, 2009; O'Neill & Polman, 2004).

Norris and Phillips (2002) propose there are two important knowledge bases comprising science literacy; the first focuses on the fundamental sense of reading and writing science content and the second involves the derived sense of being “knowledgeable, learned and educated in science” (p. 224). Those who cannot read and write are severely limited in their capacity to become scientifically literate. The fundamental skill of reading that is general to reading in all contents is crucial to science literacy along with the knowledge of the substantive content of science. Many authors emphasize both the importance of science content knowledge and the doing of science with language being an integral part of constructing that knowledge (Cavagnetto, 2011; Hand, Prain & Wallace, 2002; Osbourne, 2002). Kalantzis and Cope (2000) state that literacy is the promise of education that includes the foundational skills of reading and writing as a major function of formal education.

Numerous authors recognize the shift within science discourse from the traditional text- driven instruction to one where science literacy is connected to the real uses of science in daily life. Some of the popular descriptors are: public engagement with science, informed citizenry, civic responsibility, civic science literacy, and socio-scientific issues (SSI) (Cavagnetto, 2011; Miller, 1998; Osbourne, 2002; Sadler & Zeidler, 2009).

Roberts (2007) summarizes these ideas into two visions. Vision I reflects the idea that the primary aim of science education ought to be the promotion of scientific concepts and processes. Vision II focuses on understandings and use of science in situations removed from the traditional boundaries of science. Vision II’s “real life” situations relate to science and are influenced by other perspectives such as social,

political, economic and ethical ones (Sadler & Zeidler, 2009). Accordingly, Vision II describes a progressive science education (Deboer, 2000). This progression is viewed as a continuum from normal literacy (basic reading and writing skills) to functional literacy to conceptual and procedural literacy and finally to multi-dimensional literacy (Ahmed, 2011; Bybee, 1997; O'Neill & Polman, 2004).

In order to be critical consumers of scientific knowledge and to be scientifically literate, students must have the ability to understand and communicate the meaning and significance of science and technology information in order to make personal, social and political decisions (Committee on Science, Engineering, and Public Policy (COSEPUP), 2007; National Research Council, 2012). In addition, rather than focusing on previous instructional strategies that involve understanding science vocabulary and use of the scientific method, Ford and Forman (2006) appeal to the “practice turn” where students participate in authentic scientific practices which provides a path to a “firmer understanding of the academic disciplines themselves” (p. 1). They state that students need to “...engage in those aspects of the practice that are responsible for the grounding of authority and deciding what counts as knowledge” (p. 4). By being involved in communities of practice, students engage in the social aspects of public debates (discussions) about the nature of science, and gain an understanding of the interaction of the roles of “Constructor of claims” and “Critiquer of claims” (p. 4). This involvement could provide a deeper of understanding of how science knowledge is constructed and thus, use this knowledge to gain the disciplinary resources needed to become scientifically literate.

From our expanding definition of science literacy and the aforementioned studies and policy statements, we know that science literacy includes the ability to do the following:

- Use the fundamental skills of reading and writing, to understand science content;
- Make meaning of science content;
- Become critical consumers of science knowledge;
- Think scientifically;
- Think critically;
- Use scientific knowledge in problem solving;
- Gain independence in learning science;
- Participate in science-based, personal, political, and social issues.

These findings and policies are critical to understanding of the elements and negotiated meanings that students voice about learning, language, and science, the main purpose for this study.

In the following section, the “content area literacy” movement is examined, what was learned, how it shapes our current classroom practices, and how it is intended to meet the standards of the profession and to help create a scientifically literate population.

Content Area Literacy

Vacca, Vacca, and Mraz (2005) define content area literacy as “the ability to use reading, writing, talking, listening, and viewing processes to learn subject matter across the curriculum” (p. 17). Content area literacy is seen as including a set of generic tools that can be used with any content area texts and used in any subject area classroom (Fang

& Coatoam, 2013; Shanahan & Shanahan, 2012). Instructional strategies often include vocabulary instruction, reading a text using a “before, during, and after strategy”, making “text to self” and “text to text” connections, Venn diagrams, T-charts, examining informational text features, with writing to learn included in this list. These general reading and writing strategies are based on the belief that giving students these tools will help them to learn in each content area, as well as improving their overall educational achievement (Brozo, Moorman, Meyer & Stewart, 2013; Vacca et al., 2005).

The call to emphasize Content Area Literacy is not new. As early as 1925, William S. Gray pioneered the movement to include Content Area Literacy in all grade levels (Vacca, 2002). However, Moss (2005) notes that there was little attention given to this movement until recently when she informally analyzed issues of *The Reading Teacher* from the years 2000-2004 and found a significant increase in articles discussing Content Area Literacy compared to the previous 20 years. She makes the case that reading and writing informational texts (where, in this digital age, students must be able to quickly decipher and synthesize multiple sources of information), will increase the critical skills needed to think like a historian, a scientist, or a mathematician. She concludes that having a meaningful task that immerses a student in the content, through inquiry-based experience on a topic of their interest, will provide them with “learning tools that will last a lifetime” (p. 53).

Content Area Literacy with a specific focus on Writing to Learn is discussed below as an important approach to improving science literacy skills.

Writing to Learn

The literacy strategy of Writing to Learn in all content areas is important especially in the context of the world today. In today's high paced, global society, high level literacy and critical thinking skills are needed for a highly skilled workforce as well as for their quality of life (Applebee & Langer, 2013). Graham and Perin (2007) note that students who lack writing skills are at a disadvantage not only in their present schooling, but also in their ability to attend college, to find and get promoted at work, and in their participation in civic life. However, The National Assessment of Education Progress (NAEP, 2011) found that only 27% of students in the eighth and ninth grade performed at or above the proficient level in writing.

Writing to Learn is one strategy that has demonstrated the potential to increase literacy skills (Hand, Lawrence, & Yore, 1999; Yore, 2000) and these strategies have been found to have a positive effect on achievement (Smith, Rook, & Smith, 2007). It is thought that this effect is promoted by involving a student's long-term memory and sensory motor activity (Bereiter & Scardamalia, 1987). Connolly (1989) states that Writing to Learn is more than concerns over spelling or grammar; rather its value is in the ability of writing to enable the discovery of knowledge. Writing to Learn can take many forms such as: short and extended response, journaling, note taking, summarizing, graphic organizers, as well as numerous other writing strategies (Frey, 2011; Strong 2006). Writing to Learn is important for thinking about learning and acquiring knowledge, clarifying thinking, and constructing knowledge (Rivard, 1994). When students are engaged in writing they are engaged in thinking, understanding, and meaning making (Knipper & Dugan, 2006) and it transforms lower order elements to high order

knowledge (Bereiter & Scardamalia, 1987). It is designed to stimulate students to think more deeply about content and support critical thinking skills (Applebee & Langer, 2013). Specifically in science, Writing to Learn helps to develop a deeper understanding of the “big ideas of science” by increasing student engagement in reasoning using an inquiry approach and transforming evidence to where connections are made in the process of doing science using an inquiry approach (Akkus, Gunel, & Hand, 2007).

Writing to Learn differs from Learning to Write in that Writing to Learn does not focus on the process of writing but on instructional strategies or scaffolds that can be used in any content area (Strong, 2006). These strategies generally do not involve grading, correcting, editing, or revising; they are focused on figuring out what you know, what you want to know, and what you don’t know (Frey, 2011). The SciJourn approach could be seen as an extension of Writing to Learn strategies as students learn science content as they write their science news articles. In the following paragraphs I will examine additional Writing to Learn research and how the transition to Writing in the Disciplines (WID) could impact this research study.

Writing to Learn or Writing in the Disciplines (WID)?

In recent years there has been a call to shift the emphasis from Content Area Literacy’s Writing to Learn to Writing in the Disciplines (WID) in order to align with the practices and skills that are used in each subject area (Bazerman, 2005; Fang, 2013; Fang & Coatoam, 2013; Ford & Forman, 2006; Moje, 2008; Monroe, 2003; Wilcox, 2015). It is argued that each specific discipline is distinctively different in their “fundamental purposes, specialized genres, symbolic artifacts, tradition of communication, evaluation standards of quality and precision, and use of language” (Shanahan & Shanahan, 2012)

and therefore students need to be able to recognize the specialized language inherent in each discipline in order to meet that subject's literacy demands. For example, vocabulary is organized differently in each discipline, author's purpose is different in each discipline, and recognizing what counts as knowledge is different in each discipline. In addition, Ford and Forman (2006) state that students should be engaged in the authentic activities of historians, scientists, and mathematicians in order to promote higher order thinking skills. Research has shown that disciplinary literacy strategies have significantly increased students' skill and achievement with both higher and lower achieving students (Monte-Sano & De La Paz, 2012; Wilcox, 2015).

Numerous studies have suggested that inclusion of specific content area writing strategies improves students' retention and understanding of content knowledge (Hand, Prain, & Yore, 2001; Sampson, Enderle, Grooms, & Witte, 2013; Smith et al., 2007). Students should be engaged in the authentic activities of historians, scientists, and mathematicians in order to learn from the various practices of these communities (Ford & Forman, 2006). In Science, collaboration that is social in nature is essential for scientific knowledge to move forward. Scientists, as a matter of community and science practice, present findings, argue for the efficacy of their results, and debate what counts as knowledge in the field. In Social Studies, disciplinary reasoning includes evidence-based thinking using primary and secondary sources of evidence. Incorporating argument writing tasks that require the consideration of sourcing, corroboration of documents and causation significantly increased students' skill in recognizing and reconciling historical perspectives (Monte-Sano & De La Paz, 2012). In addition, Baxter, Woodward, and Olson (2005) found that writing in the mathematics classroom allowed both higher and

lower achieving students to more deeply explain their mathematical reasoning and thus increase their conceptual understanding of problem solving.

Many science and social studies teachers reject the idea that they are the content area specialists in the position to best understand and teach the literacy demands of the content. They believe that the general literacies of reading and writing are a discipline unto themselves (Moje, 2008). Moje, therefore, argues that pre-service literacy instruction must emphasize that content literacy is “an essential aspect of disciplinary practices, rather than a set of strategies or tools brought into the disciplines to improve reading and writing of subject-matter texts” (p. 99). Fang (2013) posits that teachers must have two things to be able to incorporate disciplinary literacy into their classrooms: deep content knowledge and disciplinary habits of mind. He also believes that content area teacher educators (CTEs) and literacy teacher educators (LTEs) need to collaborate to restructure their courses to include the “unique literacy demands and habits of mind” that are involved in disciplinary literacy. Preservice teachers usually take content literacy classes together and learn general literacy strategies that can be used across the contents. Pytash (2012) states that, “This one-size-fits-all practice fails to recognize literacy practices unique to particular disciplines” (p. 2). With the new emphasis on Writing in the Disciplines, differences between the contents must be explored by both pre-service teachers and their teacher educators. These shifts from learning to write, to writing to learn in the content area, and to disciplinary writing emphasize the need for teachers (through training and professional development) to better support literacy approaches in their content areas. The standards may prove a starting point to evolve the literacy and science practices needed for a literate population.

The Common Core State Standards (CCSS) recognize the need to focus more specifically on disciplinary literacy to achieve high standards, gain critical thinking skills, and become college and career ready in a variety of content areas. Specifically, the writing standards in History/Social Studies, Science, and the Technical Subjects ask students to “devote significant time and effort to writing producing numerous pieces over short and long time frames through the year” (CCSS, 2010, p. 63). These writing tasks should include time for research, reflection, and revision and be written for a “range of tasks, purposes, and audiences.”

There could conceivably be a distinct advantage to having students exposed to disciplinary writing in the lower grades – the sooner the better (Monroe, 2003). First year college students bring with them habits of mind concerning what writing looks like -- five-paragraph essays, brochures, short writing assignments with no revision, etc. Rather than waiting for the universities to teach the specific approaches to writing required in each university content course, disciplinary writing early in a student’s career could expand a student’s understanding of the relevance and meaning inherent in disciplinary practices.

When Applebee and Langer (2013) discuss Writing in the Disciplines, it is discussed as *a process*. In addition, Carter, Ferzli, and Wiebe (2007) explain that WID is largely social where students are socialized into the discipline and then goes on to state that this is accomplished by “writing to learn by learning to write in the disciplines” (p. 278). The SciJourn approach to disciplinary writing takes students on a journey into the world of scientists, researchers, and science journalists. They are learning to write cohesive sentences and paragraphs (learning language), they are learning how science

research is conducted and explained (learning about the language of science), and they are “doing” science by making meaning of their research topic and presenting it cohesively to an authentic audience (living the language of science) (Ardasheva et al., 2015; Halliday, 1993). In addition, they are doing this with their peers, researchers in the field, and an audience which (due to the internet) reaches around the globe. (With “hits” on the student articles in the tens of thousands, educators and students must not be the only readers and consumers of students’ published pieces). Seeing students come up to me with expressions of amazement saying, “I already have 97 hits on my article and it was just published!” (Adam, as mentioned in Chapter I), indicates the importance of literacy as a social practice that IS SciJourn. Exploring the students’ experience with SciJourn and discovering the essential elements of learning, language, and science that intersect to bring meaning to the standards, the value of science literacy for all students, and the evolution of literacy strategies from basic reading and writing, through generic writing strategies that can be used in all contents, to literacy **approaches** that include disciplinary writing as science practice is the purpose of this study.

SciJourn – The Science Literacy Approach of Writing to Learn by Learning to Write in the Disciplines

One way that Writing in the Disciplines has been proposed and studied is through the four-year, NSF funded grant “Science Literacy through Science Journalism” based at the University of Missouri – St. Louis College of Education. Several dissertation studies evolved from this grant and the inclusion of SciJourn in high school science classrooms. Farrar (2012), using a quasi-experimental design, investigated the impact of incorporating the Scijourn process in high school science classes on students’ science literacy. Students

were given the newly developed Science Literacy Assessment (SLA) at the beginning of the school year and then again, at the end of the school year. The findings suggest that incorporating science journalism can improve student science literacy. In addition, teachers who implemented the writing of a science article through the revision process had significantly larger gains on student scores.

Another dissertation study (which included “mini” studies) by Kohnen (2012) looked primarily at the SciJourn teachers – their motivation for joining the project, how they approached the writing and response to the articles, teacher reflection on the process, as well as the differing qualities between professional science journalists and teachers. Kohnen (2013) continued her research by conducting a case study focused on “latent” vs. “functional” authenticity. Latent authenticity in this context signifies that the genre exists in the “real world” but is not actualized because the assignment is co-opted by the teachers to meet their goals for learning. Functional authenticity here means that the assignment meets not only the teachers’ goals but also the goals of the genre. Kohnen (2013) indicates that the science news writing of SciJourn falls under the functional authenticity of a disciplinary literacy approach -- the students become reporters with the goal of publication in the “real world”. Kohnen interviewed five high school students to conclude that a “functional” authentic writing assignment had the benefit of demanding that students “think in certain ways about gathering information” and ... “think more carefully about audience and clarity”. This study will point to the significance of including a functionally authentic approach to disciplinary writing (SciJourn) in providing a platform where students have a real purpose for writing (publishing for an outside audience) that increases engagement and a deeper understanding of their learning.

Hope (2012) conducted a mixed-method study of high school classrooms, using the Youth Engagement with Science and Technology (YEST) survey and classroom case studies to investigate the impact on high school student engagement with science through participation in the SciJournal writing process. The results indicate the complex nature of engagement that involves the “interplay between interest, action, and identification” of the participating students and the potential for “gains in engagement especially when student choice and long term participation in SciJournal were supported”.

Although research studies were conducted around this grant and the SciJournal approach, none were completed with middle school students using face-to-face, individual interviews with students following the year of their exposure to disciplinary writing in order to discover the critical elements of learning, language, and science understanding as voiced by students. Therefore, my study will explore the disciplinary writing of SciJournal and how **students** voice what it means to learn, to write, to engage in science after experiencing the SciJournal approach in my classroom removed in time and space.

Summary of Chapter II

Standards that include the Common Core State Standards, A Framework for K-12 Science Education, and The Next Generation Science Standards provide the impetus for including effective approaches for improving science literacy for all students and include a focus on the nature of science and how science is practiced. As writing in the content areas has moved from the basic understanding of language use, to basic language strategies for use in the content areas, to the increased rigor and relevance of writing to learn in the disciplines, it is imperative that teachers embrace new approaches (such as

SciJourn) to engage students and help them make meaning from their learning.

Understanding the elements of what makes a meaningful disciplinary writing assignment will be explored through case study and analyzed through Constructivist Grounded Theory (Charmaz, 2008).

CHAPTER III

METHOD

Introduction

As reviewed in Chapter II, the Standards require inclusion of science literacy and they make the case for a scientifically literate population; teachers, however, struggle with how to do this in a way that makes sense in their content area (Moje, 2008). Several different strategies have been suggested from Content Area Literacy, Writing-to-Learn, to Writing to Learn in the Disciplines. SciJourn is an authentic writing approach that appears to meet all the suggested requirements in the current policy context and in acceptable and research based practices. It is an approach where students learn to sift through and navigate the influx of complex digital information, they learn how to synthesize this information into a coherent and logical science news article that is read by an authentic audience, and they are so engaged that they “fight me to write” their article every day when they come to class (Buerger, 2016).

This study gains an understanding of the SciJourn disciplinary approach to writing by seeking student voice as they make meaning of their experience. This is a case study of **students** as they communicate their understanding of learning during and after the SciJourn experience and is analyzed through Constructivist Grounded Theory. Through this type of analysis the essential elements of learning, language, and science understanding that students voice about their SciJourn experience are explored. As

London stated in her first interview in response to my question about whether or not she would recommend continuing to include SciJourn in my classes,

Yes! I definitely think so. I think it is a great learning tool for people who are coming into high school especially to know that information beforehand so that you are not behind everybody else. Like, I was always ahead of people with writing because they didn't know they had to say who the author was and you can't know if a .com is credible, you need to use credible sources, and you need to know how to set up a paper, and you need to have facts, and you need to have several different ideas and I think that this is a really good strategy to have for going into high school and college.

Methodological Traditions – Case Study and Constructivist Grounded Theory

The qualitative method of case study (Creswell, 2013) has been chosen due to the exploratory nature of this research project and the up close and personal nature of the data collection. Dyson and Genishi (2005) suggest that cases may involve a social unit which could include “a person, a group, a place or activity, or some combination of those units...” (p. 3). The key theoretical assumptions of qualitative case study involve the production of meaning and its dependence on context. People produce meaning in their lives “in part by how they use shared symbol systems for representing objects, action, and other people” (Dyson & Genishi, 2005, p. 5). Language is the major system for representing our experiences as we speak and write using words to describe and make meaning in the context of our experiences (Vygotsky, 1978). By examining the experiences of former SciJourn students, through their written reflections and their voices in one-on-one and group interviews, insight may be gained about the critical elements involved in the SciJourn approach and how students interpret or make meaning from the experience as they are distanced temporally from the experience.

Constructivist Grounded Theory has been chosen to analyze the data as this method provides a systematic order and structure to organize data gathering and analysis

(Charmaz, 1996) and allows for the evolving, emergent data generated from participants who have experienced the SciJourn process (Creswell, 2013). As this case study investigation involves studying individuals and the larger social process of science news writing, grounded theory methods are useful for attempting to interpret participants' lived experiences (Charmaz, 1996). Grounded theory data analysis provides guidelines that aid the researcher in studying social processes that are flexible, emergent, and inductive and that may lead to a conceptual understanding of a participant's reality (Charmaz, 2003). In addition, Charmaz (2008) states that the constructivist research process uses strategies that interrogate the data, analysis emerges from the co-construction of the data between researcher and participants, and the research process itself is a social construction. This study explores a specific disciplinary literacy writing approach (SciJourn) as provided in a seventh and/or eighth grade middle school science classroom that focuses on student voice and reflection as they negotiate the meaning and critical elements of their experiences.

In addition, the purpose is to discover the critical elements of learning, language, and science as students negotiate the meaning and the understanding of their learning as experienced through this approach.

Context

The case middle school is a low-income, urban school that is composed of approximately seventy-two percent free and reduced lunch students and is considered a Title I school. The classes chosen to complete this assignment included three comprehensive classes and six combined Advanced Placement (AP) and/Math, Science, and Technology (MST) classes. I was assigned a majority of AP/MST classes over the

years due to assignment and selection processes by the administration. As all classes are a mix of students who qualify for free and/or reduced lunch and those who do not, the diversity of this population provides for a sample that is not limited to one particular group. My science classroom has a basic science lab structure (sinks, lab tables, demonstration tables) and science equipment storage. I have a computer lab at the end of the room that is composed of around twenty-five, older, slower computers that are provided to me by the technology leader due to my continued use of and deep involvement with writing in the science classroom. My classes are usually composed of thirty-one students with two or three AP/MST classes and two or three comprehensive classes depending on the year. I have included two comprehensive classes in the SciJourn project to provide some (although limited) diversity to the sample. My theory for teaching and learning provides for active student learning that includes student interaction as they construct their knowledge of science content and science literacy. In other words, my room often looks “chaotic” because students are actively moving between computer use, conferring with their partners, sharing their writing with other students in the room, and discussing their writing with me.

Sample of Participants -- Overview

This study begins with six students who wrote reflective letters (discussed later) after their experience with writing and publishing a science news article (SciJourn) in my seventh and/or eighth grade science class. These six students volunteered to be interviewed two times – first at the beginning of their freshman year and second, near the end of that same year as discussed below. After preliminary analysis of the initial interviews, three of these students were asked to participate in a group interview that will

continue into a peer review activity. The second one-on-one interviews were conducted near the end of school and involved all six students. Choosing a smaller number of students reflects the constructivist grounded theory method of theoretical sampling in order to increasingly focus on and gain a deeper understanding of the emerging categories (Charmaz, 2008; Miles et al., 2014). Participants from each round of data collection are described in Table 1.

Name	Grade	Gender/Race	High School Type
Brandi	9th	Female/Caucasian	Public
Robin	9th	Female/AA	Private
Diane	11th	Female/AA	Private
Helena	9th	Female/Caucasian	Public
Jordan	9th	Female/Caucasian	Public
Sam	9th	Female/Caucasian	Public

Table 1 Research Participants

The student sample for the reflective letters, interviews, and group practice is a homogeneous, convenience sample of students who were assigned to my science classes and all have completed the SciJourn process to a “publishable” article which indicates a “high level implementation” as defined by Farrar (2012). The meaning of homogeneous used here indicates that the sample focuses on participants with similar social characteristics (Miles et al., 2014). In addition, high level of implementation indicates that these students have completed the SciJourn entire process through writing a publishable science news article. Publishable in this sense includes revision from a rough draft to a final piece that includes research from at least three credible sources, a lede that

“catches” the reader, and provides the writers’ connection or interest in the topic, an explanation of the science in the article, and was edited until it had few grammar or spelling errors. This sample purposely informs an understanding of the critical elements of learning, language, and science as they voice the meaning and understanding of their learning (Creswell, 2013).

There were no ECE or ESL students on my team (teams in this middle school were comprised of a language arts, a social studies, a mathematics, and a science teacher who teach a common set of approximately 120 students). However, there were several comprehensive classes that are defined as students from the local area around the school and who did not apply to the schools Advanced Placement (AP) or Math, Science, and Technology (MST) Magnet school located within this middle school. AP students are automatically accepted into the school’s MST program; however, in order for other students to be accepted into the MST program, they must submit an application letter, grades, testing scores, and behavior records. Having served on the committee for choosing these students, the applicants range from high achieving (A’s, satisfactory behavior marks, and a mix of Proficient, Distinguished, and Apprentice on state comprehensive exams to average (A’s, B’s and C’s, some unsatisfactory behavior marks, and mostly Proficient and Apprentice on state exams). Once accepted the AP and MST students are mixed into an “AP” class. The comprehensive students are from the area designated by the district to be our “resides” students (they live within a certain, prescribed area around the school), have the opportunity to apply for the MST program, and are a mix of high and low achieving students.

Each student participated during their seventh and/or eighth grade year in writing a science news article and was published on the Scijourner.org site. These students agreed to meet with me the next year during their freshman year of high school, gave me their preferred means of contact, and indicated that they were willing for me to interview them twice – first at the beginning of school and then at the end of school -- and participate in one focus group interview that included a “practice” activity to be explained later.

Participants for Group Interviews/Group Activity

As discussed earlier, the specific students chosen for follow-up interviews and the group activity were included for several reasons. They are a purposeful sample of students from my classroom that have completed the SciJourn assignment to a publishable piece, we have developed a personal and congenial relationship, and they allowed me access to them during their freshman year in high school. In addition, these students were chosen based on the constructivist grounded theory of theoretical sampling and informed the continued analysis of emerging categories.

Statement of Positionality

I (as teacher and researcher) have a preferred outcome for this research. I have been involved with and deeply immersed in SciJourn for approximately six years. My students over this time frame have indicated in their reflections and in their interactions with writing a science news article that they would “want to do this again next year” and that they found value and meaning in the process. However, this evaluation of my students’ perceptions is based on their supposed engagement while in class and the reflection letters they wrote after they have completed a publishable article. This

reflection is limited as it is graded (for explanation and evidence) and may be influenced by my role as teacher and the power that I have over student grades and their experience. In addition, my relationship with these students may have influenced their answers to the interview questions as they may have attempted to provide a favorable response in order “please the teacher.” Furthermore, it has been difficult to remove myself from being emotionally connected to them -- nurturing them through the SciJourn process, seeing where they were, and what they have become has created a bond that appears to have lasted beyond the years that I had them in class. During this research study, I have continually moved from my teacher stance to my researcher stance and in order to mitigate this teacher/student relationship, I actively monitored my bias by employing a memo book and seeking confirmation in the data. In addition, as Creswell (2013) advises, it is important to continually reflect on the relationship between the interviewer and the interviewee and this relationship will be described in the Context section of each student case.

Data Collection

This study collected data from a variety of sources including reflective writing documents, face-to-face interviews, focus group interviews, and a group practice activity as explained below. These sources of data are consistent with case study research in that documents, interviews, and observations are considered appropriate sources of data (Creswell, 2013; Yin, 2013). In addition, qualitative interviewing provides access to the participants’ substantial experience and insight through an “open-ended, in-depth exploration” through directed conversation (Charmaz, 2003, p. 311). Constructed grounded theory also provides a foundation for data analysis which guides the researcher

through early data analysis to explore emerging categories and that provides an explanation of participants' actions and meaning (Charmaz, 2012).

This research examined the experiences of students who have participated in the disciplinary literacy strategy of science news writing (SciJourn) in their seventh and/or eighth grade year and extended to the following year in high school. Rich, thick descriptions of the setting are included in each data set to provide readers a sense of shared experience (Creswell, 2009).

Table 2 includes a timetable for the research study's tasks and actions completed by the researcher. This table includes the when, what, how, and why these actions took place in order for data collection to occur.

When	What	How	Why
Prior to first contact with students	Contacted School District	Through email	To ensure the permission of JCPS to contact students
Prior to first interviews	Contacted students to re-connect and asked if they are still interested and if I could send permission forms through the mail.	Students gave me various ways to contact them: email, text, phone	Ensure that students were still willing to participate and get mailing addresses
After students indicated they were willing to participate	Sent letter requesting participation and permission from parents	Through mail	To obtain permission from students and parents to participate in dissertation research
After permissions were signed and received	Initial individual interviews were scheduled. Interview protocol attached.	By M. Buerger	To share preliminary remembrances of 8 th grade experience and

			their overall impression of the project.
After individual interviews	Group Interviews. Group Peer Review Practice. Possible interview questions and activity attached.	By M. Buerger	To gain a deeper understanding of the impact of SciJourn within a shared group experience.
Spring of 2016	Final individual student interviews with evolving interview questions attached.	M. Buerger	To discover and explore the critical elements and student meaning of the SciJourn experience

Table 2 Data Collection Timetable of Research Study Tasks and Actions Connected to Research Questions

Data Sources:

In the following paragraphs, the data sources of existing reflective documents obtained after each student completed the SciJourn process, face-to-face student interviews (first and second), and a group interview that includes a peer review, group practice activity will be described.

Existing Data -- Reflective Writing Documents

Reflective writing documents are data that may be thoughtful and attentive in describing the participants’ perceived meaning and relevance to their experience (Creswell, 2009). This evidence provided emergent codes, categories, and themes in order to inform further directions for investigation. These documents were coded for emergent categories and developed into themes using an iterative process of constant comparison to be discussed later (Hallberg, 2006). In this case, the reflective writing piece provides student voice concerning their experience and the meaning of their learning immediately after experiencing the SciJourn writing process.

This reflective assignment involved answering three questions that related to what they learned: whether or not they had a positive experience, whether or not they thought this would help them in the future, and any advice they would give the students coming in next year to complete this assignment. These seven reflection documents (one student was in my science class in both seventh and eighth grades) provided the emerging categories and themes and that informed the interview protocol.

When giving this reflective assignment, I was initially interested in discovering whether students learned from this process and, if so, what that was. I used these to reflect on my own teaching in order to improve the students learning, comfort with, and enjoyment of this assignment. Because this assignment was given before grades were due for the last grading period of school, students may have been influenced by efforts to please the teacher, and not all students may have put forth equal efforts in completing the assignment. However, I believe that these documents provide the starting point for exploring the students' interest and engagement in authentic writing activities and provided a foundation for framing the upcoming interviews of the SciJourn students' experiences as they transition into their high school year.

Face-to-Face Interviews, Group Interviews, and Peer Review Practice Activity

In order to gain a deeper understanding of the students' experience with science news writing in my classroom, it was important to follow them into their ninth grade year of high school (in one case – 11th grade) and conduct face-to-face and group interviews. Each type of interview will be discussed below as well as the peer review practice activity. These interviews and focus group activity will be audio-taped and transcribed by the researcher.

Face-to-Face Interviews

Interviews are an essential component of case study (Creswell 2013; Seidman, 2013) and are based in the sociocultural theory of learning that includes access to the meaning and understanding that people make of their experience. According to Perry (2012), literacy is considered a social practice – “Literacy is what people do with reading, writing, and text in real world contexts and why they do it” (p. 55). Barton and Hamilton (2000) caution, however, that “practices involve more than actions with texts; practices connect to, and are shaped by, values, attitudes, feelings, and social relationships” (p. 8). Interviews are one way to begin an understanding of students’ values, attitudes, and feelings about their participation in the SciJourn process which is embedded in the social relationship developed in class with their peers, outside experts, the editor, and the teacher.

As students were not directly observed writing a science news article in this study, interviews are an important part of the data collection to help to provide context and build an in-depth picture of student experience and engagement in the SciJourn process. However, these interviews may be influenced by the length of time that has passed during the summer from their eighth to ninth grade year and as they are removed from the place where they experienced the SciJourn process – their situated learning. I believe this distance from place may be helpful in creating a space between the teacher who controls their grades and a teacher researcher who is interested in their opinions. However, I am still seen as a teacher and the dynamic between teacher and student must be acknowledged.

First Interview

Interview questions are semi-structured, focused on the “reflection of meaning” (Seidman, 2013), and explore student thinking about and experience with the SciJournal process. It was essential to stimulate their memories with artifacts and help them initially with more guiding questions to re-establish our relationship, recall the SciJournal and classroom processes, and open up to deeper conversations about science, writing, and learning. I brought their published article in addition to their reflection piece in order to spark recall of the activity (Creswell, 2013). Questions began with an ice-breaker question to re-connect and relax the student and then transitioned into their current remembrance of the previous year’s involvement and current reactions to the SciJournal experience (Appendix A). In addition, there were questions that revolved around the remembered experiences of their learning from the previous year(s), and the meaning they voice of these experiences as they have transitioned to high school.

Second Interview

At the end of the year, I again interviewed the six students and asked increasingly focused questions based on emerging results from the previous interviews and group activity (Charmaz, 2012; Hallberg, 2006). As qualitative interviewing provides the opportunity for repeated interviewing to “answer analytical questions and to fill conceptual gaps” (Charmaz, 2003, p. 676), interview questions were created as the earlier data were analyzed to further explore any categories that emerged, and might provide a more in-depth understanding of the critical elements of learning, language, and science as students negotiated the meaning and the understanding of their learning as experienced through this approach. These questions included exploring more deeply about the

student's interaction (negotiation) with the editor and experts on their topic as well as the emotional engagement with the SciJourn process that was indicated in their first interviews. Interview questions for the second interview can be found in Appendix B, and were based on the preliminary data analysis of the first interview.

Focus Group Interviews

Focus group interviews are another way to collect data, provide a type of triangulation to the data collection, and relate directly to the social construction of meaning (Creswell, 2013). These interviews began with an ice-breaker that included sharing what everyone was “up to”, how they were enjoying high school, etc. (Creswell, 2013). The interview then moved to sharing preliminary recollections of the science article writing the students did in the eighth grade and their experiences (stimulated recall). Questions were developed based on the reflective document analysis and initial individual interview analysis conducted previously. (Potential framing questions can be found in Appendix C). This type of interview provides a social context for exploring the meaning of the participants learning and helps with bringing up issues and memories that one individual may not remember (Creswell, 2013). Focus groups provide for interaction among participants who have similar experiences and will help mitigate the power dynamic that may result from the relationship between former teacher and student – when students are together (power in numbers), they may feel less pressure to respond as they think the interviewer wants and gain confidence in providing a more personal interpretation of their feelings. A focus group interaction provides a place to “see” students interacting with their peers and negotiating with one another as is a stated goal of this research – how do students negotiate with self and others over time and space. I

monitored for students who may “take over” the conversation and took steps to involve all participants by directing questions directly to uninvolved students (Creswell, 2013).

Group Peer Review Practice Activity -- Learning through living language

Three students were asked to join the focus group based on theoretical sampling in order to gather additional data that would develop and refine the tentative categories emerging from the initial interviews. This type of sampling is essential in constructed grounded theory as it “...encourages you to ask increasingly focused questions and seek answers as you progress through inquiry. It builds systematic checks into your analysis” (Charmaz, 2012, p. 11). Having participated in the SciJourn experience, the students were asked to peer review several rough drafts of articles that were currently being written in my seventh grade science class. As they interacted and negotiated with their peers and the texts, their dialogue was recorded to explore the critical elements of learning, language and science understanding that were voiced during this activity. Questions that were asked include: *What did the author do well? Do you see any pieces missing? Does the lede pique your interest? How could this piece be improved?* These questions led to a discussion between students that involved more than **telling** me in their reflective documents and their first interview about their experience; these questions provided an impetus to **show** their learning by **using** their knowledge to analyze two rough drafts of a SciJourn article.

Several peer reviews were included in the students’ original experience with writing a science news article. Including a peer review activity in the focus group helped unpack their previous learning and the understanding of their learning over time, space, and identities in a group setting. It helped provide understanding as to how the students

now view and use their learning to examine other students writing. This is an authentic practice of peer review done in science class and in the real world of science writing. Examining what students say and do during this process by coding this data with active gerunds that were developed into categories (described below) revealed a deeper understanding of what they learned and how they interpreted their learning.

Table 3 indicates which of the above data sources addressed the stated questions of this research study.

Research Question	Data Source 1	Data Source 2	Data Source 3
Critical Elements	Previous Reflections	Interviews 1 & 2, and Group Interview	Group Activity – examine, critique, comprehend
Negotiated Meaning	Previous Reflections	Interviews 1 & 2, and Group Interview	Group Activity – examine, critique, comprehend

Table 3 Connection between Research Questions and Data Sources

Researcher role

The role of the researcher in this study was to gather information through the collection of data by examining documents and interviewing participants, and by interpreting this data through the lens of socially constructed learning. I assert that students will engage in learning when they socially construct knowledge through the strategy of an authentic assignment. My bias involves having attended a two-week training in the SciJourn process, my intensive involvement with teaching and providing professional development in the SciJourn literacy strategy, and my involvement in the Louisville Writing Project where writing in the content area is valued. However, I am deeply interested in developing an understanding beyond my personal experience and providing new knowledge about this process to the field of science literacy. In addition

to gathering and interpreting the data, I have immersed myself with the ethical issues concerned with working with children and created an IRB that attended to all issues involved.

Data Analysis and Data Reduction

Constructivist grounded theory provides a foundation for data analysis which guides the researcher through early data analysis to explore emerging themes and/or categories (Charmaz, 2003). Data analysis evolved from a preliminary review of the initial data (reflective documents, face-to-face interviews, focus-group interviews, peer review activity) to perceive recurring codes, categories and/or themes. The data were then analyzed using a line-by-line, focused coding scheme using gerunds to indicate action (Charmaz, 2012; Miles et al., 2014) while seeking categories and concepts that indicated a participant's subjective meanings concerning her experience (Hallberg, 2006). The data (described above) were organized and separated for analysis in the following way. Each data set was reviewed first as a complete artifact to get a general sense of the information and reflect on its meaning by taking notes and recording general thoughts (Creswell, 2009). This included a narrative description of observations and ideas by writing memos concerning certain phrases, ideas or key concepts that may form initial codes (Creswell, 2013). As I reviewed and re-reviewed the reflection and interview transcripts, I developed a list of initial codes (usually gerunds) that related to the process, actions, and meanings that sought to discover student views of their SciJourn experience asking: *How do they talk about it? What do they emphasize? What meanings do different participants attribute to the process?* (Charmaz, 2012). As one of the characteristics of grounded theory involves the constant comparative approach, every part of the data from

emerging codes and categories to analysis between data sets was re-examined until no further insight was gained (Creswell, 2013). Multiple forms of recoding the data were developed (from coding notebooks, legal pad notes and lists, to white boards where the codes were developed into categories and themes) providing a detailed description of what I saw in the data based on my own views and connected to the perspectives found in the literature review. Codes were developed into categories that formed common ideas and characterized the central theme of this study, which concerns the elements of learning, language, and science essential to the SciJourn experience as well as the meanings students voiced about their experience (Creswell, 2013, p. 180).

A study by Ainley and Ainley (2011) suggests that “there are strong predictive relations between personal value of science, enjoyment of science, interest in learning science, and students’ interest in learning more about specific science topics measured as embedded interest” (p. 11). In other words, when students find value and meaning in their learning their levels of interest in learning science content increases. I looked specifically for words or phrases that indicated personal meaning, value, relevance, interest in process or topic, enjoyment, excitement, and fun as described by Ainley and Ainley (2011) as well as other categories that emerged from continued reviewing of the data. I also included any information that was surprising, interesting, and/or unusual (Creswell, 2013) which would be identified as data that I was not expecting or that was surprising due to my experiences with six years of teaching this writing strategy (these will be identified in Chapter 4). I then began the process of reducing and combining these codes into a **fewer** number of categories that informed the emerging themes of Learning Language, Learning through Language, and Living Language. In order to

include all possible sources of meaning and to provide validity to the selection of illustrative samples, the entire data set was tabulated and included in the Appendices. Data were eliminated based on codes that were irrelevant to the study's questions and/or codes that occurred so infrequently as to not significantly influence the meaning or representativeness of the data (Smagorinsky, 2008).

The final data analysis involved interpretation of the data using the above data sets asking "What are the lessons learned?" and "What questions still need to be asked?" (Creswell, 2009) As Charmaz (2008) advises, the analysis pulled together experiences and the range of meanings of the participants and linked facts and values that provided an understanding of the SciJourn experience. An Authentic Assignment Model (see Chapter 5) was developed that visually pulls together the findings and inter-relates the central categories of the analysis (Creswell, 2013).

In order to validate findings, all procedures were documented including steps in each of the data sets obtained. The data obtained was triangulated from four different sources: reflective documents, face-to-face interviews, a focus group interview, and a practice activity. All sources were examined for evidence that built a coherent justification for the results and meaning. A rich, thick description of each source is included that will help bring the reader into the experience and contextualize the data (Creswell, 2009). A peer debriefer was recruited to review and ask questions about the qualitative portion of the study so that the account will provide a different perspective from the researcher.

I have a preconceived theory and preferred outcome for this research due to my immersion in the SciJourn process for six years and the observations and interactions I

have had with my students. In order to provide trustworthiness of the data analysis and conclusions, I examined the data with the understanding that I truly wanted a thorough analysis how students voice what it means to learn during the SciJourn process and viewed the data with an exhaustive, reiterative approach to data coding and analysis.

Providing disconfirming data that includes the experience of students who were not engaged can reveal a greater understanding of the SciJourn experience and provide insight into the “why” of their disengagement (Miles et al., 2014). This could provide possible clarification of the total experience and a better understanding of the presumed minority that may serve as a separate focus of analysis (Smagorinsky, 2008). One question that arose from this possible lack of engagement concerned whether or not students had the skills needed to gain access to the reading and writing literacy demands of this assignment and what this would mean to the larger picture of literacy in content area classrooms – are all students served by this type of activity and is this activity inclusive for the participation and learning for all students? In addition, the disconfirming data could provide for possible suggestions for improvements that can be made in the future to the assignment.

Motivating Theory

Semi-structured interviews that are reflective in nature are a basic mode of inquiry and provide insight into the meaning of personal experiences (Seidman, 2013). The personal value, meaning, relevance, and enjoyment (engagement) of students was examined through the lens of the student. My hypothesis was that science news writing increased student engagement through an authentic assignment that includes the possibility for publication (authentic audience) and, as described previously, this could be

investigated by the qualitative research process of grounded theory. Grounded theory involves the use of inductive methods of emergent ideas such as analysis of documents, interviews, and observations to the social, lived experiences of the researcher and the participants (Creswell, 2013; Miles et al., 2014). The constructed grounded theory of Constant Comparative Method of coding was used to reduce the data in order to make visible the socially constructed meaning that students experience when completing the SciJourn process as discussed previously.

Limitations

As discussed earlier, the reflection assignment was given before grades were due for the last grading period of school; students may have been influenced by efforts to please the teacher, and not all students may have put forth equal efforts in completing the assignment. In addition, when students were face-to-face with their previous teacher, they may have felt pressure to provide positive responses rather than their own deep reflection on the process.

Non-Limitations

Purposeful Sample:

In Case Study research, it is recommended that not more than four or five cases be included in a single study. These cases should be chosen to allow for the emergence of categories that inform the research as well as provide the opportunity for cross-case category analysis (Creswell, 2013). As I was interested in the meaning students make of their experiences with the practice of SciJourn, I chose students who were not only willing to be interviewed about their experience, but also, who had been published on the SciJourn.org site. Publishing involves completing their article through all revisions and

editing to the high expectations of the SciJournal editor. The particular experience of completing their article to this high level of scholarship that includes writing for an authentic audience may inform the research to its most intensive and deepest meaning. Further studies could involve the comparison between published and unpublished authors and the differences or similarities of the students' experiences.

Teacher Researcher – Inquiry as Stance:

As this research study concerns the experience of SciJournal (disciplinary writing) as a social practice, the fact that I am a teacher involved in studying my practice would seem to be an advantage. Researchers are often outsiders who are inserted into a classroom and need time to assure the comfort level of the participants and to understand the dynamics that are occurring in a foreign classroom. As I am a practitioner who continually theorizes practice as part of the practice itself and am part of the local learning community, I feel I have a unique perspective on what constitutes learning and meaning in my classroom and have a congenial and supportive relationship with my students that has already been developed over time and space. Researching my own classroom informs my research through the lens of “inquiry as stance”. According to Cochran-Smith and Lytle (2009), inquiry as stance is regarded as “a grounded theory of action that positions the role of practitioners and practitioner knowledge as central to the goal of transforming teaching, learning, leading, and schooling” (p. 119). As my goal was to understand the meaning that students voiced concerning their experience in my classroom, I am the ideal person to bring my own deeper experiences and understandings of the practice to inform the direction and research questions that have evolved over many years.

Trustworthiness

The trustworthiness of this research study was increased by including the following:

Triangulation:

Triangulation was achieved by including five sources of data collection: previous reflection letters, first and second interviews, a group interview, and a group practice activity (Lietz, Langer, & Furman, 2006).

Rich, thick description:

Rich, thick descriptions of the setting, sources, data set, and collection are included to provide readers a sense of a shared experience (Creswell, 2009). This includes a description of the context for each data source – where, how, and when the data collection took place as well as my recollections of the students' dispositions in my class and during the activities. In addition, specific excerpts from the interviews provided insight into the way the codes were developed into categories and are provided along with the negotiation findings.

Reflexivity:

I have reflected on the ways in which I identify with the SciJourn experience including my belief in the approach and my experience with it. This makes my own sociocultural position explicit and occurs throughout the project (Lietz et al., 2006).

Peer Debriefing:

A peer debriefer (Dr. Lori Norton-Meier) was recruited to review and ask questions about the qualitative portion of the study so that the account would provide a different perspective from the researcher and minimize the effects of bias and reactivity (Creswell, 2009; Lietz et al., 2006).

Procedures to Ensure Ethical Considerations in Research with Human Subjects

No study involving human subjects is without its potential risks. In studies of this kind the chief areas of risk are confidentiality/privacy rights and anxiety. This study has exempt IRB approval from the University of Louisville and JCPS DRMS (Appendix D).

In this study, I examined the participants' understanding of how the genre and authenticity of disciplinary science news writing in the students' seventh and/or eighth grade year affected their thinking about and confidence in their knowledge of writing process and structure after they transitioned to high school. Students might be sensitive about the opinions they were asked to express in an individual or group interview as well as feel some anxiety about sharing these opinions with me (the researcher) and other students. Students' rights were protected in this area by FERPA and great care was exercised to reduce concerns about the individual and group interviews and preserve the anonymity of the participants. As I have previously established an excellent relationship with each student and they all volunteered and appeared excited about participating in this study, their sensitivity and anxiety was reduced. I put the interviewees at ease by letting them know that their data would not be made public. I worked to alleviate any potential for increased anxiety associated with the interviews.

The key issues of potential risk in this work were confidentiality, sensitivity to the potential for embarrassment, and participant anxiety. Specific measures were taken to ensure confidentiality including voluntary participation and the right to withdraw from the study at any time. The provision of information about the nature of the study and the safeguards helped minimize these risks.

As I recorded the interview data, care was taken not to record the names of the students on the interview tapes. The tapes were identified only by a serial number

associated with the interview date and time. Transcripts were identified only by this number. The tapes themselves have been kept under lock and key to avoid unauthorized use. Similarly, students' names were not recorded in or associated directly with any of the computer data files.

If the data lead to scientific publications, the case studies might be used, but the confidentiality of the participants will be strictly observed. If verbatim excerpts from interviews were used, they were transcribed; thus no opportunity exists for voice recognition or other such violations of privacy.

Summary of Chapter III

This study explores the experiences of students who have participated in the SciJourn process of science news writing using the qualitative method of case study and analyzed through the method of constructivist grounded theory. The data sources are these:

- Seven reflective writing pieces that were obtained from the seventh and/or eighth grade student participants after completion of writing an article in my science classes (one student wrote two pieces as she was in both my seventh and eighth grade science class)
- Two face-to-face interviews with six eighth grade students who are now in their ninth grade of high school (one of which was in the eleventh grade)
- One focus group interview that concluded with a peer- review, practice activity with three of these former eighth grade students

The data was reduced and condensed by coding the data into categories looking for words or phrases that indicate personal meaning, value, relevance, interest in process

or topic, enjoyment, excitement, and fun as well as other categories that may emerge from continued review of the data. These codes were reduced into themes that form a common idea. The data analysis included organizing and separating the recurring themes and/or categories with recurring patterns examined and interpreted. Students' anonymity and rights were protected by the use of FERPA and attended to student anxiety and stress. Trustworthiness was increased by including triangulation, rich, thick descriptions, reflexivity, and a peer debriefer. Through analysis of data from students who have participated in the SciJourn approach to science literacy, this study explores and discovers the critical elements of learning, language, and science as they voice the understanding of their learning after leaving middle school.

CHAPTER IV

FINDINGS

Introduction

The purpose of this chapter is to explore student voice as it relates to their experience of disciplinary writing of science news articles (SciJourn) in my seventh and/or eighth grade science class after they have transitioned to high school.

Specifically, I sought to answer the questions:

- What are the essential elements of learning, language, and science understanding that are voiced by previous SciJourn students?
- How do students voice what it means to learn, to write, and to engage in science after the SciJourn experience?
 - How does negotiation with self and others over time and space develop their understanding of their experience?

The six students whose reflections and interviews are presented here (in no particular order) were former middle school students in my science class and all accomplished publication of their science article. All volunteered to be interviewed twice with three agreeing to participate in a group interview and a group activity. Table 4 provides basic participant information.

Student	Gender	Grade when writing SJ article	Grade when Interviewed	Participated in group interview/activity?
Brandi	Female	8 th Grade	9 th Grade – 1 st interview 10 th Grade – 2 nd interview	No
Diane	Female	7 th Grade	11 th Grade	Yes
Robin	Female	8 th Grade	9 th Grade	Yes
Helena	Female	8 th Grade	9 th Grade	No
Jordan	Female	8 th Grade	9 th grade	No
Sam	Female	7 th and 8 th Grade	9 th grade	Yes

Table 4 Participant Information

It was interesting that although two male students had initially agreed to be interviewed in their ninth grade year, I was unable to schedule an interview with them.

Interview Structure

As stated earlier, the interview questions are semi-structured and focused on the “reflection of meaning” (Seidman, 2013) which explored the students’ thinking about and experience with the SciJourn approach to literacy. The interview questions continued to develop using the reiterative and constant comparison method (Creswell, 2013) that evolved over approximately one year of interviewing (Appendices A, B, C). A two interview structure was chosen as completing the Seidman (2013) three-series interview approach appeared to be impractical with young teenagers. Having participated in two dissertation interviews that were conducted using the Seidman protocol and experiencing

the time and intensity involved in these interviews, I realized that younger people would not have time and availability involved for this type of interview and that the question structure itself would not lend itself to a positive outcome. For example, Seidman (2013) states that triangulation is achieved by three rounds of interviews with one participant lasting approximately 90 minutes each. The first round would only focus on the participant's life history, the second interview would extract details of their experience, and then the third would focus on the participants meaning of the experience. In addition, these interviews would be spaced preferably one week or more apart from each other. Asking teenagers deeply about their family life and school experiences could be considered intrusive and thinking they would agree to three 90 minute deeply personal interviews seemed unwise and prohibitive. I felt fortunate that these students (and parents) would allow me to interview them twice for a much shorter time period and felt that this was both practical and achievable. In fact, attempts to schedule several of the second set of interviews became extremely difficult due to time conflicts and the willingness of the students to interrupt their busy lives. I believe they did this only for my sake and the relationship we had built.

Therefore, in order to instead triangulate from a three-series interview protocol, I believe that triangulation was achieved through the initial reflections, first and second interviews, the group interview, and group activity.

Chapter Overview

In this chapter, I present the six case studies individually as their story unfolds first with their reflections and continues with their first and second interviews. Examining and providing evidence in a case by case structure allows for a more fluent

understanding of the entire student's experience over time and space and provides a deeper description and understanding of how the interviews were analyzed (Miles et al., 2013).

I begin with a brief description of the background of each student as they interacted with me in class providing foundational understanding of where they began their journey and their disposition in class. Analysis of each student's reflection letter follows indicating the specific themes of Learning Language, Learning through Language, and Living Language. These three themes were developed from the categories presented directly beneath. Significant words and/or phrases are in bold and underlined to help the reader see the connection between coding, categories and emerging themes. Negotiation with Self, Peers, Family, Editor, Experts, and Audience are not included in the **reflection** analysis as these key understandings were beginning to emerge and provided the impetus to begin looking deeper into each student's experience with negotiation. Each reflection letter is followed with a brief discussion of findings.

Next, the students' first and second interview analysis are presented starting first with a context section in order to provide direct information on where the interview was held and the student's reaction to being interviewed. I then follow with selected excerpts from the interviews that provide an indication of the key understanding of Negotiation that are present and the themes of Learning Language, Living through Language, and Living Language that are apparent from the excerpts. The specific words and phrases are bolded and underlined to emphasize the categories, themes and key understandings that were discovered and deemed significant. This structure emphasizes the complexity of the SciJourn process.

Background on Reflections: When all students have completed a publishable SciJourn article (some make all revisions to get published – others are satisfied with a final draft that may still need editing for publication but fulfills the spirit of the assignment), I have them complete a reflection on their experience. I was fortunate in that I kept these in folders before I knew that they would provide additional data for this study. Each year when reading over the reflections, I was looking to see if the students had a positive experience with SciJourn and if they recommended that I continue this for next year. I wanted to know from them what they thought and any suggestions they may have to make the experience a better one for the following year. After many reiterations of exploring the student reflections, the categories that emerged surrounded the themes of Learning Language, Learning through Language, and Living Language.

Learning Language: This theme emerged when students mentioned the specific knowledge they gained from the SciJourn process that included writing process and writing structure.

Writing process includes the categories of (how to) research, finding credible sources, editing, revision, plagiarism, and understanding audience needs.

Writing structure includes the importance of an interesting and catchy lede, putting paragraphs in an orderly flow, including citations in the body of the article, and not having a conclusion in a journal article.

Learning through Language: This theme emerged when students indicated that they learned science content through researching their topic. In addition, they seemed to increase their knowledge of science practice and expanded their view of who scientists are and what they do.

Living language: This was an interesting and significant finding where students lived the assignment and found meaning – these categories included: seeing value, showing emotion/pride, gaining confidence, the significance of publishing, having an audience, gaining tenacity, identity as writers/authors/scientists, as well as increasing communication skills, and increasing interest in reading, writing, and studying science.

However, when analyzing the reflection letters there appeared to be something that continued to pique my interest and was worth exploring. It appeared that students were expressing that the SciJourn experience included negotiation beyond the usual teacher directed assignment. I asked myself if there was a key understanding here that would develop more significantly in the interviews. What I discovered is that **negotiation** was directly involved in the ability of the students to find meaning in the assignment. Negotiation with Self emerged from the Living Language theme where it was noted that students appeared to be taking ownership of the writing process and their learning. They found meaning in the assignment where they sought to discover their own needs and the needs of others. In addition, they negotiated with others – they developed connections with their family as well as their peers, they revised their article for submission to the editor, they wrote to experts about their topic, and they sought to provide all the information needed to help their audience understand the significance of their topic. I have divided the excerpts by the key negotiation understandings of self, family, peers, editor, experts, and audience.

I provide Table 5 that includes each participant with abbreviated results to help with guidance through the presentation of the data. The first column identifies the student with a brief description. The second column includes the **categories** that evolved

from coding the students' reflections as described earlier. The second and third columns also contain the coding categories with the addition of the key understandings of Negotiation that appeared in the interviews. The complete data set for each student that corresponds with the coding in Table 5 is located in the Appendices F through M.

Student	Reflection	First Interview	Second Interview
<p>Brandi Female 9th Grader Published Author -- Gained writing knowledge, science content, Showed emotion, saw value in gaining confidence and the sig. of publishing. Values Neg. with Self and Others esp. the Editor Identity as expert, author, scientist. Increased reading in science</p>	<p>Learning Language – Writing, editing, revision, research, citation, plagiarism, ledes</p> <p>Living Language – having a connection, gaining confidence, having a partner, publishing, seeing value, identity as an author, gaining tenacity</p>	<p>Learning language – Writing, revision</p> <p>Living Language – showing emotion/pride, publishing, having an audience, gaining tenacity, seeing value, having connection, choosing topic, increasing engagement, identity as writer/author/expert</p> <p>Negotiation with Self Negotiation with Family Negotiation with Audience</p>	<p>Learning Language – writing, credibility, revision, editing</p> <p>Learning Through Language – content</p> <p>Living Language – showing emotion/pride, having a connection, gaining tenacity, having a partner, gaining confidence, publishing, seeing value, having an editor, having an audience, increasing interest in reading non-fiction, identity as expert/author/scientist</p> <p>Negotiation with Self Negotiation with Peers Negotiation with Editor Negotiation with Family Negotiation with Audience</p>
<p>Diane Female 11th Grader Published</p>	<p>Learning Language – writing, editing, revision, audience needs, credibility</p>	<p>Learning Language – writing, credibility, editing, research, citation</p>	<p>Learning Language – writing, research, credibility, citation</p>

<p>Author --</p> <p>Gained writing knowledge, science content and confidence. Showed emotion as she interacted with Experts on her topic and increased communication skills, identity as writer, scientist</p>	<p>Living Language -- showing emotion/pride, having a connection, publishing, connecting to experts, gaining tenacity, having an editor, having a partner, identity as author</p>	<p>Learning through Language – content</p> <p>Living Language – showing emotion/pride, publishing, seeing value, increasing interest in science, identity as scientist, having an audience, connecting to experts, gaining confidence, having a partner, gaining tenacity</p> <p>Negotiation with Self Negotiation with Peers Negotiation with Family Negotiation with Experts Negotiation with Audience</p>	<p>Learning through Language – increasing understanding of science practice/scientists, content</p> <p>Living Language – gaining confidence, gaining tenacity, publishing, identity as author/writer/scientist, increasing interest in science, showing emotion/pride, seeing value, connecting with experts, increasing communication skills</p> <p>Negotiation with Self Negotiation with Experts</p>
<p>Robin Female 9th Grader Published Author --</p> <p>Gained writing and content knowledge, while gaining tenacity and confidence. She also saw the value of having an editor and having an audience.</p>	<p>Learning Language – writing, editing, revision,</p> <p>Learning Through Language – content</p> <p>Living Language – gaining tenacity, choosing own topic, having a connection, having a partner, seeing value</p>	<p>Learning Language – writing, research</p> <p>Learning through Language – content</p> <p>Living Language – choosing own topic, increasing engagement, having a partner, showing emotion, gaining tenacity, publishing, seeing value having an audience</p> <p>Negotiation with Self Negotiation with Peers</p>	<p>Learning Language – writing, research, credibility, understanding audience needs</p> <p>Learning through Language – understanding practice of science</p> <p>Living Language – showing emotion, publishing, seeing value, having an audience, gaining confidence, having an editor</p> <p>Negotiation with Self Negotiation with Editor</p>

		Negotiation with Audience	Negotiation with Audience
<p>Helena Female 9th Grader Published Author --</p> <p>Gained writing, content knowledge while showing emotion and gaining confidence. Having an editor and a connection increased engagement and identity as a writer</p>	<p>Learning Language – writing, plagiarism, credibility, research, revision, citation</p> <p>Living Language – seeing value, gaining confidence, gaining tenacity</p>	<p>Learning Language – writing, research, citation, revision, credibility</p> <p>Living Language – seeing value, gaining confidence, showing emotion/pride, increasing engagement, having a partner, publishing, choosing topic, having a connection, having an editor, gaining tenacity, having an audience</p> <p>Negotiation with Self Negotiation with Peers Negotiation with Family Negotiation with Editor Negotiation with Audience</p>	<p>Learning Language – writing, revision, research, credibility,</p> <p>Learning through Language –science practice, content</p> <p>Living Language – gaining confidence, having a connection, showing emotion/pride, having a partner, increasing engagement, seeing value, choosing own topic, having an editor, publishing, identity as a writer, having an audience</p> <p>Negotiation with Self Negotiation with Peers Negotiation with Family Negotiation with Editor Negotiation with Audience</p>
<p>Jordan Female 9th Grader Published Author --</p> <p>Increased confidence in writing knowledge. Showed emotion and saw value in publishing. Increased</p>	<p>Learning Language – writing, research</p> <p>Living Language – Increasing confidence, publishing, choosing own topic, increasing</p>	<p>Learning Language – writing, research, credibility, citation</p> <p>Learning through Language – content, science practice</p> <p>Living Language – showing emotion/pride, seeing value, having a connection, increasing engagement, increasing interest in science,</p>	<p>Learning Language – writing, research, credibility, audience awareness</p> <p>Learning through Language – content, expanding view of science practice/scientists</p> <p>Living Language – showing emotion/pride, publishing, gaining confidence, seeing value, increasing</p>

<p>identity as writer, interest in science and science practice</p>	<p>engagement, having an editor</p>	<p>gaining confidence, gaining tenacity, publishing, identity as author, having a partner</p> <p>Negotiation with Self Negotiation with Peers Negotiation with Family Negotiation with Audience</p>	<p>engagement, identity as writer/author, choosing own topic, having a partner, having an audience, gaining tenacity</p> <p>Negotiation with Self Negotiation with Peers Negotiation with Audience</p>
<p>Sam Female 9th Grader Published Author</p> <p>Increased confidence and showed emotion. Values choosing topic and working with partner and peers which increased engagement. Increased identity as writer and in science. Presentation important and increased reading in science.</p>	<p>7th Grade Reflection: Learning Language – writing, editing, revision, plagiarism, picking topic</p> <p>Learning through Language – content</p> <p>Living Language – choosing own topic, increasing engagement, gaining tenacity, having a partner</p> <p>8th Grade Reflection: Learning Language writing, credibility, ledes, research, revision</p> <p>Learning through Language – content</p> <p>Living Language – showing emotion gaining confidence, increasing engagement, gaining tenacity</p>	<p>Learning Language – writing, research, credibility, revision</p> <p>Learning through Language – understanding science practice</p> <p>Living Language – showing emotion/pride, choosing own topic, increasing engagement, gaining confidence, seeing value, presentation, having an audience, publishing, having a partner, having an editor, having a connection</p> <p>Negotiation with Self Negotiation with Peers Negotiation with Family Negotiation with Editor Negotiation with Audience</p>	<p>Learning Language – reading, writing, research, credibility, peer review (editing, revision), audience awareness</p> <p>Learning through Language – expanding view of science/ scientists, content, understanding science practice,</p> <p>Living Language – choosing own topic, increasing engagement, increasing interest in science, gaining confidence, seeing value, having a partner(s), showing emotion/pride, publishing, identity as writer/author, having an audience, gaining tenacity</p> <p>Negotiation with Self Negotiation with Peers Negotiation with Family Negotiation with Audience</p>

Table 5 Participants with Abbreviated Results

I now begin with Brandi, her background in my class, an analysis of her reflection, context for each interview, and analysis of the data from her first and second interviews. From Brandi we learn that choosing a topic that relates to her personally was significant to her engagement in the SciJourn process.

Case Study 1 – Brandi

Background: Brandi is a white female who was rather quiet in class but was hard-working and concerned about her grades and her learning. She was assigned to my eighth grade science class during the one year that I taught this grade and appeared enthusiastic when I introduced the SciJourn project. When she first mentioned she was interested in writing about an unusual health syndrome; I was quite intrigued as I was not familiar with this syndrome. When asked why she wanted to research this topic, she said that her niece has this syndrome and she wanted to learn more about it. At times, she came close to giving up on the article as she struggled to find current information on the topic and then to understand the science behind it:

*I remember when I was writing it, **I couldn't find updated**, like **science research** on it because no one had actually researched it in a while and it was like towards the end when I found something and **I didn't understand** what it was talking about!*

Brandi's Eighth Grade Reflection Letter

When analyzing Brandi's reflection from her eighth grade year, the themes of Learning Language and Living Language were prevalent. The categories that developed those themes are noted under each with significant quotes from her reflection. I have included bold and underlining to help draw attention to specific words and phrases that were significant and that help the reader see the connection between the categories and

the themes. The original spelling and grammar are included in these excerpts from her reflection letters as well as in the other cases as these are quotations and provide the students' actual words. Italicizing the students' words helps to differentiate them from my own.

Learning Language:

Writing process/structure that includes researching, citation, plagiarism, ledes, editing, revision --

What I learned from completing the Sci-Journ process is how to write and edit how you do it in college, how to revise, what the difference between editing and revising is.

...I know that writing in five paragraph form is not always acceptable (in college).

Always edit, revise, and repeat, do these steps over and over and over. Have new research or a connection to our topic – open with an amazing hook.

I also learned how to research a topic and write about it in my own words.

Cite your evidence -- you didn't just know all this stuff.

Living Language:

Gaining confidence, having a partner, publishing, seeing value, identity as an author, gaining tenacity --

I also further advanced my knowledge on working with others - a partner or team, teamwork.

Pick a partner who is generally present and not easily distracted.

I believe this experience will help me in high school/college because I can write that I'm published in my application ...

While I found this a challenging experience, the entire time I was writing I found it a positive one because I always had the same idea of being published in my head.

From the analysis of her reflection, it was apparent that the themes of Learning Language focused on her increased knowledge of the writing process and structure category that included researching, editing, revising, and citation. The Living Language theme was indicated by the categories -- gaining confidence, having a partner, publishing, gaining tenacity, and she felt this was important knowledge for her future (seeing value). I began to see the impact of the Living category -- it appeared that she was negotiating with not only herself for meaning but also, her partner/peers, and her audience as she worked to publish her article.

However, I was interested in hearing Brandi's voice and the meaning she attached to her learning when removed from my influence as a teacher who was grading her, as well as removed from the experience in time and space. Would she continue to see this as a positive experience? Would she even remember the experience? I wanted to explore what she remembered about the opportunities to **negotiate with herself**, her **peers**, her **family**, the **editor**, **experts** in the field, and with her **audience**. The interviews were revealing in that it quickly became apparent that the SciJourn experience had a strong impact on her and that she remembered it well.

First Interview – Brandi

Context: Brandi lives in the area around the school which consists of modest homes in an urban setting. I met her at her house and was taken aback when I first saw her – she had grown taller, had changed her appearance, and walked into the kitchen with confidence. As I entered the kitchen, I talked with her mother who let me know how impressed she was about the interview and her child's ability to write a published article. Brandi and I then exchanged hugs and we sat down at the kitchen table. I expected to

have to drag responses out of her but she knew exactly what she wanted to say. What struck me from the beginning was how animated and emotional she was as she began the interview. She sat forward in her seat and her responses came quickly.

In the first interview, Brandi's recollections demonstrated clearly that "negotiation with self" was the dominant and most often voiced key understanding. Negotiation with Self involves more than the usual "complete the assignment and turn it in for a grade" where little if any meaning is attached to it. Negotiation with Self involves...seeking to discover your own needs and those of others as well as seeking to discover new knowledge. Examples of this negotiation includes: self- assessment, finding meaning, prioritizing, having to put oneself into the assignment, making decisions, time management, engaging with the assignment, and showing pride and emotion. In addition, she voices the importance of Negotiation with Family where she is writing about her niece's health condition and how proud her family is of her.

I am providing selected examples from Brandi's interview that indicate the significance she voices to her learning experience with the SciJourn approach. Boxes with these examples are included to clearly indicate specific excerpts chosen from the interviews and italics are used to separate the student's original words from my words. I begin with the key understanding of Negotiation and provide specific excerpts that demonstrate the students' understanding of their learning. I will then end with a discussion of the overall findings from the interviews.

"R", as indicated below, is me – the researcher -- and "S" is the student. The question asked is included when it provides context to the answer.

Negotiation with: Self

In Brandi's first interview, there were **six** excerpts that indicated that Negotiation with Self was a key understanding (please see Appendix F for a complete data set of Brandi's first and second interview with significant coding, categories, themes, and negotiations). Brandi's recollections demonstrated clearly that Negotiation with Self was the dominant and most often voiced Negotiation.

I have included **three** excerpts from Brandi’s first interview indicating that Negotiation with Self is a prevalent key understanding. The excerpt in Table 6, Negotiation with Self involves the process of meaning making where Brandi shows the emotion she feels over the number of people who are reading her article.

R: I also printed out your article today and it has 4,335 hits!

S: ***Oh my god! That is a lot!** I didn’t even know because I haven’t looked in like a really long time.*

Living language – showing emotion, publishing, having an audience

Table 6 Brandi’s First Interview – Negotiation with Self

The second excerpt in Table 7 indicates how that emotion unfolded while she was writing her article in which she was “*super frustrated*” but has insight into her processes and has learned how to control them. She gained understanding about the revision process and that it takes tenacity to complete a publishable article.

R: So, what do you remember about your experience?

S: *I remember when I had to **write the paper over and over again** and I was like **super frustrated**. But like right now I am doing a paper and to get some points that I missed I have to **re-do it** again. So, it’s like **teaching me patience** and **how to re-write** my paper. Like the **first time isn’t always the best** time.*

Learning language – writing process – revision **Living language** – showing emotion, gaining tenacity

Table 7 Brandi’s First Interview – Negotiation with Self

In this third excerpt (Table 8), Brandi again, shows emotion and pride as she develops her identity as a writer/author justifiably proud of her accomplishments. She was “*super excited*” and “*really happy that I got published*”.

R: So, what was your overall reaction in having persevered and having the article be published on the site?

S: *I was actually super excited! Like I remember like being really happy that I got published and it was like a really big deal ...*

Living language – showing emotion/pride, publishing, identity a writer/author

Table 8 Brandi’s First Interview – Negotiation with Self

Negotiation with: Family

Brandi saw great value in her ability to choose a topic that was directly concerned with her family and how this freedom increased her engagement in Table 9.

R: So, what was your family’s reaction?

S: *I remember my sister being like super happy because she commented on here and she was super happy, really, really excited!*

R: *...and then picking your own topic. Was that important?*

S: *Yes! I think if I had to do something that had nothing to do with me then I wouldn’t have been as engaged in it.*

Living language – having a connection, choosing own topic, increasing engagement

Table 9 Brandi’s First Interview – Negotiation with Family

Brandi's sister was excited because the article was written about her daughter and she was clearly emotional that Brandi wrote about and was interested in her daughter's condition (*my sister being like super happy...she was super happy, really, really excited!*)

Negotiation with: Self, Family, and Audience

The excerpt in Table 10 indicates the complexity of the SciJourn process and the significance of Negotiation as a key understanding. Brandi negotiates not only with herself in showing the emotion and desire she had in wanting to publish but also with her family and her audience by indicating the importance of having the freedom to write about a personal topic that involves her family and sharing her expertise with an audience (*...I really wanted to publish...my niece has it, so it was really important for me...*).

S: *I think I really wanted to publish it because, well, Noonan Syndrome is part of my family...my niece has it, so it was really important for me to publish it, you know. But like, it's like, it's one of those things no one knows about so I wanted to really be one of those people who knows about it and puts it out there as well.*

Living language – showing emotion/pride, publishing, having a connection, identity as an expert, seeing value

Table 10 Brandi's First Interview– Negotiation with Self, Family, Audience

What we learn from Brandi's first interview is that having a connection to her topic that included her family increased her engagement. In addition, having achieved publication of her article affected her identity of herself as a writer and an author. In Brandi's second interview, I wanted to explore more about her changing identity and if negotiating with an editor impacted the emotion she revealed in her first interview.

Second Interview – Brandi

Context: The second interview was difficult to set up as Brandi was extremely busy. We finally met and talked near the beginning of her sophomore year. We again met at her house and her mother was present. As we sat at the kitchen table, she apologized for not being available earlier in the year; however, she was clearly glad to see me with hugs and smiles and continued to show increased confidence and maturity as a young woman.

In the second interview, Brandi continues with Negotiation with Self as a prevalent key understanding. In addition, the key understandings of Negotiation with the Editor, Family, Peers, and Audience are explored and show the complexity of the SciJourn process as several of these negotiations are indicated in a single excerpt. The category of showing emotion which is indicated under the Living Language theme emerges continually and was surprising to me. This finding will be discussed in more detail in the analysis of the interviews. I am including several excerpts from her second interview that expand on her learning and the evolution of her thinking.

Negotiation with Self

There were **six** excerpts in her second interview that indicate that publishing and learning about her chosen topic was an emotional one. (All six excerpts are included in Appendix F). In the excerpt in Table 11, Brandi shows emotion in her ability to work towards her goal of publishing her article showing confidence and tenacity in the process. She found out that she was “*good at swimming and not sinking*” and she had the goal of publishing and “*...was working really hard...*”

R: Then, did you discover any strengths through the SJ process that you had but didn't know about?

S: *I found out that I was good at swimming and not sinking!! I really wanted to get this published, like that was my goal--get this thing published. So, I was working really hard to do that. I was doing everything I could to make sure that no matter what, I was published. I had to make it perfect.*

Living language – showing emotion, gaining confidence, gaining tenacity, publishing

Table 11 Brandi's Second Interview – Negotiation with Self

Negotiation with: Editor

Negotiation with the Editor is a key understanding that is indicated in Table 12.

Brandi, again, values the contact and interaction with the editor and clearly shows how this negotiation impacted how she views the SciJourn experience.

R: I noticed that one of the things students were talking about was the fact that they had an editor...that there was a real editor that was looking at their writing. Did that have any impact on your thoughts about this?

S: *The editor looked at my paper and then sent it back with revisions. He was like the person who was helping me the most, because I was like this guy was helping me here and I got this! He was helping with grammar and that helped me a lot because as long as I keep sending it, he will keep sending it back. I always have that little help. I liked it. It made it easier, I think.*

Learning language – editing (grammar)

Living language – showing emotion, having an editor, gaining confidence

Table 12 Brandi's Second Interview – Negotiation with Editor

Negotiation with: Audience

There were **three** excerpts from her second interview that indicated that Negotiation with the Audience was significant and this key understanding emerges more clearly in this interview. One representative excerpt is included in Table 13. Brandi sees value in becoming the expert on her topic and shows emotion and pride (*it makes me proud*) in her ability to publish a science article that informs and helps her audience understand her topic (*...I know that more people are learning...*).

R: *So, I was wondering, what does the count do for you? I would say that your count would be up over 6 – 7,000 by now if not more.*

S: *Yeah. So, it is like I published a paper and no one read it, I would feel kinda like, I just did something for nothing. But, if I **published** a paper and at least **one person read** it, then **I know** that **they are a little more informed** (about Noonan's) just like **I was more informed** from writing it. It is like a **helping thing** and **I like that** when the **number goes up**, **I know** that **more people are learning** more about this rare disease that could very much **affect them** and it **makes me proud**. I still have the article that you re-printed **hanging in my room**.*

Learning through language – content

Living language – showing emotion/pride, seeing value, publishing, identity as an expert, having an audience

Table 13 Brandi's Second interview – Negotiation with Audience

Negotiation with: Self, Peers, and Audience

In Table 14, an excerpt from the second interview clearly shows the complexity of the SciJourn process. The combination of negotiations in these two passages would not allow me to pigeon hole them into any one Negotiation understanding. She voices that working with a partner and sharing that with an audience was significant to the meaning

she found in the assignment. Therefore, these help to clarify the impact of SciJourn and the key understandings that are included.

*S: Actually, the thing **I am most proud** of is that **I have a published paper**, you can look at it, **it is beautiful**, so, I would say that I am not a confident person, but **I am confident about my paper**. This is **what I did** and you can't be like, "no you didn't" because **it is right there**. So, **I am confident** about that. And **I do feel** like I was part of a **bigger science community** when I was writing it. Now I did this thing, and **I am practically a scientist!** Just a **notch below one!** So, yeah, mine was more **frustrating** than hard, it was **fun**, but it was more frustrating than fun because I didn't have a **partner**. I wish I had a **partner** through a lot of it. **Once I got a partner, it became fun** because we were like **working together**.*

Living language – showing emotion/pride, gaining confidence, having an audience, having a partner, identity as published author/scientist

Table 14 Brandi's Second Interview–Negotiation with Self, Peers, Audience

What I learned from Brandi was that Negotiation with Self to find meaning in the assignment was a key understanding. She gained confidence in writing and research, she found meaning in publishing, she felt connected to her topic, her family, and the audience, the science community, and she saw great value in her ability to choose a topic that was directly concerned with her family (having a connection). She also showed emotion and pride in her accomplishment of publishing and her identity as an expert on her subject, a published author, and as a scientist.

As you can see from these categories, emotion emerges often. I was definitely surprised by this especially because of the passage of time.

Brandi was the only participant who expressed her **identity** as an expert on her subject. In addition she saw herself as a published author and as a scientist.

Identity as Expert -- *“But like, it’s like, it’s one of those things no one knows about so I wanted to really be one of the people who knows about it and puts it out there as well.”*

Identify as writer/author -- *“...I got **published** and it was like a really big deal because I hadn’t been **published** before and I never thought I was a good writer. So, for me to get **published** it was like **super important**.”*

Identity as scientist – *“And I do feel like I was **part of a bigger science community** when I was writing it. Now I did this thing and I **am practically a scientist!**”*

Brandi was also the first to mention that SciJourn spurred her increased interest in **reading non-fiction** (science). She was one of two students (Sam) who stated that she now reads science articles because of her exposure to SciJourn.

*Well, before **SJ** I didn’t even like reading as much as I do now. I was only into fiction writing.*

I now continue with the second and third cases, their background in my class, an analysis of their reflections, context for each interview, and analysis of the data from their first and second interviews. What we learn from Diane is the significance she voices of her interaction with an expert on her subject while Robin indicates, like Brandi, that having an editor increased her engagement in the SciJourn process.

Case Studies 2 and 3 – Diane and Robin

I have chosen to share the data of these two cases together as the sisters always arrived together and seemed inseparable as I will explain in more detail when discussing the interviews. I will begin with Diane and then follow with Robin.

Background: Diane and Robin are African-American sisters and attend a local parochial high school. Diane is the older sibling and was in my seventh grade classroom during the 2011/12 school year with Robin in my eighth grade classroom during the 2014/15 school year (when I had moved to the eighth grade for one year). Diane was such a pleasure to have in my classroom. She was friendly, outgoing, got along with her peers, and was focused on her future. She had a great work ethic and we developed a warm relationship. I will provide background on Robin previous to the analysis of her reflection letter followed with interview one and interview two.

Diane's Seventh Grade Reflection Letter

Similar to Brandi, Diane indicates in her reflection that she increased her understanding of writing process and structure (Learning Language), however, the theme of Living Language is where the assignment held the biggest meaning for her. She showed emotion and pride in her accomplishment of publishing and added the significance of connecting with an outside expert to learn more about her topic. I have, again, italicized the student's words to help separate their words from mine and kept the spelling and grammar as written in the reflections as they are direct quotes and help provide context.

Learning Language:

Writing, editing, revision, understanding audience needs, credibility --

*But the most is when you **send the article off** & it comes back you have to **revise & re-edit** it.*

*Pick an **interesting topic**; **editors & publishers** would probably love to have a **juicy story**.*

*What I learned in this project is like **new, different, & unique things** I've never discovered before. How to tell if you have credible sites & sources or not.*

Living Language:

Showing emotion/pride, publishing, having a connection, connecting to experts, gaining tenacity, identity as published author, having an editor, having a partner --

*Make sure you have 100% of your effort on this. You **can't succeed** if you don't have your 100% effort on this.*

Make this article somewhat related to your personal life.

*Try your **best** to get publish and put 100% effort into what you're doing because the article is basically about you and how it relates to you.*

*The most **incredible thing** I learned from this is that you can e-mail a professor for help & research. Sometimes they respond back & it's just awesome.*

Yes, my favorite experience of this project was that you had a feeling inside when you get published. It's like a bonus point towards everything, because being published is a dream, a success, a accomplishment, a achievement that every one can experience. Because being published lets you know that you have completed every task to the best of your ability to the teachers needs; editor needs; & importantly, your partner's needs.

From the analysis of Diane's reflection, it was apparent that the theme of Learning Language emerged and was focused on her increased knowledge of the writing process and structure category (editing, revision, understanding audience needs, credibility). However, Living Language clearly stood out as she showed very strong emotion and pride in emailing an expert and her accomplishment of publishing a science article. This reflection also began to direct me to Negotiation as a possible key

understanding. She seemed to be indicating that negotiation was happening not only with herself, but also, with the teacher, the editor, her partner, an expert, and her audience.

I was interested in digging deeper in the evolving key understanding of Negotiation as she voiced it in her interviews.

First Interview -- Diane

Context: Previously, I had bumped into Diane and her mother several times at a local restaurant after she graduated middle school and we always greeted each other with hugs and excitement. I had mentioned the possibility of including her in my dissertation study and she was enthusiastic and agreeable. Robin also agreed but I surmise that this was mainly due to her sister's involvement. Diane is definitely a leader both at home with her sister and at school. She is a high achiever academically, has grown into a confident young woman, and in her junior year applied for the Senior Research Project where she was one of ten chosen out of fifty students that applied for the project at her high school.

Diane and Robin came to my room after school to be interviewed and were still in their school uniforms. I had some snacks ready for them and we made small talk while they ate and relaxed. I thought about interviewing them separately and was concerned about the validity of having them together but I felt that Robin (who is extremely shy) would not have handled this well -- having Diane there for her seemed to make her more comfortable. We sat around the science table and I began the interview. We decided to start with Diane. During the interview, Diane looked into my eyes and spoke clearly as she composed what she wanted to say.

Negotiation with: Self

Even though it has been about four years since Diane was involved with the SciJourn process, she was not hesitant in voicing her emotion and pride in being a

published author and the value she found in the assignment. In her first interview, **five** excerpts indicated Negotiation with Self as a key understanding and these clearly showed that she sees value in increasing her knowledge of the writing process/structure, and indicates that the significance of SciJourn on her connection with and identity as a scientist. I have included two excerpts that represent her thinking about her experience.

The excerpt in Table 15, Negotiation with Self is indicated by the emotion and pride she feels by knowing the exact number of hits on her article – *27,163*.

R: So, it's been awhile since you have done the SciJourn thing. It is pretty impressive that you have, what, **27,000** hits on your piece or something?

S: *Yeah, **27,163!***

Living language – showing emotion/pride, publishing

Table 15 Diane's First Interview – Negotiation with Self

In addition, in Table 16, Diane indicates that Negotiation with Self includes seeing the value of Learning Language (credibility, editing, researching) and Living Language which includes the significance of publishing on her high school career – (*...since I got published really helped me during high school...*).

R: From this project, what did you learn that you are using in high school now?

S: *Probably, I think just having the right sources and editing, I don't know...just having the right resources and researching really helped me especially with this project since I got published really helped me during high school with some of my research papers and stuff like that.*

Learning language – credibility of sources, editing, research

Living language – seeing value, publishing

Table 16 Diane's First Interview– Negotiation with Self

Negotiation with: Family

Unlike Brandi, Diane and her partner did not have a direct family connection with their topic as they wrote about a subject that was of interest to teenagers. However, Diane shares the excitement and pride her family showed for her accomplishment in publishing her article in Table 17. They were “*really excited*” and “*just impressed.*” This also demonstrates the complexity of the SciJourn process as Negotiation with Family is also included with Negotiation with the Audience.

R: And what happened when you found out that you were published?

S: *They were really excited and I wouldn't say they weren't surprised but they were just impressed that I could me and (other author) could have an **article that was published and everyone can see it – all the work that we have done.***

Negotiation with family

Negotiation with audience

Living language -- showing emotion/pride, having an audience, publishing

Table 17 Diane's First Interview – Negotiation with Family, Audience

Negotiation with: Experts

Rather than Negotiating with an editor (like Brandi) Diane's ability to **interact with an expert** was her most memorable experience as indicated in Table 18. Diane shows emotion when remembering her interaction with a chiropractor who had conducted research on her topic and received a reply with information that improved her article (*...just having feedback from him which is really cool...*)

R: What are some of the things you remember from being in my room?

S: *The thing probably that **I most remember** is emailing the chiropractor in Florida...in Plantation, Florida and just having feedback from him which is really cool just to have the actual facts especially from someone who is not in Louisville.*

Living language – showing emotion, connecting to experts

Table 18 Diane’s First Interview–Negotiation with Experts

Negotiation with: Self, Peers, and Experts

The exchange in Table 19 shows the complexity of the SciJourn process. Diane reiterates the importance of her interaction with an expert (*emailing Dr. Fishman and him responding back...*) and adds the value of having a partner (*...it just helped me...*).

R: Okay, well, is there anything about the experience that you would want me to know?

S: *Well, probably, I think I have two things. One thing is that actually emailing Dr Fishman and him responding back not once but multiple times. It really helped me build up my confidence and courage to continue writing. And also, my partner because she was really dedicated and it just helped me to keep up the fight and researching.*

Living language -- gaining confidence/courage, having a partner, gaining tenacity, connecting to experts

Table 19 Diane’s First Interview – Negotiation with Self, Peers, Experts

Like Brandi, Diane also showed **emotion and pride** in **publishing** her article, however, the strongest meaning she found in the assignment was the **confidence** she gained from publishing. In addition, in Table 20, Diane indicates that SciJourn increased

her interest in science (...*after this I did feel more connected with science...*) and her identity as a scientist (...*I want to be a marine biologist.*)

S: It really helped me build up my confidence and courage to continue writing.

*Actually, **this did help me** with my **English** and my **punctuation** and after this **I did feel more connected with science** because **I want to be a marine biologist**. So, this really just pushed me to look more into the future of science.*

Living Language: gaining confidence, increasing interest in science, identity as a scientist

Table 20 Diane's First Interview— Confidence. Interest in Science. Identity as

What I learned from Diane's first interview was that unlike Brandi, who saw meaning in Negotiation with the Editor, she valued interacting with an expert by communicating with him about the topic of her article. Along with gaining confidence and tenacity in writing and researching, she learned about her content and indicated that she increased her interest in science

In this second interview with Diane, I wanted to explore more about her increased interest in science, her identity as a writer and a scientist, and how the SciJourn approach affected her confidence in future endeavors.

Second Interview -- Diane

Context: This interview was also held in my room at school. It was easy for their father to drive them in together. They seemed amused about seeing their words in print when I showed them their first interview to member check and to make sure I had captured what they wanted to say. I also explained the process of researching and analyzing their

interviews. When I saw their dad the following week, he stated that he was thankful that I had “let them in” on how research is done and that they had talked about it all the way home.

There were **eight** excerpts from Diane’s second interview that confirmed that Negotiation with Self was a significant key understanding. In those excerpts, she continues to discuss her identity as a scientist and adds her increasing identity as a writer/author. She also indicates that this was an emotional experience and significantly expanded on her developing confidence in her ability to write and communicate with others (please see Appendix G for a complete data set with significant coding, categories, themes, and negotiations.) I have included a representative excerpt (Table 21) from her interview that indicates her increasing mention of gaining confidence and tenacity in researching and writing and her increasing interest in science (*I know that I can write a full report on that and have patience*).

R: How did that increase your interest in science?

S: *Well, I do want to go into the marine biology field. I know that with this – being a published author – I know it is going to help me with my further research in whatever marine animal I decide to study – whether it is going to be a shark, an octopus, or a dolphin...I know that I can write a full report on that and have patience and know how to put a research paper together so that I know it can be published.*

Learning language – writing, research

Living language -- gaining confidence, gaining tenacity/patience, publishing, identity as published author/writer, increasing interest in science, increasing engagement

Table 21 Diane’s Second Interview – Negotiation with Self

Diane continued to mention her interaction with an outside expert as helping her with her communication skills and confidence in Table 22 and it appears that Diane's contact with experts outside the school setting was "pretty cool" and increased her engagement.

R: Did you discover any strengths that you had when you were going through the SJ process?

S: *A strength that I probably had was contacting others, like just different scientists on that topic. Because I know that when I was contacting or emailing the chiropractor in Florida...which is really far from Louisville... I worded it in a way that I knew he would respond back. I thought that was pretty cool.*

Living language – showing emotion, gaining confidence, connecting with experts, increasing communication skills, increasing engagement

Table 22 Diane's Second interview – Negotiation with Experts

In Table 23, Diane wanted to share that experiencing the SciJourn process has significantly helped her in high school. In fact, she directly attributes her success with being accepted in the senior research project at her school because she could indicate on her application that she was a published science author. This appears to indicate the significance of the SciJourn approach to literacy.

R: Okay! Is there anything else that you want to tell me that I haven't asked you?

S: *Um, well I think that **the SJ project is really going to help me with my big project that I will have senior year 'cause I just got accepted into the Senior Independent Project where we pick a topic and do a project for a whole year! And then, it is a huge project that you have to do whether you are learning sign language, or just a different language, you have to present it to a board of committees and they'll see if you pass or not – if you learned anything from it. So, **I know that the SJ project and the research from there would definitely help me with the research on my project** that I am going to do next year.***

R: And, how did you get picked for that? Is it everybody?

S: *If you want to do it, then you have to send in an application and you have to write a two-page letter about why you should be picked for the SIP project.*

R: Did you put it in that you had done research before...that you were published?

S: ***Yes, I did** and about fifty girls sent in their application and only about 10 girls were picked.*

R: So, did you feel more confident to do this because of the SJ?

S: ***Yes, I did.** I knew that I had the background, I knew that I had that little thing in my pocket where I can put it in my letter, in my application that I was going to send them and they knew right away that, “Oh, this girl has some background with her” and so I am sure they just picked me from that!*

Table 23 Diane's Second Interview: Significance of Publishing

In looking deeply into the data, Diane clearly indicates the power of an authentic assignment that includes publishing for an audience, interacting with an expert in the field and how this increased her engagement. In addition, she expressed the value she found in this experience to help her in the future by helping her build her confidence and increase her communication skills. Diane was the first student to mention in the interviews that this experience helped her gain confidence in her **communication skills**.

I now move to an analysis of Robin's reflection letter and her first and second interview. Robin, though less verbal than her sister, indicates that she sees value in gaining knowledge of the writing process and how this will help her in high school and college.

Robin's Seventh Grade Reflection Letter

Background: Robin was also a pleasure to have in class and was very concerned with her grades and making sure she had her work turned in. Unlike her sister, she was very shy and more reticent to interact with her peers. Nevertheless, we developed a warm relationship and she was very excited when her and her partner's article was published.

In this reflection, in attempting to ascertain what Robin had experienced through the SciJourn process, I have revisited her reflection repeatedly and discovered that she appears more comfortable when actually using the knowledge she gained (in the group activity) rather than writing or talking about it. However, in the following analysis, she is clear that she increased her knowledge of the writing process, learned content as she was researching, and saw value in choosing her own topic, having a connection, and working with a partner

Learning Language:

Writing, editing, revision --

*I've also learned that it takes a **lot of work** to do and a **lot of time** (see below) because you have to **write, look back over it,** and see if there are **no errors.***

Learning through Language:

Content --

*What I've learned from the Scijourn is **alot about my topic,** the **definition,** what it **can cause** and other **good facts** to.”*

Living Language:

Gaining tenacity, choosing own topic, having a connection, having a partner, seeing value --

*I've also learned that it takes a **lot of work** to do and a **lot of time...***

*Lastly, **choose a topic** that you are **comfortable** with and that **relates to you** because it would be **easier** and you **wouldn't be confused** with your topic.*

*Advice to incoming 7th graders –...**choose a partner** that will take the **time to work** because if you don't then you'll probably be **stressing** and probably being **in need of help** constantly.*

*I think this would **help us in high school** and **colledge** because it would **help us** with **writing essays and reports done in high school** that we have learned from SciJourn.*

From the analysis of Robin's reflection, I began to evolve my understanding of the importance of students **living** the assignment and the significance of Negotiation aspects of this theme. She appeared to be negotiating with herself and her partner, and this interaction was an important one. I wanted to learn more in the interviews about the meaning she voices to her experience and has this changed over time and space.

First Interview -- Robin

Context: Robin was a freshman at the time of the interview and was not as vocal or sure of herself as her sister. She often struggled to come up with something to say and Diane often felt she needed to prompt her. However, as the second interview and especially the group activity took place, I could see growth and more focus each time we met.

Negotiation with: Self

Unlike Brandi and Diane, Robin did not express as much emotion during the interview and did not mention the interaction with the editor or with an expert in the field. However, there were **two** excerpts in Robin's first interview that indicated Negotiation with Self where she increased her knowledge of writing and researching and the ability to choose a topic learn more information on this subject increased her engagement. The representative excerpt in Table 24 indicates that choosing her own topic increased her engagement with the assignment (*...researching about the topic and how interesting it was...*)

<p>R: What do you remember most about the project?</p> <p>S: <i>Ummmm, probably, I remember like <u>researching</u> about <u>the topic</u> and <u>how interesting</u> it was and I was like, this is <u>cool</u> to talk about and <u>write about</u> and stuff.</i></p> <p>Learning language – writing, research</p> <p>Living language – choosing own topic, increasing engagement</p>
--

Table 24 Robin's First Interview – Negotiation with Self

Negotiation with: Self, Peers, and Audience

In Table 25, Robin indicates the complexity of the SciJourn experience showing emotion concerning her accomplishment of being a published author, working with her partner, and having an audience that wants to read her work (*I felt like happy...we worked hard on this...and people actually want to read this...*)

R: It doesn't have 27,000 hits but it does have over 4,000 hits. How does that make you feel?

S: *That we actually, like, that people actually want to read this and learn from what we wrote about.*

R: So what did you feel like when you were published?

S: *I felt like happy because we worked hard on this and I was like I hope this gets published and stuff.*

Living language -- showing emotion, gaining tenacity, publishing, seeing value, having an audience

Table 25 Robin's First Interview—Negotiation with Self, Peers, Audience

What I learned from Robin's first interview was that even though a student may be less forthcoming concerning their experience with SciJourn, they do see the value in increasing their knowledge of writing and researching and that gaining the tenacity to publish an article with an authentic audience, held meaning for her.

I now continue with Robin's second interview. I was interested in exploring more about the importance she voiced to publishing and if she would be more relaxed in discussing the impact this had on her emotionally and the confidence she gained as a writer.

Second Interview – Robin

Context: As described above, this interview was also held in my room and their father dropped them off together. Diane and Robin seemed amused about seeing their words in print when I showed them their first interview to member check and to make sure I had captured what they wanted to say. I also explained the process of researching and analyzing their interviews. When I saw their dad the following week, he stated that he was thankful that I had “let them in” on how research is done and that they had talked about it all the way home. Robin shared that she loves to sing and is in her high school choir and is interested in becoming an oceanographer. Diane again helped prompt her sister’s answers, however, Robin was somewhat more comfortable with the process and provided some additional information.

The excerpt in Table 26 provides a brief view of how Diane comes to her sister’s rescue and their interaction during the interview.

R: So, was it more the actual writing that you learned, the language and that kind of stuff or was it more researching and putting it together. What do you think you have really improved on since this?

S: *Ummmm. I think my writing skills...I have improved on that. Making it....I don't know how to put this. Like...*

D: *(Diane jumps in!!) ...like writing a formal research paper???*

S: *Yeah.*

D: *Punctuation?*

S: *Yeah (all laughing!)*

R: I love how you are helping her out!

Table 26 Robin and Diane Interaction

In the second interview, Robin now had **five** excerpts that indicated a Negotiation with Self. I have included the excerpt in Table 27 as a representation of her experience with SciJourn. It became apparent that publishing had an impact and she shared the emotion of writing and publishing an authentic assignment (...*having chance to publish...*) and (*It made me feel excited...*).

R: Were any of those stand out more than others?

S: *Um, Yes! -- having a chance **to publish** the article.*

R: What did that mean to you?

S: *It was **my first time** and it was like **really important**. It made **me feel excited** to what would happen and what they would do.*

R: So when you heard about...if you can remember back...so this is the hard part because you are removed from it...when you first heard about writing this do you remember if you were feeling, Oh my goodness...were you scared...were you anxious?

S: *Well, I was **anxious** because it would be **really exciting** to have like your **article published** on like a web site where **everybody can see it**.*

Living language -- showing emotion, publishing, having an audience, seeing value, publishing

Table 27 Robin's Second Interview – Negotiation with Self

When comparing Robin's first and second interview, she began to show emotion more clearly in the second interview (...*it would be really exciting...*) and indicates that she has gained confidence in her ability to write in that she would "*know what to do.*" It is obvious that having an editor and an audience increased the level of stress involved but

that working through that stress with her partner led her to experience the excitement of publishing and having people read her work.

I now continue with the fourth case study – Helena -- her background in my class, an analysis of her reflection, context for each interview, and analysis of the data from the first and second interviews. Helena builds on the finding that SciJourn increases confidence in the writing process and expands on the key understanding of Negotiation with Self, Peers, Editor and Audience in her interviews.

Case Study 4 – Helena

Background: Helena and I started off on the wrong foot. Helena was on another team in the seventh grade however, she was assigned to my Academic Enrichment (AE) class which was centered on engineering skills. I was always puzzled when she gave me dirty looks, major attitude, and was very disagreeable whenever I talked to her. When I saw that she was on my team when I moved to the eighth grade, I was very apprehensive but was determined to start the year out with an open mind, giving her the benefit of the doubt. I made sure to include her, ask her questions, listen to what she had to say, and she quickly came around to interacting with me in a pleasant and positive way. When I felt comfortable with our relationship, I asked her why she was so mean to me the previous year. She stated that she had hated her seventh grade science teacher and figured I was just like her. She came into my AE class with a pre-conceived idea and decided she wasn't going to give me a chance. When she found out that I would be her 8th grade teacher, she thought I would retaliate. When I didn't and when I treated her like the other students, she relinquished her dislike of me and over the year, we became fast friends. In fact, after the second interview, I turned off the recorder and we spent a good

hour or so talking and laughing about the past and learning about what she sees in her future.

Helena is a young woman who, after a rocky start, became a hard-working, conscientious student in my eighth grade science class.

Helena's 8th Grade Reflection Letter

From analyzing Helena's eighth grade reflection immediately following her experience with SciJourn, the categories of writing process/structure (plagiarism, credibility, research, revision, editing, and citation) were developed into the theme of Learning Language. The Living Language theme was developed from the categories of seeing value, gaining confidence, and gaining tenacity. The categories with corresponding excerpts are listed under the appropriate theme.

Learning Language:

Writing process/structure (plagiarism, credibility, research, revision, editing, citation)

From completing the Sci-journ process, you learn not to plagiarize and how to go to credible websites and find the information you need, It shows you/helps you to make changes in your writing to see what you can change/fix for next time in deep detail, but it also helps you learn how to manage your time right. If you aren't managing your time, you won't get anything done. You have to have focus and split it up when doing a project with certain requirements.

Living Language:

Seeing value, gaining confidence, gaining tenacity, (credibility, citation)--

This experience will definitely help me in high school and college because when teachers will assign us reports to do, I will know how to not plagiarize, how to find credible websites, how to site sources correctly, and how to manage my time and stay focused.

From this reflection, it was apparent that Helena specifically remembered the writing knowledge she gained from the SciJourn experience as well as gaining confidence in her writing ability. In addition, she saw the value in using that knowledge in her future. The complexity of the SciJourn experience begins to surface above when Learning Language and Living Language intertwine in one excerpt. This was intriguing and I was interested to see if this would appear in her interviews.

As I began to see negotiation with self as a key understanding in Helena's reflection (as was hinted at in Brandi's, Diane's and Robin's reflection), I wanted to explore more about her experience as voiced in her interviews. It quickly became apparent that this experience held great meaning for her and she was clear in what she had to say.

I will now move into the presentation of the data from the first and then the second interview indicating the key understandings of Negotiation that emerged from constant reiteration of the data and focus on the overarching meaning found in the initial categories (often gerunds) and emerging themes of Learning Language, Learning through Language, and Living Language.

First Interview – Helena

Context: Helena was my first interview for this dissertation study. We were both nervous and we set up the interview after school. I met her at her high school in the parking lot after her cheerleading practice where we agreed to drive to the local library (her dad was driving). Helena is attending her local high school (which does not have the best reputation) but she is determined to take advanced classes in order to achieve a career possibly in teaching.

Helena worked with her partner on her SciJournal article and they were published after the usual 8-9 edits and revisions. As this was my first interview, I was focused on skill retention. This focus changed as I continued to interview students and talk with my committee about my research questions. The following are excerpts from her interview that reveal her thinking and meaning making when discussing the SciJournal process. I have presented these first under the key understandings of Negotiation: Negotiation with Self, Negotiation with Peers, Negotiation with Family, and Negotiation with Editor and begin with the most notable category of Negotiation with Self. I then follow with the initial categories and themes that show where the student has expressed learning under the Learning Language, Learning through Language, and Living Language with revealing categories. At the end of this section, I will sum up with a brief discussion of the reflections and both interviews.

Negotiation with: Self

There were **three** excerpts in Helena's first interview that indicate that Negotiation with Self is a prevalent key understanding that was also noted in the previous three cases. (All of Helena's data is located in Appendix I.) These excerpts reveal the student's thinking and the process of meaning making where Helena not only learns the writing process and structure (research, citation, revision) but also voices that her confidence as increased from her experience with the SciJournal process. I have included one excerpt in Table 28 as a representation of Helena's voice where she indicates that an authentic writing assignment provides meaning, enjoyment, and increased engagement to learning (*...it keeps the kids engaged...*), (*...it is actually something you enjoy...*), and (*...we tend to do a better job about it.*)

R: Do you think teachers should do more of this kind of writing?

S: *I think **they should do more of it because it keeps the kids engaged, they don't realize that they are actually like revising papers, and they don't realize it when they are engaged in something cause it doesn't seem like it is just classwork, it seems like, okay, I need to do this and this, and it is actually something that you enjoy, it's not like about how to fix a chair or something, it is actually important to us so we tend to do a better job about it.***

Living language – showing emotion, increasing engagement, seeing value

Table 28 Helena's First Interview – Negotiation with Self

Negotiation with: Peers

There were **two** excerpts in Helena's first interview that indicate that Negotiation with Peers was significant in her engagement with the process. The excerpt in Table 29 exemplifies the emotion she feels in having a partner and how this increased her engagement in the project (*It was fun, too, with partners...*).

R: I just remember you and (her partner) sitting over at the computers and just working like little bunnies. I will never forget that image I have in my head of you two. It was very awesome.

S: *It was fun, too, with partners because you were able to talk and laugh if we messed up and it was fun.*

Living language – showing emotion, increasing engagement, having a partner

Table 29 Helena's First Interview – Negotiation with Peers

Negotiation with: Family

Helena had both a family connection with topic and her interaction with her parents. In the two excerpts in Table 30, Helena expresses that it was a “pretty big deal” in getting published and how proud her parents were for her accomplishment. In addition, she thought it was important that she could choose a topic tied to her family and how this increased her engagement (*...I got to choose...*) and (*...this is a personal piece for me because my mother had it...*).

R: And, what was your reaction in your family?

S: *They were actually really proud. My mom, whenever I told her I got published, she wanted to go on the site and she wanted to read it and see how many views there were and she was excited and she called my Dad and was like, “Your daughter just got something published!” So, it was a pretty big deal.*

Living language -- showing emotion/pride, publishing

R: And, then, most people thought it was fun and it was engaging because they were working with a partner, they were getting to research something they were interested in?

S: *Yes, I think that is better actually because I got to choose what I wanted to do and it wasn't just what you assigned because this is a personal piece for me because my mother had it, therefore, I wanted to get as much research as I can because it happened to my mother.*

Living language – choosing own topic, having a connection, increasing engagement

Table 30 Helena’s First Interview – Negotiation with Family

Negotiation with: Editor

There were **two** excerpts that indicate that having an editor increased Helena's pride in her accomplishment. The excerpt in Table 31 clearly shows that interaction with someone outside the classroom emotionally challenges Helena to do her best on her article (...*but when an editor does it you feel like you have to make sure that it is good...*).

R: So, having the editor read it? Was that something that made a difference, that it wasn't just me as a teaching reading it?

S: *Yes, it did because then you felt like...you know teachers are there with you every day and you are **really comfortable**, but when **an editor does it** you feel like you have to **make sure that it is good** because he doesn't know you and you want to make sure that you look good, have a good impression.*

Living language – showing emotion/pride, having an editor

Table 31 Helena's First Interview –Negotiation with Editor

Negotiation with: Audience

In the excerpt in Table 32, Helena indicates that publishing and having an audience increased her confidence and she showed the pride she felt that she was able to

R: So, as far as the perseverance goes, what made you finish all the way to the end where maybe some other students didn't?

S: ***I wanted** to get it **published** because once you set your mind to something you want to see it through and if it is good enough you want it to be shown, thataway, you can say , "I did that!" and it was good and it was good enough to get it published.*

Living language -- showing emotion/pride, publishing, gaining tenacity, having an audience, gaining confidence, identity as writer/author

Table 32 Helena's First Interview -- Negotiation with Audience

persevere (*I wanted to get it published...*) and (*"I did that!"*).

What I learned from Helena's first interview was the significance of providing an authentic writing assignment that allows for student choice in topics and the possibility of publishing her writing. This appears to result in increased engagement and tenacity and a feeling of pride and emotion as she becomes a published author.

I now continue with Helena's second interview. I wanted to explore more about her experience with the editor and her increasing identity as an author.

Second Interview – Helena

Context: During the second interview, Helena was more comfortable with the process (and so was I) and we met at her house near the school where she was alone as her parents were working and would not be home until later. She shared that she tutors younger students at her house, that she keeps away from the drama of teenage girls (and boys), and is very focused on her future. She also stated that she was enrolled in the Cambridge program at her high school. It states on their website that, "The Cambridge Advanced International Certificate of Education (AICE) Diploma is an international curriculum and examination system that emphasizes the value of broad and balanced study." Helena shared that,

And, at the end of every year we take certain tests and you get college credits at the end of it. And then, you get money, like if you get certain scores, you get a certain amount of money. And then, at the end of the four years, if you take enough of the tests and pass enough of them, you get like an AICE diploma, which is recognized world-wide. I guess I can go anywhere and have an AICE diploma thing.

For the second interview with Helena, I had been coding and analyzing the students' first interviews and rather than focus on skills, I wanted to explore more about how she viewed scientists and her experience with the editor. The complexity of the SciJourn process was again apparent as certain Negotiations would overlap in several of the excerpts.

Negotiation with: Self

Similar to the first interview, there were **three** excerpts identified as Negotiation with Self where Helena continues to emphasize the importance of having a personal connection to her topic which resulted in an increase her engagement. However, like Diane, in the excerpt in Table 33, she also gained an understanding of scientists and science practice (...you have to have a lot of time and energy.)

R: What do you think scientists do now that you have been exposed to some of the research? How do you see scientists?

S: *It is **extremely hard** because, you don't exactly know the causes to everything and you have to try and get down to the bottom of it and **figure out** what it is, what medications you can use to try and stop it or how you **can try to prevent it**. And you have to try and **spread the word out** and **that's a lot of work** because, I don't know if I could do that because you have to **have a lot of time and energy**. And you have to be able to **look at all the statistics** and **interview a bunch of people**, and get a bunch of **people's information** about it. It seems like a **very long process**.*

Learning through language – understanding of science practice

Table 33 Helena's Second Interview – Negotiation with Self

Negotiation with: Peers

In second interview, Helena continues to show her emotion in **two** excerpts as she discusses the importance of having a partner. The representative excerpt in Table 34 adds to the increasing show of emotion in the second interview as she discusses the importance of having a partner (...*this was really just special to me. It was important.*) and (...*my partner and I would stay on the phone until 10:00PM working on this...*)

<p>R: Can you remember any others?</p> <p>S: <i>I remember...we did a PP in Mr. H., I don't remember what it was about. We did the foldable flashcards in your class. I remember that because that actually helped. I actually use flash cards in high school now whether they say to or not because it helps. But, other than that, no. Like this was <u>really just special to me.</u> It was <u>important.</u> <u>I came home and I worked on it some and my partner</u> and I would stay on the phone until 10:00PM working on this trying to make sure that it <u>sounded good.</u></i></p> <p>Living language -- having a partner, increasing engagement, seeing value</p>
--

Table 34 Helena's Second Interview – Negotiation with Peers

Negotiation with: Family

In the excerpt in Table 35, Helena continues to indicate the importance of having a connection with her family and herself and indicates the increasing emotion she shares throughout this second interview (...*my mom actually went through it...*) and (...*me and her both could have actually died...*).

R: Do you think that this brings up any kind of emotion when you first think about it? When you look at it? When you were researching it?

S: *Well, yeah, because my mom actually went through it and it was good to know what she went through and the type of things she had to deal with, how she even thought about dealing with pre-eclampsia and all the effects that it had. It was also important because when we were at the hospital, me and her both could have actually died because of how severe her pre-eclampsia was. So, thinking like I made it but what were the causes of it, how can we prevent it, and things like that you are just curious and you want to do it versus you just getting a thing that you are supposed to want to research but you don't actually want to research it because you don't really care. But this actually happened so you want to know how can I prevent it, am I more likely to have it if I have kids. What are the main causes of it.*

Table 35 Helena's Second Interview – Negotiation with Family

Negotiation with Editor

There were **five** excerpts in the second interview that explored more about the importance of having interaction with individuals outside the classroom. In the excerpt in Table 36, Helena emphasizes the importance and value she sees in having an editor approve of her work, the confidence she gains because of that and, like Diane, her increasing identity as a writer (*But it was really good because once he approved of it you felt good enough to be published...*) and (*...it really boosts confidence, 'cause I never thought my writing as good. Ever.*)

R: So, you were just talking about working with an editor.

S: Yes.

R: What did that add to the project?

S: Well, it is a ***little scary*** because you have ***someone*** who knows ***exactly what they want*** and ***they are reading your stuff***. ***But it was really good*** because ***once he approved of it you felt good enough*** to be ***published*** and you felt like ***...it brings confidence*** because you think, well ***if they think the writing is good*** then maybe ***it really is good***. So it really ***boosts confidence***, ***'cause I never thought my writing was good. Ever.***

Living language -- showing emotion, gaining confidence, having an editor, publishing, identity as writer

Table 36 Helena's Second Interview – Negotiation with Editor

Negotiation with: Audience

I share the excerpt in Table 37 to indicate that in the second interview, Helena increased her mention of her identity as a writer/author and discusses the change in confidence she gained after publishing where thousands of people are reading her article (...they don't know me but they like my work.) and (they feel like I am good enough...it does really help with confidence.)

R: So, how did this process affect your vision of yourself?

S: *It did because at this point in time when I wrote this article, I remember in 8th grade, I was not confident at all...like in anything not just in related to school. But, whenever you see that other people are reading the stuff that you are putting out there and they like it and they enjoy it. Because I did look at the hits for a long time until they took it away. But it is really nice to see people do it because they don't know me but they like my work. They feel like I am good enough to be on the thing and they don't even know me. So, yes, it does really help with confidence.*

Living language – showing emotion/pride, gaining confidence, having an audience, identity as a writer/author

Table 37 Helena's Second Interview – Negotiation with Audience

Similar to Brandi and Diane, Helena felt strongly about having a connection to the topic of her article. However, her connection was not about a family member (Brandi) or a topic that was generally interesting to teenagers (Diane). Her connection was in researching about a personal health issue that affected both herself and her mother.

Similar to Brandi and Diane, Helena showed strong emotion when discussing her connection with her family as evidenced above and similarly to Diane, having an editor was clearly a memorable experience and increased her confidence in her work. In addition, Helena continued to gain confidence in her identity as a writer from having an audience. Helena, similar to Brandi, Robin, and Sam, indicates the importance of her interaction with the editor.

What I learned from Helena is that gaining confidence was a key category that was connected with having an editor and an audience which is part of the authenticity of SciJourn. There were five excerpts where she emotionally discussed the impact that having an editor had on her writing, her confidence, and her engagement. In addition, she was very passionate about sharing that writing about a personal issue and having an audience also built her confidence and she now sees herself as a published author and writer.

From the first four cases, there has been a consistent emphasis from the students that they not only Learning Language (writing process and structure) but also Learning through Language (science content concerning their chosen topic). In addition, all four students voiced that they saw value in the process and that this was an emotional experience that helped to increase their confidence in their writing now and in the future (Living Language). They all indicate that the opportunity to publish increased their engagement with three (Brandi, Diane, Helena) suggesting that they now see themselves as writers. In the following case study, I was interested in seeing if emotion and confidence continue to be a significant finding and explore how SciJourn changed the

way students saw scientists and science practice possibly increasing their interest in a science career.

Case Study 5 – Jordan

Background: Jordan was in my eighth grade science class and published her article on a topic that concerned her personal health. Jordan is a Caucasian female who is outgoing, high achieving, very motivated, and has a dry sense of humor. She was not one to hang around my desk but always sought help if she needed it and took the SciJourn assignment very seriously. We developed a cordial, respectful, and fun relationship.

Jordan’s 8th Grade Reflection Letter

When analyzing Jordan’s reflection letter, the themes of Learning Language and Living Language emerged. I have listed these with the respective categories underneath and included excerpts from the reflection. I have included bold and underlining to help draw attention to the specific words and phrases that I saw as significant. The original spelling and grammar have been included as these excerpts are direct quotes from the reflection.

Learning Language:

Writing structure, research --

*I learned that Sci-Journ really **helps you master** or keep **developing your writing skills**. It shows you that **writing doesn’t have to be a five paragraph** essay to be a **good piece**. I’ve also learned the **proper way** to do **research**.*

Living Language:

Increasing confidence, publishing, choosing own topic, increasing engagement having an editor--

*I think this is a **positive** experience because **it teaches** that writing can be **published by an average kid**. It shows that by **choosing your own topic***

you can write a better or more interesting piece, because you enjoy the topic!

By sending your Sci-Journ piece to the editor it teaches you that just because you get it back doesn't necessarily mean it's wrong: it means that they want to make you and your work better.

From the analysis of Jordan's reflection, the theme of Learning Language focused on her increased understanding of writing structure and researching. Under the Living Language theme, she voiced that the SciJourn experience was positive one due to the possibility of publishing and her ability to choose her own topic therefore increasing her engagement. When Jordan expresses the importance of her interaction with the editor -- here is where I began to see that Negotiation with an Editor may be a key understanding in the SciJourn process.

The following are excerpts from Jordan's interview reveal her thinking and meaning making when discussing the SciJourn process. (All of the excerpts from Jordan's interviews are located in Appendix J.) I have presented these first under the key understandings of Negotiation: Self, Peers, Family, and Editor and begin with the most notable category of Negotiation with Self. I then follow with the initial categories and themes that show where the student has expressed learning under the Learning Language, Learning through Language, and Living Language. At the end of this section, I will sum up with a discussion of both interviews.

I now move to Jordan's first interview. I wanted to hear her voice as she discussed her experience with SciJourn.

First Interview – Jordan

Context: Jordan and I set up her first and second interview at her house. She lives in the modest, urban area around the school. When I arrived, her older sister was at home and

met me at the door. Jordan came into the living room and greeted me warmly. We sat in the living room and I began the interview. Again, I was pleasantly surprised that she had strong opinions and seemed very clear in what she wanted to say.

Negotiation with: Self

There were **seven** excerpts in Jordan's first interview that indicated the significance of Negotiation with Self. (Please see Appendix J for the complete data set.) They clearly indicate that Jordan has internalized her learning and that having a connection when writing increased her engagement. In the excerpt in Table 38, Jordan shows emotion when speaking about SciJourn and also indicates that she learned science

R: Some of the other students have said that this has actually created an interest in going into some science field....

S: ***Yes! I actually majored in science this year. When scheduling I declared science.***

R: Do you think that had any influence from the SciJourn experience?

S: ***Actually, yeah, because I don't know, I find it really interesting to go deeper in health because I want to be a nurse anyway and I like learning about the body and I thought it was interesting in going back and seeing how our brains worked and how our bodies can do stuff that I didn't even know they could do. **I just found it interesting that anything science related I didn't even know that it was science related. So, I did major in science.*****

Learning through language – learning content, increasing understanding of science practice

Living language – showing emotion, increasing interest in science, increasing engagement

Table 38 Jordan's First Interview – Negotiation with Self content. In addition, Jordan also expresses that this experience has increased her interest in going into a scientific field, and has increased her understanding of science practice

(Yes! I actually majored in science this year.) and (I just found it interesting that anything science related I didn't even know that it was science related.)

In the **seven** excerpts concerning Negotiation with Self (located in Appendix J), Jordan's expression of emotion concerning her experience with SciJourn confirmed and expanded on the significance of emotion as a category in the Living Language theme.

In Table 39, an excerpt is included that continues to indicate the emotion she voices concerning the value she sees in learning new information and how this will help her in the future (*Yes! I loved it. I love learning new information...*).

R: That is really cool (both laughing). And so, last year you wrote about it and most people thought it was fun and engaging and do you still think that this process was fun and engaging?

S: *Yes! I loved it. I love learning new information and I thought it was really good knowing how to do all that because it really does prepare you for high school knowing how to set up a writing piece because you are going to be doing writing pieces through high school and college and knowing how to research, and put in information, and just learning about the information was just awesome, I loved it a lot!*

Learning language – writing, research

Learning through language – content

Living language – showing emotion, gaining confidence, seeing value

Table 39 Jordan's First Interview – Negotiation with Self

This excerpt (Table 39) opened up a new understanding for me concerning Jordan's love of learning. As there was less developed background and interaction with me as a teacher (compared with the other students), I would never have known her

passion for SciJourn and the value she saw in the process if I had not returned to her as a researcher. I now have a stronger connection to and understanding of Jordan's personality and what she values as a person.

Negotiation with: Peers

I am including **one** of two excerpts in Table 40, where Jordan directs us to the significance of working with a partner and how that has impacted the confidence with how she works in groups in high school.

R: I learned a lot about your situation from reading it. So we did some specific things during this like we did research, we presented, we pitched ideas, edited, revised, we worked with a partner. Have you used any of these when you went to high school?

S: *Yes, actually **working with partners**, I wasn't really familiar with that before 8th grade. I just like was used to working on my own. And now in **high school** we actually **get in groups** a lot and it is **easier** to like **let my ideas and opinions flow** without trying to say, "**Just let me do that!**"! It is **easier** to say what **I have to say** without saying well, that's **not what I want**.*

Living language – showing emotion, gaining confidence, having a partner

Table 40 Jordan's First Interview – Negotiation with Peers

The excerpt in Table 40 continues to support the finding that working with a partner (Negotiation with Peers) provides confidence not only in the writing process but also in working with others "*in groups*" in the future. Jordan indicates that it is "*easier*" to share her ideas and opinions while being a more open participant.

Negotiation with: Family and Audience

In the excerpt in Table 41, Jordan describes the interaction with her family and the importance of writing about herself and sharing that with her audience.

R: So what did your parents think when you were published?

S: *Well, they were **very happy for me** when I actually got **published** and that I had wrote an article **about myself** to **help other people** through **my condition**.*

Living language – showing emotion/pride, having a connection, publishing

Table 41 Jordan's First Interview – Negotiation with Family

Jordan continues to show the emotion and pride she feels about publishing an article that was connected to her and how sharing this may help other people.

What I learned from Jordan's first interview, is that, like Brandi and Helena, Jordan shows emotion when discussing the SciJourn experience that relates to her personal connection and seeing the value of gaining confidence in her knowledge of writing process and structure (see Appendix J). Working with a partner continues to be a recurring Living Language theme.

In Jordan's second interview, I was interested in continuing to explore her experience and how it related to her increased confidence and engagement and her identity as a writer.

Second Interview -- Jordan

Context: During the second interview, I again met Jordan at her home. She was alert, focused, and ready with answers. I let her read over her first interview to see if she agreed with my transcription and if there was anything that she wanted to change. She thought it looked good. I wanted to follow up on her change of view about writing after

the SciJourn experience and having a partner, further explore her changing view of science and science practice.

Negotiation with: Self

In this second interview it was, again, apparent that she had considered and deeply thought about the impact of the SciJourn experience and what she gained from the experience. There were **eight** excerpts that indicate Negotiation with Self was a powerful key understanding by showing her emotion, increased confidence and her identity as a writer/author. I am providing **two** excerpts in Table 42 that reveal the significance she voiced to her expanding view of science (*There are so many things that have science in it and I didn't even know. I had no idea!*).

R: What do you understand more about science itself from what you learned?

S: *That it is very, very broad. There are so many things that have science in it and I didn't even know. I had no idea! And that everything, for the majority, is broken up to scientific facts and that everything has a cause and an action, and it just all wraps around back to each other. There is a reason for it and most of it is science!*

R: And, what do you understand that scientists do?

S: *They do a lot of research. A lot! And I feel like they are some of the smartest people. A scientist has to be extremely smart to know and memorize a lot of stuff they look over and they have a lot of determination, too. I feel like they want to know more and they want to know why stuff happens and how it happens and it is amazing that so many things happen and you just want to know more about it. I feel like scientists are extremely smart and great, altogether.*

Learning through language -- expanding view of science practice/scientists

Living language – showing emotion/pride, seeing value

Table 42 Jordan's Second Interview – Negotiation with Self

As indicated in Table 42, it seems clear that Jordan has developed an increase understanding of scientists and science practice. She mentions that scientists are “*extremely smart*” and shows emotion concerning her new understanding that science is found in “*everything.*”

In the excerpt in Table 43, Jordan clearly indicates her increased confidence with the writing process and her identity as a writer. Jordan is adamant (“*definitely*”) about her growth as a writer and her increased comfort with the writing process and believes it would be a “*good experience*” to do again.

R: So, if you were doing SciJourn now, how comfortable would you be with the process?

S: *Oh, **definitely more comfortable**, yeah. Because I am **familiar** with the system and **how it works** and **definitely** since **I have grown as a writer** that I feel like it would be a **good experience** to do it again.*

Living language – showing emotion, gaining confidence, identity as a writer

Table 43 Jordan’s Second Interview – Negotiation with Self

Negotiation with: Audience

There were **two** excerpts in Jordan's second interview that indicate the significance of having an audience. The excerpt in Table 44 shows that the opportunity to publish for an audience increased her confidence and her desire to inform people about her topic providing the motivation/tenacity to complete her article (*...I can do this, I can do it and it just kept me going...*) and (*...to inform more people...it was a really great thing to do.*)

R: So, what are the strengths that you discovered that you had through this SciJourn process?

S: *I think the determination I had always made me...because the fact that SJ was being **published**, I could have it **published**, that even though I was kind of **struggling** at several points that it was going to be **published** so I was like, okay, **I can do this, I can do it** and it just **kept me going** and that I could **research more** and **get more information** in there to **inform more people** because of the SciJourn I just thought it was a **really great thing to do**.*

Living language -- showing emotion, gaining tenacity, publishing, gaining confidence, having an audience

Table 44 Jordan's Second Interview – Negotiation with Audience

What I learned from Jordan (like the other participants) was that Negotiation with Self to find meaning in the assignment occurred in the great number of excerpts. The value she found in the process consisted of gaining confidence and understanding of the writing process as well as gaining an identity as a writer and author. The opportunity to work with her partner to publish an article that included an authentic audience increased

her engagement and the memory of her experience. Similar to Diane, Jordan indicates that the SciJourn process has increased her interest in science.

The following Case Study was unique in that the first interview inadvertently included the voice of Sam's mother (explained below). In addition, like Robin, Sam was certainly a less outgoing student in class and I was impressed with her growth as a student and as a person.

Case Study 6 – Sam and Parent

Background: Sam is a young woman who was very quiet but motivated to get good grades, to learn, and to achieve...I would look at the class, then over to her, and she was always listening and paying attention to what I was saying. Sam came in late to my seventh grade class which also seemed to make her less verbal. She published the first year but did not publish in her 8th grade year when I moved to the 8th grade. Sam mentions often that she is very interested in science and is considering becoming an astrophysicist!

Sam's Seventh Grade Reflection Letter

When re-reading and coding Sam's first reflection letter, it was apparent that she had a less than positive experience with the SciJourn assignment in the seventh grade even though she was published. She states,

*I had an **unfavorable** experience with SciJourn because of **all the editing** involved. I knew me and **my partner** would have to **edit a lot**, but **not as much as we did**. We typed at least **ten rough drafts**.*

However, later in her reflection, she is able to see the positive aspects of the experience and even says she would want to do this again (and she did!).

*I would like to **do this again** in eighth grade because it was **very interesting** trying to **pick a topic**. Also, it's **better than sitting in a chair** the whole period,*

*listening to a long, boring lecture. **SciJourn is different than an ordinary class, it's more fun and interacting with other classmates.***

From this reflection, the three themes of Learning language, Learning through language, and Living language were evident from the categories and excerpts that follow. I have included bold and underlining to draw attention to the specific words and phrases that I saw as significant and that were coded to create the categories. I have included the original grammar and spelling as these excerpts are direct quotes from her reflection.

Learning language:

Writing, editing, plagiarism, picking topic --

***Editing** is the hardest part, so don't expect your first draft to be perfect, and published, **it takes time**.*

*Some of our article was {copied at first}, but we **either quoted it**, or we **changed the words around** and said the same thing, but in a **different, easier sentence**.*

*Pick an **interesting topic** that is **easy to explain** and can be **narrowed down**.*

Learning through language:

Learning content --

*But when it came to **writing**, it was **hard** because we **had to explain** all the **scientific words**, or simple words **into even more simpler words**.*

Living language:

Choosing own topic, increasing engagement, gaining tenacity, having a partner --

*...because it was **very interesting** trying to **pick a topic**...*

SciJourn is different than an ordinary class, it's more fun and interacting with other classmates.

*What I learned from SciJourn is **hard work**. It took **lots of time, effort, and skill**.*

Also, teamwork -- it's hard to work as a team because we have different ideas and opinions. We had to compromise a lot, but we managed.

For Sam it appears that editing and revision certainly frustrated her, however, she learned science content through having to explain it in her own words and ended up feeling that even though this was challenging, it was fun especially when interacting with her partner. Again, I began to see that negotiation with peers may be a key understanding of this research.

Sam's 8th Grade Reflection

Context: As Sam was not published in the eighth grade, I was concerned that this would affect how she experienced SciJourn. However, her second reflection was more positive and she indicates that having additional experience writing a science news article provided her with the confidence she needed to feel comfortable with the process. She states, "Yes, I found this a *positive* experience because I *enjoy writing* especially things that *interest me*."

Learning Language:

Writing, credibility, ledes, research, revision --

I learned the importance of credibility and ledes. If you don't use examples that are credible, then your whole article might be incorrect and you would have to start over.

Ledes are very important because introduction is everything.

I would tell them to keep a folder and keep all research and underline all research used in the article. Keep your folder organized so things are easy to find.

Learning through Language:

Content --

My article was about music, and I learned a lot about biology because of how music affected the brain.

Living Language:

Showing emotion, gaining confidence, increasing engagement, gaining tenacity --

Yes, I found this a positive experience because I enjoy writing especially things that interest me.

I understand it more this year, because I knew what to expect. I knew to expect many rough drafts and mistakes.

From Sam's reflection we gained insight into the theme of Learning Language. She focused on her increased understanding of writing structure and process that included learning about credibility and ledes and the importance of staying organized when doing research. In addition, Learning through Language and Living Language were indicated as she enjoyed learning about her topic and the science content involved while gaining confidence in the process.

We now move to Sam's first interview. I was somewhat concerned with this interview because Sam had been so quiet in my seventh and eighth grade class and her reflections were overall positive but indicated that at first editing and revision were frustrating for her. However, she has gained a confidence I had not seen previously and she appeared comfortable with the interview process.

First Interview – Sam

Context: I was somewhat surprised when Sam volunteered to be interviewed as she was such a quiet student and had a rocky start to her path of publishing her article in the seventh grade. Therefore, I was very interested in her perspective about the SJ process and what specifically she gained from the experience. Her mother brought her to my

class after school and opted to stay during this first interview. This, at first, made me somewhat uncomfortable but I quickly learned that she wanted to share her experiences with SciJourn right along with her daughter. Mom clearly was aware of the SciJourn assignment, her daughter's participation, and the benefits she felt Sam gained from the experience.

During Sam's first interview, I brought out both her seventh and eighth grade reflections to stimulate her recall of her middle school SciJourn experience. I was relieved when she immediately recognized her change in perspective from the seventh to eighth grade. Below she is discussing that she didn't need to read her seventh grade reflection because she had a better experience in the eighth grade.

R: So, I was trying to pull out the important things from them {the reflection letters} also for my own benefit so that I know and I can change things each year based on student feedback. So, you started off... "this is really hard", "there is a lot of revision and editing"but then, in the 8th grade....

*S: It was **definitely different**...I don't have to read this one.*

R: You don't have to read this one?

*S: Nope. It was more like **we got it** and we just have to do it because (**her partner**) was a very good writer and **we both had very good ideas** and ***kinda knew what we were doing***. I remember also in 7th grade, I came in late. So, it was kinda different.*

I begin with excerpts from the interview that demonstrate the key understanding of Negotiation with Self that consistently flows through all of the interviews. In order to find meaning in their learning, students have an **inner conversation with themselves** concerning what they remember and want to pull forth in their interviews. The themes of Learning Language, Learning through Language, and Living Language follow the key

understandings of Negotiation to indicate where the categories emerged that are essential for understanding the SciJourn experience. All excerpts can be found in Appendix K.

Negotiation with: Self

There were **five** excerpts indicating that Sam has internalized her learning as she shows emotion and pride in her increased knowledge and confidence in her writing and researching ability. She emphasizes the importance of being able to choose her own topic which she believes increases engagement. The excerpt in Table 45 is representative of the emotion she demonstrates when discussing SciJourn and her increased engagement from the opportunity to choose her own topic (*...the fact that we got to choose the topic – it wouldn't be boring.*)

R: What do you remember about your experience in writing a science news article in my class. What was the big overall impression?

S: I was excited about it because I do love writing and I do also love science and the fact that we got to choose the topic – it wouldn't be boring. Because if I was forced to do a certain topic that I had no interest in, you're not going to get a good paper.

Living language – showing emotion, choosing own topic, increasing engagement

Table 45 Sam's First Interview – Negotiation with Self

The excerpt in Table 46 continues with Negotiation with Self as Sam voices her increased understanding of scientists and science practice from her experience with SciJourn (...*presenting your information, describing it, backing it up, and that's what science is.*)

R: So exciting. That's really neat. So, when you were able to become part of the science community with your article...did that make it feel a little more real? Or...

S: Yes. Because *in most things in science* you have to create your hypothesis of it or you have to present your idea on paper and this was doing so...it was presenting your information, describing it, backing it up, and that's what science is.

Learning through language – understanding of scientists/ science practice

Table 46 Sam's First Interview– Negotiation with Self

Negotiation with: Peers

In the excerpt in Table 47, Sam was the only student who mentions that presentation to her peers was an important aspect of the SciJourn project. It is interesting to note that even though she admits that she is a “*shy person*,” Sam sees value in the inclusion of presentation as this is “*a life thing*” that she will be involved with in the future.

R: So, what specific skills do you believe you have retained from the writing process.

S: *I feel like the **actual research part** and making sure that things are **credible** and that they are **real** and **making sure** that you know that. And then the **presentation part**...*I am a very shy person and to **get up there** and to **have to share your idea** and have it **possibly shot down**...that was a **life thing**, because that is something **most people will have to do in life** – **present their ideas**. So, **I thought** that was an **important** part of it.**

Learning language – research, credibility

Living language – showing emotion, presenting to peers, seeing value

Table 47 Sam’s First Interview – Negotiation with Peers

Negotiation with: Family

When Sam's mother began to chime in during the interview, I thought this gave an added dimension to the interviews and a significant finding on the importance of Negotiation with Family. Sam did not write about a personal family condition, like Brandi and Jordan. However, the pride her mother voiced concerning the knowledge and confidence Sam gained about the writing process was clearly evident in the two excerpts in Tables 48 and Table 49. In this excerpt, "P" is the parent.

P: *Yes, this is a baccalaureate, if you want to be specific. But you would think, first, going in as a freshman in high school, that it is really intimidating because it is a big transition and then you know you are going in and your sixth period is a college course. And then, on day one, in school of the freshman year you have a college course and they tell you have to write a research paper that was due the next day was it not? (asking Sam) ...they only gave you a couple of days?*

S: *Two days.*

P: *And you had to write a two page paper but I think that everything that she learned through the SciJourney program, she was able to come home and she like, sat right down, and banged it out. And, um, she didn't appear to be intimidated at all by it.*

Learning language – writing, research

Living language – gaining confidence, connection with family

Table 48 Sam's First Interview – Negotiation with Family

As was evident in Table 48, Sam's mother indicates that taking a college course in her daughter's freshman year and the expectation that "on day one" Sam was required to complete a research paper was a challenging one – one that Sam met with the knowledge she gained from the SciJourn process.

In the excerpt in Table 49, Sam’s mother continues to show her emotion in her daughter’s accomplishment of publishing and having “4,000” people reading her article and that is “*pretty crazy if you think about it.*” She continued to say that it “*is really cool and being published is really a big deal.*”

R: What did you think about her being published?

P: *I think it is completely amazing. I remember her working on this, I remember them on the phone, whatever, trying to figure out what they were going to call their paper, I mean, just the simplest little detail.*

S: *It was her idea actually, to call it...*

P: *It was not my idea but we all talked about it, and I was listening in, and hearing you hash everything out and um, when she had 4,000 people looking at it I didn’t even know what to say, cause that is pretty crazy if you think about it. But then, sitting here today, and seeing how it has over doubled what it was...with still more to come...but, I am just hoping she realizes that that is really cool and being published is really a big deal.*

Learning language – writing process

Living language – showing emotion, having an audience, publishing, having a partner

Table 49 Sam’s First Interview– Negotiation with Family

Negotiation with: Editor

Having interviewed several students before this interview, I had noticed a brief mention of having an editor. I wanted to explore this more in Sam's interview. In the excerpt in Table 50, she was very clear that interacting with an editor improved her article and helped her to become published.

Offering this on her own --

S: *I mean in sixth grade you don't write a lot of papers. It's worksheets and this was the first, like, impressive paper, I feel like I have written with help of course...you can't forget. (laughing)*

R: Well, I had help, too, from the editor... Did having an editor, a real editor, help?

S: *Yes. Because as soon as he pointed out something, well, I thought that was dumb. Why did we do that? You know. It kinda opened my eyes...this does have to be laid out a certain way for it to sound professional and for it to just flow well and I feel like the editor really helped out with that 'cause without that person, it would be a completely different article.*

Learning language – writing, revision

Living language – showing emotion/pride, gaining confidence, seeing value, having an editor

Table 50 Sam's First Interview– Negotiation with Editor

Sam indicates that the editor “*opened her eyes*” about revision and how to help her article “*sound professional*” providing her with suggestions for improvements to help her article flow better.

Negotiation with: Self, Peers, Audience

The excerpt in Table 51, demonstrates the complexity of the SciJourn process. Sam is showing emotion over her and her partner's accomplishment in being published and having an audience that has expanded beyond her teacher.

R: You persevered in completing the assignment and you got published, so, what was your overall reaction to being published?

S: ***Wow!** (both laughing) I didn't really know what to think. I don't know. It was just me and my partner did this together and it turned out great and people can see it. It is just really cool.*

P: I am curious to know now how you feel that 10,000 people have read your work?

S: *Yeah, at least, cause it counts one of you on one computer. That's crazy.*

Living language – showing emotion/pride, having a partner, having an audience, publishing

Table 51 Sam's First Interview–Negotiation with Self, Peers, Audience

At the end of the interview, Sam's mom felt that she needed to share additional information on her impression of the SciJourn process. She was very passionate and clearly knew what she wanted to say. Having a parent perspective helps to see the deeper impact of SciJourn not only on the students involved but also their families. I was thrilled that she shared her thoughts with me.

P: *I think these are life-long skills. You know. I have gone through college myself, even recently and to write, to be able to read, comprehend, and write your thoughts about something into an organized paper, possibly present in front of a group of people, not matter how big or large, to collaborate with fellow students is huge. These are life-long lessons. And I think the sooner that our kids get to experience them, it's only going to make it easier and better for*

them and have them **more prepared** as they move into **higher education**. It's not just something that you can get from junior high into high school. **You can take these skills into college and beyond** and continue to build upon them and be **successful with it**. Wouldn't you say (turning toward daughter)?

S: Yeah. ***I couldn't have said that better.*** (laughing)

P: Because ***she wasn't hesitant on day one.*** She literally sat at the table and ***banged it out.*** She ***couldn't have done that if she didn't have this preparation*** ***through this program.*** ***Without a doubt,*** ***it gave her the confidence*** and that is ***huge.***

S: Yeah. ***Confidence is important.***

P: If you are ***confident***, you are going to get it done. And, ***she knew that she could do it.***

R: (awed)...thanks. It's kind of that release thing. We got you through it and then, hopefully, it releases so that you have that really strong foundation. So, that is very cool, thank you for sharing that with me.

P: ***Please continue. Please, please work towards getting them to get it sooner for these kids.***

R: Yeah, I am really trying (laughing)

P: ***Good. Don't give up.***

Sam's mother voices and reiterates the importance of understanding the writing and research process in order to be successful and confident in high school and college for both her and her daughter.

What I learned from Sam in this first interview was that Negotiation with Self to find meaning in the SciJourn process occurred in the majority of excerpts. She often showed emotion and pride in her work and saw value in her increased confidence and understanding of the writing process/structure. In addition, her interaction with her partner, the editor and her family increased her engagement and the memory of her

experience. She was the only student who voiced the impact of the presentation aspect of SciJourn.

I now continue with the second interview. I wanted to explore more about her changing view of science, scientists, and science practice as well as confirming her learning about writing and the value she voiced in becoming a published author.

Second Interview – Sam

Context: This interview followed several weeks after the group interview and group activity that Sam participated in. When Sam came into my room at school this time, she was without her mother. This gave me a chance to speak with Sam alone and probe her experience without having the influence of a parent in the room. She was becoming for comfortable with me and shared what she values as a person.....

I value acceptance and equality – that everyone is equal no matter what you are or who you are. I feel like, as a person that is definitely up there for me.

I provided Sam with a copy of her first interview and the group interview to see if I had captured what she wanted to communicate to me – and she stated,

Sure. I definitely say the same things.

Negotiation with: Self

There were **seven** excerpts where Sam indicates that Negotiation with Self was, again, a significant finding. She clearly expresses her change of perspective in Table 52 on scientists and science practice indicating that the ability to choose her own topic and discover that she had access to so many science topics has increased her interest and engagement in science (...*I pictured Einstein with crazy hair! Then afterwards, I thought that like – everything else!*).

R: So, what do you think scientists did before and how did your ideas change from SJ?

S: *Well, before, like I said, I pictured just some man in like a white lab coat and really big googles just like chemistry, mixing stuff. That is what I pictured – I pictured Einstein with crazy hair! Then, afterwards, I thought that like -- everything else! You could be a teacher and still be a scientist because you are still studying these things because that is what science is – you are learning things. And, you can be in marine biology or astrology – two completely different things but still, science and scientists.*

Learning through language – expanding view of science practice/scientists

Table 52 Sam's Second Interview– Negotiation with Self

Sam was the one of only two students (Brandi) to share that she is now reading more science articles. The excerpt in Table 53 indicates the possible significance of SciJourn on increasing interest in science as Sam is now reading more science articles and increasing her learning of science content on her own.

R: So, what do you understand about science and writing now that you have published an article?

S: *I read a lot more about science articles! I read one on the way here!*

R: Did you really? (both laughing)

S: *Yes. I read one on black holes and things and space. It was awesome! But I just actually...I am googling science news articles now and am actually interested in it. I didn't really know it was a thing, I guess, until we did this, so that just opened a whole other door of my love for science... 'cause there is more access.*

Learning language – increasing scope of reading in science

Learning through language – content, expanding view of science

Table 53 Sam's Second Interview – Negotiation with Self

Negotiation with: Peers

This interview followed the group interview and activity (discussed later) of which Sam was a part. I was concerned how Sam viewed this experience as she had been such a quiet and non-verbal student in middle school. I was pleasantly surprised that in the excerpt in Table 54, she discusses the value of sharing ideas with her peers (*Well, two heads are better than one and we had three!*).

R: We wanted to see you “doing” it and to see how that impacts your memory of what you did. And, you did it with the other two...you told me that you liked hearing other people’s opinions about it?

S: *Yeah.*

R: Could you expand on that a little bit?

S: *Well, two heads are better than one and we had three! So, just hearing what they had to say...it just ran some of my thoughts even further into different ones and it just made me think more. So, I just kind of...I was influenced by what they said and incorporated it into my thoughts.*

Living language – showing emotion/pride, having partners, seeing value

Table 54 Sam’s Second Interview – Negotiation with Peers

Negotiation with: Audience

There were **two** excerpts in Sam’s second interview that provided insight into her believe that there is value in having a published article with an authentic audience and how this will help her in the future. Both excerpts also indicate her increasing identity as a writer and author (*...she’s a published author – that’s impressive.*) and (*So, that just*

knocks you up a couple more places...). I have included **one** excerpt in Table 55 that reveals her thinking.

R: Do you think this will be of value...just the fact that you got published?

S: *Well, yeah. for resumes and just showing it to people. It just looks, it just looks good and it's, like I said, it is just rewarding to know that and if you are applying for certain things and they see, like, she's a published author – that's impressive. So, that just knocks you up a couple more places to be successful in that application.*

Living language – showing emotion/pride, seeing value, publishing, identity as writer/author

Table 55 Sam's Second Interview – Negotiation with Audience

Negotiation with: Self, Peers, Audience

The excerpt in Table 56 continues to demonstrate the complexity of the SciJournal process as this quote combines the Negotiations of Self, Peers, and Audience. Sam indicates the emotion and pride she felt in having a partner to share the work load involved (...*we did this together*...) and the accomplishment of publishing the article for an authentic audience (...*to have it published and so many people see it*...).

R: When you got published, I know you were really frustrated... what was that like to overcome that and go from frustration to being published?

S: *I was very relieved at first that we didn't have to work on it any more (laughing) and that frustration was kind of gone but it was also very rewarding knowing that, like, we worked on this together and we did this together and it was good enough to have it published and so many people see it and it is just very interesting. Like, I don't know who these people are but they took time to at least click it, maybe not read it but they at least clicked it to see what it was! That makes me happy.*

Living language — showing emotion/pride, seeing value, having a partner, gaining tenacity, publishing, having an audience

Table 56 Sam's Second Interview – Negotiation with Self, Peers, Audience

I have included the excerpt in Table 57 to indicate the impact that providing an authentic literacy writing approach to middle school students has on both student and teacher. I believe this type of assignment brings teachers and students together and

creates a lasting relationship that was forged in the struggle and emotion of completing a science journalism article for publication.

R: Is there anything else that you would want to tell me that I haven't asked you?

S: *Thank you for the struggle* (both laughing) *for your struggle and my struggle for it works out for both of us in the end. I just wanted to say that.*

Living Language -- seeing value, gaining tenacity

Table 57 Sam's Second Interview – Seeing Value

What I learned from Sam was the impact of SciJourn on her expanded view of science and scientists. This experience propelled her interest in science so that she is now looking for and reading new science research that previously she did not know was available. It was very clear that Sam has gained a significant amount of confidence in her writing ability and demonstrated that ability when she was required to write a research paper in her college course in high school. Sam was the only student to mention that presentation to her peers was important knowledge for her future. Sam's family negotiation was unique in that her mother was a vocal proponent for the knowledge Sam gained from the SciJourn experience.

Review

When comparing the data from the reflections to the interviews, it was noticeable that students in their **reflections** provided information primarily on the specific knowledge of the writing process (how to research, credible sources, editing, revision,

audience needs, plagiarism) and writing structure (importance of ledes, paragraphs in order, citations in body of article, not writing a conclusion) with some mention of the emotion and pride they felt in publishing and the value they placed on gaining confidence in writing a science news article. This may be due to the nature of the questions asked in the reflection documents and the fact that this assignment was being graded (for effort and thoroughness of explanation) and I, the teacher, would be reading it. However, in the **interviews** the students clearly voiced the impact that SciJourn had on their increased engagement with the assignment and the resulting increase in their confidence with the writing process and in interacting with others.

From the interviews, it is important to note that all six students indicated their increased engagement and emotion and pride they felt from the ability to choose their own topic and interact with their peers. They also saw value in gaining knowledge of researching and writing an extended writing piece and the tenacity they developed while accomplishing their goal of publishing their science article. All six students also voiced that interacting with the outside world – the editor, an expert, or their audience – was an essential element that also increased their engagement.

Four students (Brandi, Robin, Helena, Sam) specifically mentioned that the interaction and Negotiation with the Editor impacted their interest and engagement in completing their article and the remembrance their experience.

Three students (Helena, Jordan, Sam) indicated in their interviews that they increased their understanding of science and scientists while Diane, Jordan and Sam stated that the SciJourn experience increased their interest in science.

Five students indicated that they had gained an identity as either an expert on their topic (Brandi), their identity as an author/writer (Brandi, Diane, Jordan, Helena, Sam) or their identity as a scientist (Brandi, Diane). I was not expecting to see this result and would like to delve deeper into this finding in future research.

Two students (Brandi, Sam) were the only students who mentioned that they have increased their reading of science informational articles with one student (Sam) indicating that presentation was a valuable experience for her future.

From this research, the following appear to be the **essential elements** that increase the meaning and value of the SciJourn experience for the students:

1. Choosing topic
2. Having a connection
3. Having a partner
4. Interacting with outside world (editor, experts, audience)
5. Opportunity to Publish

I will now continue with the analysis of the Group Interview. I was interested in discovering if the same themes of Learning Language, Learning through Language, and Living Language would continue to be evident in a group setting.

Group Interview -- Diane, Robin, Sam

Context: Getting students together for a group interview proved to be very difficult. I was hoping to get several more of the previously interviewed students together but now I realize how fortunate I was that three agreed and could fit this into their busy schedules. Again, Diane and Robin (the sisters) arrived together to my classroom dressed in their school uniforms and Sam's arrived in torn jeans and a t-shirt with printed letters – quite a contrast. We began with eating pizza – it was 4:00 PM by then! We introduced each

other and made small talk. I was concerned that Sam would find this activity difficult as they had not met in middle school and were attending different high schools. I was also wondering how Robin would handle talking with not only me, but also a stranger. We began by taking turns to answer the question and I tried to move them into more of an open discussion with only some success. However, in the Group Activity (discussed later) that followed, they had bonded, were much more comfortable, and the three of them stayed for about 30 minutes after the group activity sharing what was going in their lives and seemed to connect in a powerful way.

I was interested to see if the same categories and ideas would appear in this group interview.

Group Interview

The Group Interview was coded by looking for confirmation evidence for the findings in the individual six case studies and or anything that might be new, interesting or non-confirming (Creswell, 2013). This interview is provided in its entirety with corresponding coding in Appendix L. The excerpt in Table 58 provides the introduction to the interview to provide an understanding for how the interview began. In the following excerpts, “R” is the researcher, “Sam” is Sam, “D” is Diane, and “Robin” is Robin.

R: I wanted to start off by saying thank you again for coming. I appreciate it so much! I printed out your articles again and this one has – this one is for Robin – and it has 5,191 hits on this one. And, this one is Sam’s and it has 10,619 hits. What was it the last time?

Sam: *It was about 5,000 I’m pretty sure.*

R: And Diane’s it up to 27,453 hits. 27,000!!! That is amazing to me! We are going to start out with a few questions and then an activity. Something you should be familiar with but it helps me see you doing science and how you remember and make meaning of what you learned.

Table 58 Group Interview -- Introduction

I am providing a basic overview of the Group Interview as it was noted that there were no new, interesting, or surprising findings. There were **five** excerpts, where it is again evident that Sam and Diane have deeply considered the impact and meaning that SciJourn has had on their lives. They discuss their expanded view of science practice and scientists and the knowledge they gained from the experience. Sam and Diane saw the value in having a **partner** to discuss and share the work load of writing a research article. Diane remembers the **emotion of her interaction with editor** and discusses the importance of her interaction with an **expert** on her topic.

As Diane and Sam were the two students who indicated that they had increased their ability to communicate in their individual interviews, the excerpt in Table 59 demonstrates their interaction as they build off each other's comments confirming their learning (*I think I did too, especially with communication...*).

R: *Do you see yourself growing as a person?*

D: *I definitely have to say yes because just like I said, it helped me **further my communication skills** with different people and helped me **get out of my comfort zone**. So, when I have questions or if I want to learn more about something, then **I will ask somebody about it**. Or, if I am **working with a partner**, then **we will work together and communicate better**. **I feel I learned a lot and progressed a lot with it.***

Sam: *I think I did too, especially with communication because I always wanted to say something if I felt like I needed to say it but especially recently, I have been more open to actually saying what I want to say and I never really liked writing until like 7th and 8th grade because of this. And, I just enjoy writing now. It is easier for me to do it and I feel like this has helped.*

Table 59 Group Interview -- Communication

Robin was more reticent in sharing her ideas during the group interview; however, the group practice is where she came out of her shell and demonstrated her knowledge and learning (to be discussed during the analysis of the group practice).

What I learned from the Group Interview was a confirmation of the importance that Diane and Sam felt in working with their partners and the confidence they gained through an increased knowledge of the writing process and their communication skills. In addition, it was also confirmed that they strongly felt an increased connection with science and had expanded their view of science practice and scientists.

At the end of the group interview, I became increasingly nervous as it appeared that Robin would not feel included and would not fully participate in the Group practice. I found that the Group Practice activity was a significant inclusion in order to understand Robin's learning from the SciJourn experience and was grateful that this was included in my research design.

Group Activity: Peer Review

Context -- Before the Activity: When we moved to the group activity, (Diane, Robin, and Sam) I first gave the students a rough draft article that was being written by a current student and then a different article for them to peer review. This was an activity we had done several times in my classroom while we were writing our articles. I was hoping to see where the students remembered the process and structure of writing a science news article – to see them actually “do” what they appeared to expressing in their interviews. They had previously talked about learning credibility – would they remember to mark that in the article? Would they feel confident about what they were doing? Would they work together as peers? In this activity, Robin really showed that the interview structure was a difficult one in which to voice her understandings. When she was participating in the peer review of the two articles, she seemed to blossom before my eyes. She was confident and powerful in what she wanted to say. I could see the value in having more than one vehicle for student voice.

I attempted to code the Group Activity in the same way as the Interviews and found that this was not productive. I then remembered how in Dr. Chisholm's class when observing and coding a conversation, it was beneficial to put the conversation into one column and the coding in the second column. This produced a more meaningful result

and the complete discussion and coding of the Peer Review Activity is included in Appendix M. After the students completed the activity on their own, I began a conversation concerning what they found. I did not have to prompt them very often as the conversation flowed between all three students and provided confirmation especially of Diane's and Sam's interview results and a deeper understanding of Robin's learning. I will provide a brief overview of the findings for the activity and several excerpts that show the interaction between the students. The excerpt in Table 60 shows all three students sharing and discussing their findings after they had analyzed a peer's article and indicates their ability to ask questions and provide evidence from the text.

D: *When he or she states a sentence that involves facts, you always have to have your sources. Like this first sentence has a fact. "CTE is commonly found in people who play football or who box and it was first diagnosed in a boxer." Like, how am I supposed to know if that is even true?*

Robin: *I feel like you can't overpower sources though. Like if every ending of a sentence comes from a different source especially if you use the same source over and over again. So, I feel like it just depends on how you word it.*

D: *I was wondering because I don't know if it is just football and boxers. Like there are multiple sports that can accommodate brain injuries in it. I was just wondering, where did he get this source from.*

Robin: *And I also feel like, um, his sources are like in one paragraph. I know it's not but most of the sources are and I think they should be spread out through the paper.*

Sam: *That is what I was thinking, too.*

Table 60 Group Activity – Analysis of Peer Article

Robin was one that in her interviews was more reticent and seemed not to have gained as much from the assignment. However, here, she is **active** and **participating** and **appears confident** in what she is saying (*There is one mistake we found though.*) and when she was able to demonstrate her learning it was obvious that she had gained confidence in her knowledge of writing structure and process. An example of this is included in Table 61.

<p>Robin: <i>Just because it is a .org doesn't mean it is credible!</i></p> <p>Sam: <i>There is one mistake we found though.</i></p> <p>Robin: <i>What?!</i></p> <p>Sam: <i>Well, he didn't put the Dr.'s name 'cause he said "doctors have found another symptom" and we don't know what they are!</i></p> <p>D: <i>We don't know!</i></p>

Table 61 Group Activity – Active Participation

The following were the categories that emerged from analysis of the group activity that confirmed and developed the themes of Learning Language, Learning through Language and Living Language and the key understanding of Negotiation:

They demonstrated that they had Learned Language by indicating the following --

- Research and writing process /structure:
 - Credibility of sources
 - Audience awareness
 - Importance of a good lede and having a connection to topic
 - Citation

- Structure of a science news article
- Transitions

They demonstrated that they were Learning through Language:

- Identifying where the author needs to explain the science for understanding (content)

They demonstrated that they were Living Language by their ability to:

Observe, analyze, discuss, work with peers, agree, disagree, build off each other's statements, remember, provide evidence from text, identify area where author did well and where to make improvement, ask questions of the text, express opinion, understand writing process and structure, and to communicate with peers.

They Negotiated with Self and Peers by:

- Working together, showing confidence, and putting into practice their increased knowledge of writing process and structure in a group setting.

What we can see from this activity is that the students were definite in their understanding of author's connection, credibility and sourcing, and science explanation that are essential in a science news article. They built off each other's comments and negotiated with each other (peers) in a congenial and helpful way. I was surprised at their level of commitment to the activity and how intense they were in showing what they knew. They did feel the responsibility of helping a fellow writer (peer) in improving their writing and they showed confidence in doing so.

I am now including what happened after the Group Activity as this provides a deeper description of the students' interactions and how they developed over time.

Context -- After the Activity: When the recorder was turned off, the young women began by discussing women's rights and what they had been learning in school. Diane was very confident and vocal. Sam is absolutely flourishing at her high school. She barely spoke a word during my seventh and eighth grade sciences classes but states that she has found a group of quirky friends who accept her as she is and she is "very happy". She was also more vocal during and after the interviews and group activity. Robin contributed to the conversation and appeared to have confidence and insight into how she was developing as a young woman. I could not get the girls out of my room as they were talking, sharing, and discussing their experiences in high school. Sam began the women's rights issue by saying that she was a feminist not a "feminazi!" That got them all talking!!

Summary of Chapter IV:

In this chapter, we heard from six case studies and in those six case studies the key understandings of Negotiation with Self, Peers, Family, the Editor, Experts, and/or the Audience provided an emotional experience that resulted in increased engagement with the SciJourn process and continued confidence in their ability to complete an authentic writing assignment to a publishable piece. These findings involved the themes of Learning Language, Learning through Language, and Living Language where students increased their knowledge of the writing process and writing structure, they learned content and increased their knowledge of scientists and/or science practice, and found meaning in their interactions with self and others. A surprising finding from this data analysis was of the expression of emotion students voiced when discussing their experience with the SciJourn process. In addition, I was not expecting that a change in

identity was indicated: five students (Brandi, Diane, Helena, Jordan, and Sam) appeared to develop their identity as writers, Brandi saw herself as an expert on her topic, and Brandi and Diane indicated that they saw themselves as scientists.

After deeply thinking about and listening to what these six young women voiced in their reflections, their interviews, and the group interview/group activity concerning their experience with SciJourn removed in space and time, I attempted to build an authentic literacy assignment model that would capture the essential elements and negotiations that emerged from my analysis and answer the research questions. The complexity of these findings resulted in many attempts to synthesize my learning into something useful for teachers, teacher educators, and administrators as they seek to incorporate deeper learning literacy approaches in content classrooms. The resulting model will be discussed and presented in the Chapter Five. I will then continue with a discussion of the broader implications of these research findings.

CHAPTER V

DISCUSSION

Introduction

I found out that I was good at swimming and not sinking!! I really wanted to get this published, like that was my goal... get this thing published. So, I was working really hard to do that. I was doing everything I could to make sure that no matter what, I was published. I had to make it perfect.

In the quote that starts Chapter V, Brandi expresses the significance of the SciJourn approach to science literacy. She negotiates with herself in discovering her strengths and the significance of the opportunity to publish. She shows emotion in her desire to “get this thing published” and the tenacity it took to “make it perfect.” It was in the SciJourn process that I not only saw students as writers, but also as young people attempting to find their way in the world. As students begin their search for a career and identity that has meaning to them, SciJourn may help them identify careers in science as well as take up multiple identities as writers and scientists. More importantly, it appears that science news writing helps students become “competent outsiders” where they can access, interpret, and use science to improve their lives now and in the future (Feinstein, Allen & Jenkins, 2013). I found as a teacher of this group that there were certain things we could learn from them that would help us understand the research questions of this study:

- What are the essential elements of learning, language, and science understanding that are voiced by previous SciJourn students?

- How does the student voice what it means to learn, to write and to engage in science after the SciJourn experience?
 - How does negotiation with self and others over time and space develop their understanding of their experience?

The purpose of this chapter is to first present and discuss the model that resulted from the analysis and review of the research findings. In addition, SciJourn will be discussed with research questions connected to the research findings and the implications for teaching and student learning. I will then end with future research implications.

Model Presentation

Teachers, when creating an assignment, keep certain goals/needs in mind. They must provide instruction that meets the goals of the state, the school district, the school administration, and the science department along with meeting testing goals. These goals are driven by standards adopted by states that include NGSS and CCSS (2010) as well as the No Child Left Behind Act. In addition, the science teacher considers what daily content needs to be covered and mastered nested in a framework of science practice. With the renewed focus on science literacy (as discussed in the literature review) teachers are searching for assignments that meet all these needs and are frustrated when they spend time on an assignment and it does very little to further their goals and move their students to proficiency (Moje, 2008). In my 18 years of science teaching, common literacy assignments were shared and are often found at NSTA convention “share-a’thons”. These have included the “Rock through the Rock Cycle” assignment, “Water Droplet through the Water Cycle,” “Research a Scientist,” etc. Many science teachers are familiar with these and have assigned them with the hope that students will learn content

while engaged in writing and displaying a different or unique science project. In order to be effective, we have to ask ourselves the purpose for each assignment and the learning goals -- is the assignment worth the time and effort to design, explain, teach, and provide time for students to think/discuss, develop, and create their end products? Many of us try these assignments and have found that students do not internalize their learning – they do not appear to learn content and although temporarily engaged – have not shown that their knowledge of the writing process and structure has increased.

It appears that there are essential elements that help an assignment provide for the development of student meaning and emotional engagement in order to gain the knowledge and confidence needed for their future endeavors. In addition, these elements help support the time and effort involved in providing an in-depth literacy approach that will also meet the goals of all involved. Student voices provide the knowledge and data to delineate useful, “powerful,” and/or “worthy” assignments from ones that are a waste of time or have limited goals and outcomes (Fielding, 2006; Messiou, 2006).

In returning to the research question (What are the essential elements of learning, language, and science understanding that are voiced by previous SciJourn students?), looking deeply into the six cases, and listening to the voices of the young women who experienced the SciJourn approach to literacy, I was wondering, “Where do we go from here?” I generated an “Authentic Literacy Experience Model” that teachers and educators could easily use to analyze their literacy assignments and incorporate the lessons learned from my research. In the following model, the essential elements of an authentic disciplinary literacy approach as are listed in the “Assignment” box. These include:

- Authenticity (both in terms of the discipline and in terms of the assignment outcome)
- Choosing own Topic
- Having a Connection (with themselves, topic, and/or family)
- Having a Partner
- Interacting with the Outside World (editor, experts, audience)
- Opportunity to Publish

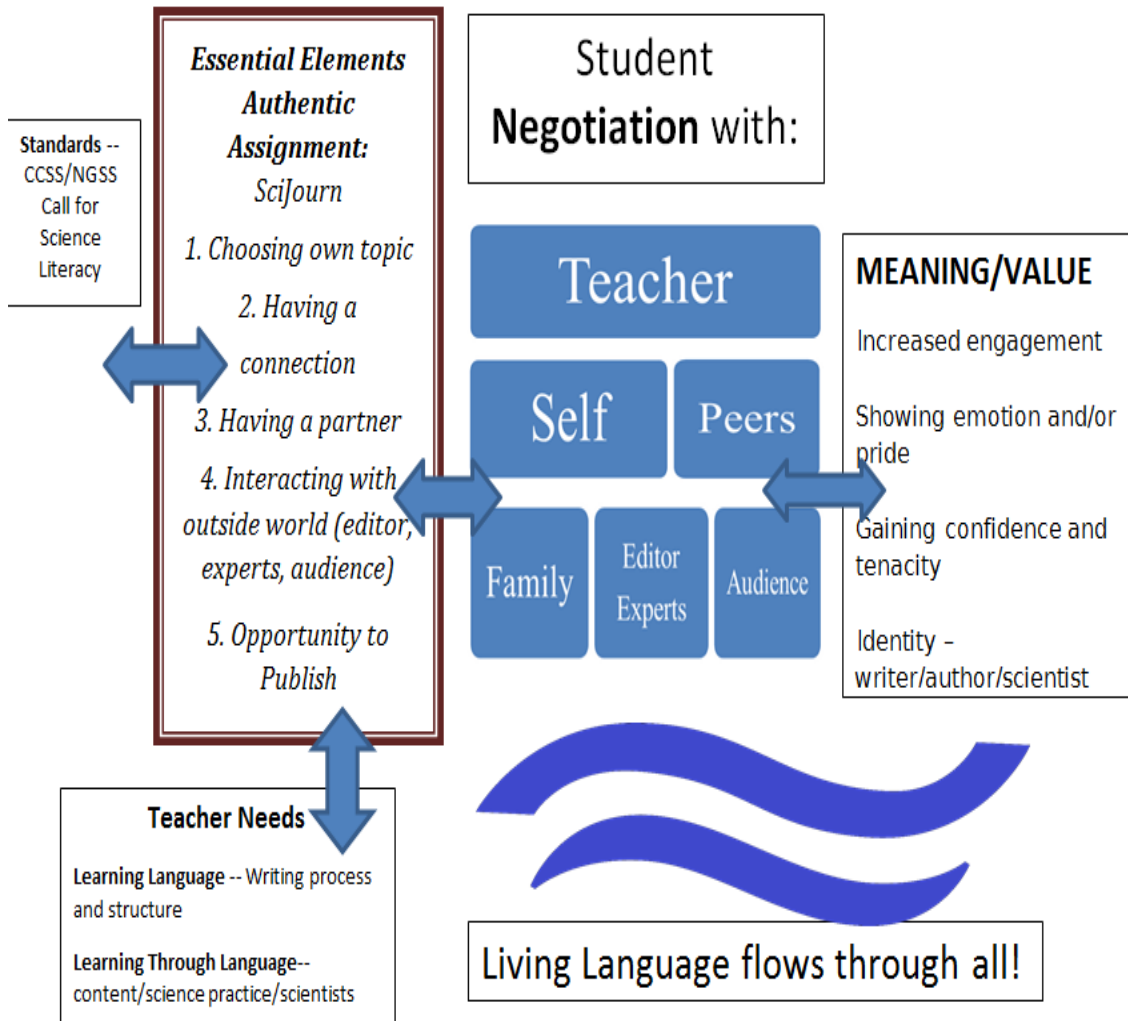
When these essential elements are present in an assignment, the second research question appears to be answered.

- How does the student voice what it means to learn, to write, and to engage in science after the SciJourn experience?
 - How does negotiation with self and others over time and space develop their understanding of their experience?

Students voice that they must negotiate with themselves (Negotiate with Self) to find meaning, they Learn Language (writing process and structure), they Learn through Language (content and practice of science), and in the Negotiation with various entities (peers, family, editor, experts, audience) they are “living” the assignment. From the results of this study, this Negotiation appears to result in engagement, emotional investment, and a lasting understanding of what people and scientists do in the “real” world. These are not random assignments that teachers “hope” will provide learning and understanding of where content sits in the world and what scientists do with that knowledge. We can no longer “hope” that our assignments move students to learning – we must “know” that what we (and they) do has meaning. When an assignment has

meaning, students struggle, they learn, they negotiate, they discuss, and they remember using this knowledge in their future educational endeavors, in their career, and making decisions for themselves and their family.

Authentic Assignment Model:



Let me show you how this construct works. Insert a literacy assignment into the first box. Ask if the assignment has the essential elements of an authentic disciplinary assignment which includes being functionally defined (as discussed previously) and having an authentic audience (someone other than the teacher). It is possible that the water cycle assignment (where students write about the experiences of a water droplet as it travels through the water cycle and may include a poster) meets the needs of the teacher if the goal is to have the students examine the content, have them involved in a hands-on assignment, and hope that by making the assignment somewhat more involved than memorizing the steps of the water cycle, they will remember the content. This may have a limited audience as the product that they created is submitted to the teacher for a grade and the poster may be displayed in the room or in the hallway. This assignment then, may meet the goal of learning content. It may not meet the essential elements of authenticity (when do scientists write about the adventures of a water droplet?), of students choosing their own topic, having a connection, having an audience, and/or publishing. If you then place the SciJourn approach into the first box, you can then observe that this assignment meets all the essential elements (as voiced by students), allows for Negotiation with others (self, peers, family, editor, experts, audience) and results in increased engagement, understanding of content, understanding of what Language Arts (reading and writing) is used for in the world – in other words, they live the process. Students also appear to gain the confidence necessary to retain their knowledge and learning into their high school years due to the **emotional** nature of this assignment. It is notable that I have included negotiation with the teacher in this model –

I will discuss the implications and significance of including this negotiation later in this chapter.

Emotion

As mentioned previously, the emergence of emotion from all six young women was surprising and one that I would not have predicted. While coding the reflections, the interviews, and the group activity, one of the strongest categories under the Living Language theme that emerged was that of “feeling emotion/pride” and was also indicated under the key understanding of Negotiation with Self. This was a surprise to me as I felt that this assignment was an important one but I had no idea that the students would be so emphatic about the meaning they internalized and that this feeling would last beyond the last day they had me as a teacher. They often mentioned that because the SciJourn experience connected to them personally, their engagement and confidence increased and they retained the feeling that this was a valuable and important process to work through.

For example, Brandi mentioned in her interviews being “*super excited!*” and “*really happy*” that she was published and how she remembered her sister being “*super happy, really, really, excited.*” She also showed emotion when indicating how important it was to be able to write about her niece stating,

I think I really wanted to publish it because, well, Noonan Syndrome is part of my family...my niece has it, so it was really important for me to publish it, you know.

Emotion emerged from Diane’s reflection letter where I began to pay attention to and explore the feelings students expressed in their interviews. Diane was effusive stating, “...*because being published is a dream, a success, a accomplishment, a aichevment...*” She continued showing emotion in her interviews where she thought it

was “*really cool*” to receive feedback from an expert on her topic and additionally indicated emotion when discussing her increased knowledge of the writing process – “*Just having credible resources and sites, and oh, definitely citations!*”

Robin, though less emotional overall, however, showed emotion in her interview when discussing her experience with the opportunity to publish her article, stating she was “*anxious*” but “*it would be really exciting*” to have her article published.

Helena added to this finding by showing emotion and pride when her family was excited for her accomplishment when her mother called her dad telling him, “*Your daughter just got something published!*” and she continued, “*So it was a pretty big deal.*”

Jordan also indicated emotion as a significant category in her interviews when expressing her views on the project saying,

Yes! I loved it. I love learning new information and I thought it was really good knowing how to do all that because it really does prepare you for high school knowing how to set up a writing piece because you are going to be doing writing pieces through high school and college and knowing how to research, and put in information, and just learning about the information was just awesome, I loved it a lot!

As Sam was the last case study, it was notable that, even though she was the least verbal when in my science class, she also expressed emotion about her SciJourn experience:

I was excited about it because I do love writing and I do also love science and the fact that we got to choose the topic – it wouldn't be boring.

So, why was emotion such a powerful category in the Living Language theme of this research study and how does emotion impact learning? Immordino-Yang (2016) states that research on the brain’s Default Mode Network (DMN) that supports social-emotional memory process is “associated with self-process, identity, meaning-making,

and future oriented thought” (p. 211). She asserts that when students find meaning in a task this influences their tenacity and their ability to achieve competence. In addition, when students are provided opportunities to engage in in-depth projects that connect to their own interests, they move from superficial accumulation of knowledge to “deep master and durable learning.” Immordino-Yang and Faeth (2010) share the message that social and affective neuroscience clearly suggest that we can no longer “think of learning as separate from or disrupted by emotion” as the social interaction between students and teachers cannot be fully appreciated by quantifying the attainment of “academic skills.” They state that “...building academic knowledge involves integrating emotion and cognition in a social context” (Immordino-Yang & Faeth, 2010, p. 67).

As teachers, we may view emotion as something that needs to be controlled or removed from our assignments as this may disrupt the orderly flow of the classroom – if students are given freedom to think, engage, struggle, move, “have fun,” and explore their world, it may look and feel chaotic. However, this research indicates that without living the assignment with all of its emotional struggle, anxiety, ups and downs, as well as feelings of pride and accomplishment, little meaning making takes place and engagement does not result.

As we return to Halliday (1993), we are reminded that,

The most important single principle moving from protolanguage to mother tongue is the metaphysical principle that **meaning is at once both doing and understanding. Meaning consists in simultaneously construing experience and enacting interpersonal relationships** (p. 100).

As students reflected on their experience with the SciJourn process distanced in time and space, they found meaning and retained an emotional connection with their

learning. They were emotionally involved in all steps of the process. They were frustrated, excited, looking forward to responses from adults, anxious to get published, ecstatic when they were published and proud of their accomplishment. This was sustained to some degree for many months.

The significance of social interaction between students and teachers as they learn from one another involves more than simply focusing on “the ‘cold’ cognitive aspects of academic skills” (Immordino-Yang & Faeth, 2016, p. 2). The teacher/student interaction within the SciJourn process extends beyond the specific writing and content knowledge developed – it **begins** the social interactions that are rich in this process as described below.

Negotiation with: Teacher

While not many students reported specifically the interactions with me (the teacher), they first had to negotiate the topic they wanted to research (they had to research three ideas to begin with and then talk to me about which one would meet the criteria for a good article – interest of audience in topic and being able to “hook” them into reading the article, understanding the science and able to explain it to the audience, able to find at least three references, etc.). Then, after developing a solid first draft, they had to negotiate the revisions with me. We would spend time reviewing and looking for strengths and weaknesses in the draft – they were required to re-write their article until I felt that the article was developed enough to send to the editor. My goal is always to send the article so that no revisions would have to be made. I believe that the revisions that the students discuss in their interview that were so frustrating were the ones that I insisted that they do. For example, if they came to me and I began reading their piece, I

looked for specific criteria that were required in the article – I would give it back to them immediately if their sources were not cited or the researcher’s information was incomplete. When that was fixed I would look at whether the science was explained so that a sixth grader could understand it. I would look to see if the writing appeared to be plagiarized (if it was better than what I could write, then I would usually know that they could not have written it), I would look for their connection (did they have a personal connection or could they connect the topic of the article to the audience). Going through this revision process (often 7, 8 or 9 times) was brought up often in the interviews.

*I’ve also learned that it takes **a lot of work** to do and **a lot of time...***

*I had to go through and **revise a bunch of times** to make sure that my **paragraphs** were **in order**, and that I had **sentences where they needed to be** and make sure that **I was precise on everything** and **I didn’t give any vague answers**.*

*And....that’s pretty much it. **I just had to make sure that everything was set up right**.*

This student/teacher negotiation appears to have added to the emotional experience with the SciJournal process and created a stronger bond between the students and myself. I was the conduit between revision, interaction with others, submission of their article, and the opportunity to publish.

SciJournal Approach to Literacy

SciJournal is a process. It takes time. There are lessons that students need before they begin...you would think that students would know about research, about credibility, about how to write a paper especially when you know they have been through many years of reading and writing instruction. However, it is apparent, when giving them a research assignment, that students do not know how to incorporate the lessons they have learned in one discipline into an assignment in another content area (Shanahan &

Shanahan, 2008). What I have found is that I have to teach each one of these skills as it applies to writing in science. I am positive that they have been given lessons on credibility, yet, when I talk to the students about this, they really have no idea what a credible site is. Or, they appear to leave their knowledge of reading and writing in the Language Arts class and cannot transfer what they learned into their science class.

What does SciJournal do for science literacy and for gaining knowledge of the purpose for language? It provides a platform for authentic learning; a place where students apply lessons learned in an authentic arena where they use all of their knowledge – pulling it together – and this is where the process gets “hard!” **They are given a chance to negotiate and wrangle with who they are and where they fit into the world. This process involves negotiating “thorny, wicked problems” (Wendy Saul, in conversation, July, 2017) This is the place where they synthesize their learning about language and must use all the skills they have in order to become published authors.** This is where they must take their learning out of a box and put it into action. This is where they must negotiate with themselves, their partner/peers, their family, experts, editor, and with their audience. This is a difficult and emotional effort. Students must reach inside – often never having done this before – in order to find a connection, write about something that is personal or something they are personally interested in. They must negotiate this interest with themselves – looking deep into their lives, their family’s life, and wrangle with whether or not the editor and/or the audience will be interested in what they are writing in order to get published. This is the real deal.

When students negotiate with more than the teacher, such as self, peers, family, editors, experts and the audience, they retain a feeling of accomplishment. They embrace

the struggle developing patience while developing a vision of themselves as writers, authors, scientists, and someone who is contributing to the knowledge base of the audience. This appears to take that kernel, that spark that students have deep inside them (after many years of being forced to conform – to stay in that box, to only listen to the teacher) that they have something important to say. They have researched, synthesized the information, developed an interesting way to share this information, and then put it out there for all to read, know, and learn. They become the teacher. The power of this is shown over and over again in their interviews and writings. They gain sustained knowledge of the lessons learned, they enjoy the understanding that they were the players – not just the watchers – and they are adamant that this assignment made a difference in how they see themselves and the discipline of science.

Each year I debate about whether or not I have time to include SciJourn in my curriculum, whether or not the students find value in the assignment, and/or whether or not I want to put this type of effort into my teaching. Each year, I come back to the emotional feelings I get when I watch the students struggle and then succeed, as they grow and become accomplished writers, as they see the value in their frustration, and gain personal and academic knowledge necessary for them to succeed in high school and college. How could I not include this science journalism approach to science literacy and learning?

So...What is Learning?

Having completed this dissertation research and deeply listening to and analyzing the students' voices on their experience with SciJourn, I have re-negotiated my definition of learning. I would previously have stated that my definition of learning would range

from gaining knowledge of content to gaining an understanding of the skills necessary to become a productive member of society. My **theory** for teaching and learning provides for active student learning that includes student interaction as they construct their knowledge of science content and science literacy.

Now, because of the overwhelming emergence of emotion and negotiation with self and others as voiced by each of the young women, I must conclude that construction of knowledge and science literacy is a limited view of learning. I never expected that emotion would play such a major part in their remembrance of their experience especially with the time that had elapsed nor did I expect that the negotiations that were inherent in the process would prove to be a key understanding of the meaning that students found in their experience. Students can memorize every fact, complete every lab report (as I did), learn how to “do” school, however, if they cannot participate in a memorable experience that provides meaning to their learning, then how can they push themselves to gain the knowledge needed for their future success and to become functioning, contributing members of society? My definition of learning has evolved specifically due to the findings of this research. I now believe that learning isn’t specific to learning skills, or gaining content knowledge even in an interactive way-- it combines all of these into helping a student learn **how to be in the world**. What are they going to do with all this knowledge? You have to apply it. You have to know where it fits into your world. When two of the students (Brandi and Sam) shared that they are now reading more science articles, I can feel their emotion and confidence and how this makes them feel different in the world. When Sam mentions that having to present in front of her peers was a significant experience in helping her to share with her peers in high school and beyond, I

see that she is gaining confidence in her interactions with others and she is learning how to be in the world. There is no learning really unless you can figure out how to make that learning come alive and have meaning.

Future Research

From emersion in this current research study, many future avenues of study are suggested and are of interest to further validate these research findings and to gain a deeper understanding of disciplinary literacy. It would be significant to complete a longer term research study that followed SciJourn students in their later years in high school and into college. Do the students continue to value and use the knowledge gained from the SciJourn process four, six, and even eight years later? Does the meaning and value they voice provide them with the knowledge needed to become informed citizens as well as college and career ready?

Another study could involve following the inclusion of the SciJourn approach to literacy through students' experiences in elementary, middle, and high school. What significance would a deeper immersion in disciplinary writing have on students? How would this learning translate into their engagement and confidence in their writing and learning into college and into their careers?

As this study did not include the voice of male students, exploring the similarities and differences of male and female students with science news writing may bring a deeper understanding of the SciJourn approach to science literacy. Do males experience this approach differently? Does this experience propel females to gain a sense of identity as writers and as scientists (as was suggested in this study) that is significant and/or different from males?

Another significant study would include comparing the students that do get published versus the ones that do not get published – do they experience the process in the same way? How does achieving publication change the experience of writing a science news article?

This high expectation disciplinary approach to science literacy appears to be an authentically developmentally responsive experience for adolescents. They enact personal relationships with others and a larger community as well as providing them with autonomy through an active, purposeful learning experience (Ellerbrock & Kiefer, 2013). Further study of this experience could help deconstruct the idea of middle level students as dis-interested and inform middle level teacher preparation programs.

There are many other studies that could inform disciplinary literacy approaches such as: including a disciplinary approach in Social Studies (research using primary and secondary sources to create an interpretation of a historical event and providing an outlet for publication), or, investigating the experiences of students when a language arts and science teacher teach reading and writing not in isolation from one another but in conjunction with one another. Would this experience provide students with the knowledge that reading and writing in the language arts class are essential to the learning in a science class?

My Journey

This past year, I was given the opportunity to teach a science methods class to pre-service teachers at Bellarmine University -- they students were a combination of pre-service and alternatively certified teachers (alt cert -- teaching at the same time they were completing their teaching degree). At this point, I was deeply involved in analyzing and

writing sections of my dissertation and began reflecting on how my research might inform teacher education both with pre-service teachers and with providing professional development for experienced teachers. As Moje (2008) states, there is over 20 years of research indicating that pre-service teachers are skeptical about including content area literacy assignments in their classroom because of the time this may consume in their packed content, they believe that “telling” rather than “doing” is more efficient, and their reluctance and knowledge of how to be a literacy teacher appears to be limited. I had previously experienced this same resistance in experienced teachers. However, this university teaching space is where I began to see that pre-service teachers were serious in seeking those experiences for students that would provide for deeper learning and connection with their science content -- whether including SciJourn or another authentic literacy experience. When presented with this process, they stated, “This is what I was looking for” and, “Why haven’t I been taught this before?”

My experience with providing PD to current teachers has changed from my ability to say, “I think this will significantly help your students” to “My research indicates that the SciJourn approach to literacy WILL help your students.” I am now anxious to share my research experiences and am confident that this will afford a deeper understanding for teachers of why disciplinary literacy approaches promote emotional and meaning-filled experiences that result in deeper learning of not only content but knowledge needed for students’ future endeavors.

I come back to my real question for this research study – which concerns my students and their voices. It is difficult to extract myself from my own emotional involvement with SciJourn and all the students who join me in this journey – I have

moved from researcher to teacher and back again. My identity as a teacher and researcher has shifted from one who **thinks** I know this literacy approach is essential to student learning to one who **knows** this approach is essential to student learning. I have gained confidence in my ability to effect change in the lives of my students and in the significance of including authentic literacy assignments in all content area classrooms.

REFERENCES

- Ahmed, M. (2011). Defining and measuring literacy: Facing the reality. *International Review of Education, 57*, 179-195. doi: 10.1007/s11159-011-9188-x.
- Akkus, R., Gunel, M., & Hand, B. (2007). Comparing an Inquiry-based Approach known as the Science Writing Heuristic to Traditional Science Teaching Practices: Are there differences? *International Journal of Science Education, 29*(14), 1745-1765.
- Ainley, M., & Ainley, J. (2011). Student engagement with science in early adolescence: The contribution of enjoyment to students' continuing interest in learning about science. *Contemporary Educational Psychology, 36*(1), 4-12.
- American Association for the Advancement of Science (AAAS). (1993). *Benchmarks for science literacy*. Oxford University Press, USA.
- Applebee, A. N., & Langer, J. A. (2013). *Writing instruction that works: Proven methods for middle and high school classrooms*. Teachers College Press.
- Ardasheva, Y., Norton-Meier, L., & Hand, B. (2015). Negotiation, embeddedness, and non-threatening learning environments as themes of science and language convergence for English language learners. *Studies in Science Education, 51*(2), 201-249.
- Barber, J., Catz, K. N., & Arya, D. (2006, April). Improving science content acquisition through a combined science/literacy approach: A quasi-experimental study.

In *Annual meeting of the American Educational Research Association, San Francisco, CA.*

Barton, D., & Hamilton, M. (2000). Literacy practices. *Situated literacies: Reading and writing in context*, 7(15).

Baxter, J. A., Woodward, J., & Olson, D. (2005). Writing in mathematics: an alternative form of communication for academically low-achieving students. *Learning Disabilities Research & Practice*, 20(2), 119-135.

Bazerman, C. (2005). *Reference guide to writing across the curriculum*. Parlor Press LLC.

Bereiter, C., & Scardamalia, M. (1987). The psychology of written communication. *Hillsdale, NJ: LEA*.

Brossard, D., & Shanahan, J. (2006). Do they know what they read? Building a scientific literacy measurement instrument based on science media coverage. *Science Communication*, 28(1), 47-63.

Brozo, W. G., Moorman, G., Meyer, C., & Stewart, T. (2013). Content area reading and disciplinary literacy: A case for the radical center. *Journal of Adolescent & Adult Literacy*, 56(5), 353-357.

Buerger, M. R., (2016) Examining science news writing through the lens of writer's craft, writer's meaning, and writer's engagement, *Journal of Literacy Innovation*.

Bybee, R. W. (1997). *Achieving Scientific Literacy: From Purposes to Practices*. Westport, CT: Heineman.

- Bybee, R. W. (2013). The next generation science standards and the life sciences. *Science & Children, 50*(6), 7-14.
- Calkins, L., Ehrenworth, M., & Lehman, C. (2012). *Pathways to the common core: Accelerating achievement*. Portsmouth, NH: Heinemann.
- Carter, S. (2006). Redefining literacy as a social practice. *Journal of Basic Writing, 94*-125.
- Carter, M., Ferzli, M., & Wiebe, E. N. (2007). Writing to learn by learning to write in the disciplines. *Journal of Business and Technical Communication, 21*(3), 278-302.
- Cavagnetto, A. (2011). The multiple faces of argument in school science. *Science Scope, 34*-37.
- Cavagnetto, A. R., Hand, B., & Norton-Meier, L. (2011). Negotiating the inquiry question: a comparison of whole class and small group strategies in grade five science classrooms. *Research in Science Education, 41*(2), 193-209.
- Charmaz, K. (1996). The search for meanings – Grounded Theory. In J.A. Smith, R. Harre, & L. Van Langenhove (Eds.), *Rethinking Methods in Psychology* (pp.27-49), Jordan: Sage Publications.
- Charmaz, K. (2003). Qualitative Interview and Grounded Theory Analysis inside Interviewing: New Lenses. *New Concerns Sage Publications*.
- Charmaz, K. (2008). Constructivist-Grounded Theory. In *APA 116th Annual Convention, Boston, Massachusetts, August 14-17, 2008*.
- Charmaz, K. (2012). The power and potential of grounded theory. *Medical Sociology Online, 6*(3), 2-15.

- Chinn, P. W. U., Hand, B., & Yore, L. D. (2008). Culture, language, knowledge about nature and naturally occurring events, and science literacy for all: She says, he says, they say. *Educational Studies in Language and Literature*, 8(1), 149-171.
- Cochran-Smith, M., & Lytle, S. L. (2009). *Inquiry as stance: Practitioner research for the next generation*. Teachers College Press.
- Committee on Science Engineering and Public Policy (COSEPUP) (2007). *Rising Above the Gathering Storm: Energizing and Employing American for a Safer Future*. Washington, DC: The National Academies Press.
- Connolly, P. (1989). Writing and the ecology of learning. *Writing to learn mathematics and science*, 1-14.
- Creswell, J. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches*. SAGE Publications, Incorporated.
- Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches*. Sage Publications, Incorporated.
- Culham, R. (2006). The Trait Lady. *EDUCATIONAL LEADERSHIP*.
- DeBoer, G. E. (2000). Scientific Literacy: Another Look at Its Historical and Contemporary Meanings and its Relationship to Science Education Reform. *Journal of Research in Science Teaching*, 37(6), 582-601.
- Dyson, A. H., & Genishi, C. (2005). *On the case* (Vol. 76). Teachers College Press.

- Ellerbrock, C. R., & Kiefer, S. M. (2013). The interplay between adolescent needs and secondary school structures: Fostering developmentally responsive middle and high school environments across the transition. *The High School Journal*, 96(3), 170-194.
- Fang, Z. (2012). Approaches to developing content area literacies: A synthesis and a critique. *Journal of Adolescent & Adult Literacy*, 56(2), 103-108.
- Fang, Z. (2013). Disciplinary Literacy in Science. *Journal of Adolescent & Adult Literacy*, 57(4), 274-278.
- Fang, Z. (2014). Preparing content area teachers for disciplinary literacy instruction. *Journal of Adolescent & Adult Literacy*, 57(6), 444-448.
- Fang, Z., & Coatoam, S. (2013). Disciplinary literacy: What you want to know about it. *Journal of Adolescent & Adult Literacy*, 56(8), 627-632.
- Fang, Z., Lamme, L. L., & Pringle, R. M. (2010). *Language and literacy in inquiry-based science classrooms, grades 3-8*. Corwin Press.
- Farrar, C., (2012). *Assessing the impact participation in science journalism activities has on scientific literacy among high school students*, (doctoral dissertation) University of Missouri-St. Louis.
- Feinstein, N. (2010). Salvaging Science Literacy. *Science Education*. Retrieved from Wiley Online Library website: doD:10.1002/sce.20414.
- Feinstein, N. W., Allen, S., & Jenkins, E. (2013). Outside the pipeline: Reimagining science education for nonscientists. *Science*, 340(6130), 314-317.
- Fielding, M. (2006). Leadership, radical student engagement and the necessity of person-centered education. *International Journal of Leadership in Education*, 9(4), 299-

- Frey, N. (2011). *Improving Adolescent Literacy: Content Area Strategies at Work*. Pearson Higher Ed.
- Ford, M. (2008). Disciplinary authority and accountability in scientific practice and learning. *Science Education*, 92(3), 404-423.
- Ford, M. J., & Forman, E. A. (2006). Redefining disciplinary learning in classroom contexts. *Review of research in education*, 1-32.
- Graham, S., & Perin, D. (2007). A meta-analysis of writing instruction for adolescent students. *Journal of Educational Psychology*, 99(3), 445.
- Gunel, M., Hand, B., & McDermott, M. A. (2009). Writing for different audiences: Effects on high-school students' conceptual understanding of biology. *Learning and Instruction*, 19(4), 354-367.
- Hallberg, L. R. (2006). The “core category” of grounded theory: Making constant comparisons. *International Journal of Qualitative Studies on Health and Well-being*, 1(3), 141-148.
- Halliday, M. A. (1993). Towards a language-based theory of learning. *Linguistics and Education*, 5(2), 93-116.
- Hand, B., Lawrence, C., & Yore, L. D. (1999). A writing in science framework designed to enhance science literacy. *International Journal of Science Education*, 21(10), 1021-1035.
- Hand, B., Norton-Meier, L. A., Gunel, M., & Akkus, R. (2015). Aligning teaching to learning: A 3-year study examining the embedding of language and argumentation into elementary science classrooms. *International Journal of Science and Mathematics Education*, 1-17.

- Hand, B., Prain, V., & Wallace, C. (2002). Influences of writing tasks on students' answers to recall and higher-level test questions. *Research in Science Education, 32*, 19-34.
- Hand, B. M., Prain, V., & Yore, L. (2001). Sequential writing tasks' influence on science learning. In *Writing as a Learning Tool* (pp. 105-129). Springer Netherlands.
- Hope, J.M.G. (2012). Exploring the nature of high school student engagement with science and technology as an outcome of participation in science journalism. (doctoral dissertation) University of Missouri, St. Louis.
- Immordino-Yang, M. H. (2016). Emotion, Sociality, and the Brain's Default Mode Network: Insights for Educational Practice and Policy. *Policy Insights from the Behavioral and Brain Sciences, 3*(2), 211-219.
- Immordino-Yang, M. H., & Faeth, M. (2010). The role of emotion and skilled intuition in learning. *Mind, brain, and education: Neuroscience implications for the classroom, 69-83*.
- Kalantzis, M., & Cope, B. (2000). Changing the Role of Schools. In B. Cope, & Kalantzis, M. (Ed.), *Multiliteracies: Literacy Learning and the Design of Social Futures* (pp. 121-148). New York: Routledge.
- Kentucky Department of Education, (2010). *College and Career Readiness Anchor Standards for Writing*.
- Knipper, K. J., & Duggan, T. J. (2006). Writing to learn across the curriculum: Tools for comprehension in content area classes. *The Reading Teacher, 59*(5), 462-470.

- Kohnen, A., (2012). *A new look at genre and authenticity: making sense of reading and writing science news in high school classrooms*. (doctoral dissertation) University of Missouri-St. Louis.
- Kohnen, A. M. (2013). *The authenticity spectrum: The case of a science journalism writing project*. *English Journal*, 102(5), 28.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.
- Lemke, J. L. (1990). *Talking science: Language, learning, and values*. Ablex Publishing Corporation, 355 Chestnut Street, Norwood, NJ 07648 (hardback: ISBN-0-89391-565-3; paperback: ISBN-0-89391-566-1).
- Lietz, C. A., Langer, C. L., & Furman, R. (2006). Establishing trustworthiness in qualitative research in social work implications from a study regarding spirituality. *Qualitative Social Work*, 5(4), 441-458.
- Linebarger, D. L., & Norton-Meier, L. (2016). Scientific Concepts, Multiple Modalities, and Young Children. In *Using Multimodal Representations to Support Learning in the Science Classroom* (pp. 97-116). Springer International Publishing.
- Liu, W. (2009). Beyond science literacy: Science and the public. *International Journal of Environmental & Science Education*, 4(3), 301-311.
- Luke, C. (2000). Cyber-Schooling and Technological Change: Multiliteracies for new times. In B. Cope, & Kalantzis, M (Ed.), *Multiliteracies: Literacy Learning and the Design of Social Futures* (pp. 69-91). New York, NY: Routledge
- Messiou, K. (2006). Understanding marginalisation in education: The voice of children. *European journal of psychology of education*, 21(3), 305-318.

- Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook*. SAGE Publications, Incorporated.
- Miller, J. D. (1998). The Measurement of Civic Scientific Literacy. *Public Understanding of Science*, 7, 207-223.
- Moje, E. B. (2008). Foregrounding the disciplines in secondary literacy teaching and learning: A call for change. *Journal of Adolescent & Adult Literacy*, 52(2), 96-107.
- Moje, E. B. (2015). Doing and Teaching Disciplinary Literacy with Adolescent Learners: A Social and Cultural Enterprise. *Harvard Educational Review*, 85(2), 254-278.
- Monroe, J. (2003). Writing and the Disciplines. *Peer Review*, 6(1), 4-7.
- Monte-Sano, C., & De La Paz, S. (2012). Using writing tasks to elicit adolescents' historical reasoning. *Journal of Literacy Research*, 44(3), 273-299.
- Moss, B. (2005). Making a case and a place for effective content area literacy instruction in the elementary grades. *The Reading Teacher*. 59(1), 46-55.
- National Assessment of Educational Progress (NAEP) (2011), National Center for Education Statistics, U.S. Department of Education.
- National Assessment of Educational Progress (NAEP) (2013), National Center for Education Statistics. U.S. Department of Education.
- National Governors Association Center for Best Practices and Council of Chief State School Officers. (2010). Common Core State Standards for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects. Retrieved from www.corestandards.org website:

- National Research Council. (2012). *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. Washington, DC: National Academies Press.
- National Science Board. (2008). Science and Engineering Indicators 2008. Two volumes. Arlington, VA: National Science Foundation (volume 1, NSB 08-01; volume 2, NSB 08-01A).
- National Science Foundation. (2008). *Science and Engineering Indicators: 2008*. Arlington, VA: National Science Board.
- Norris, S. P., & Phillips, L. M. (2002). How literacy in its fundamental sense is central to scientific literacy. *Science Education*, 87(2), 224-240. doi: 10.1002/sce.10066.
- O'Neill, D. K., & Polman, J. L. (2004). Why educate "Little Scientists"? Examining the potential of practice-based scientific literacy. *Journal of Research in Science Teaching*, 41(3), 234-266. doi: 10.1002/tea.20001.
- Osborne, J. (2002). Science without literacy: A ship without a sail? *Cambridge Journal of Education*, 32(2), 203-218. doi: 10.1080/03057640220147559.
- Perry, K. H. (2012). What Is Literacy?--A Critical Overview of Sociocultural Perspectives. *Journal of Language and Literacy Education*, 8(1), 50-71.
- Phillips, V., & Wong, C. (2010). Tying together the common core of standards, instruction, and assessments. *Phi Delta Kappan*, 91(5), 37.
- Polman, J. L., Newman, A., Saul, E. W., & Farrar, C. (2014). Adapting practices of science journalism to foster science literacy. *Science Education*, 98(5), 766-791.
- Porter, A., McMaken, J., Hwang, J., & Yang, R. (2011). Common core standards the new US intended curriculum. *Educational Researcher*, 40(3), 103-116.

- Prain, V. (2002). Learning from writing in secondary science: Some theoretical implications. *Ontological, Epistemological, Linguistic and Pedagogical Considerations of Language and Science Literacy: Empowering Research and Informing Instruction*.
- Pytash, K. E. (2012). Engaging preservice teachers in disciplinary literacy learning through writing. *Journal of Adolescent & Adult Literacy*, 55(6), 527-538.
- Rivard, L. O. P. (1994). A review of writing to learn in science: Implications for practice and research. *Journal of Research in Science Teaching*, 31(9), 969-983.
- Roberts, D. A. (2007). Scientific Literacy/Science Literacy. In S. L. Abell, N. (Ed.). *Handbook of Research on Science Education* (pp. 729-780). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Sadler, R. D., & Zeidler, D. L. (2009). Scientific literacy, PISA, and socioscientific discourse: Assessment for progressive aims of science education. *Journal of Research in Science Teaching*, 46(8), 909-921.
- Sampson, V., Enderle, P., Grooms, J., & Witte, S. (2013). Writing to learn by learning to write during the school science laboratory: Helping middle and high school students develop argumentative writing skills as they learn core ideas. *Science Education*, 97(5), 643-670.
- Saul, W. (2012). *Front-page science: Engaging Teens in Science Literacy*. NSTA Press.
- Seidman, I. (2013). *Interviewing as qualitative research: A guide for researchers in education and the social sciences*. Teachers College Press.
- Shanahan, T., & Shanahan, C. (2012). What is disciplinary literacy and why does it matter? *Topics in Language Disorders*, 32(1), 7-18.

- Smagorinsky, P. (2008). The method section as conceptual epicenter in constructing social science research reports. *Written Communication*, 25(3), 389-411.
- Smith, K. S., Rook, J. E., & Smith, T. W. (2007). Increasing student engagement using effective and metacognitive writing strategies in content areas. *Preventing School Failure: Alternative Education for Children and Youth*, 51(3), 43-48.
- Strong, W. (2006). *Write for insight: Empowering content area learning, grades 6-12*. Pearson Allyn and Bacon.
- Snyder, T. D., & Dillow, S. A. (2015). Digest of Education Statistics 2013. NCES 2015-011. *National Center for Education Statistics*.
- UNESCO. (1958). *Recommendation Concerning the International Standardization of Education Statistics*. 10th Session. Paris: UNESCO.
- UNESCO. (1978). *Recommendation concerning the Standardization of Education Statistics*, 20th session. Paris: UNESCO.
- UNESCO. (2005). *Aspects of Literacy Assessment*. Topics and issues from the UNESCO expert meeting. Paris: UNESCO.
- University of Missouri – St. Louis, College of Education. Retrieved May 5, 2016, <http://coe.umsl.edu/w2/initiatives/SciJourn%20Web/projects.html>
- Vacca, R. T. (2002). Making a difference in adolescents' school lives: Visible and invisible aspects of content area reading. *What research has to say about reading instruction*, 3, 184-204.
- Vacca, R. T., Vacca, J. A. L., & Mraz, M. E. (2005). Content area reading: Literacy and learning across the curriculum.

- Vygotsky, L. (1978). Interaction between learning and development. *Readings on the development of children*, 23(3), 34-41.
- Wilcox, K. C. (2015). An urban secondary school case study of disciplinary writing in tracked classrooms. *Education and Urban Society*, 47(2), 242-268.
- Yin, R. K. (2013). *Case study research: Design and methods*. Sage publications.
- Yore, L. D. (2000). Enhancing science literacy for all students with embedded reading instruction and writing-to-learn activities. *Journal of Deaf Studies and Deaf Education*, 5(1), 105-122.

Appendix A

Student Questions for First Set of Interviews

Prior to beginning interview questions, I will stimulate their remembrance of the SciJourn process with artifacts and initial questions that help with recall of the experience. Questions will begin with an ice-breaker question to re-connect and relax the student and then will transition into their current remembrance of the previous year's involvement and current reactions to the SciJourn experience.

1. What do you remember about your experience in writing a science news article in my class last year?
2. What specific skills (which includes researching, presenting, pitching your idea, editing, revising, working with a partner, etc.) do you believe you have retained from the writing process?
3. How was this experience valuable in either creating an interest in science or increasing your writing skills?
3. What skills do you believe will be using in either your high school science class or language arts classes this year?
4. You stated last year that you thought the SciJourn process was fun and engaging. What do you believe about the process now?
5. What is your overall reaction to having persevered in completing the assignment and being published on the SciJourn.org website. What was/is your family's reaction?
6. Is there anything else you would want to share with me?

Appendix B

Follow-up Questions for Second Interview

Based on previous interviews, need to frame questions to study processes not skills... detailed interview guide not always necessary, sufficiently narrow to elicit and explore part. experiences. Probe and follow-up. Learn subjective meaning about action. Initial analysis of reflective documents and interviews indicate a change in identify, gaining confidence, having fun, learning about credibility, learning how to put a research piece together, taking pride in one's work, participating in the science community...also, there was some mention of the significance of the editor.

What do you understand about science and writing now that you have a published article on SciJourney.org ?

Tell me about your strengths that you discovered or developed through SciJourney

What do scientists do?

Do all scientists write? What do they do with writing?

How did having an editor reading your article make a difference in your experience?

What if you were doing SciJourney now? How comfortable would you feel with the process?

What does writing help you understand or do better now?

Do you see yourself as a scientist? How did the SciJourney process affect your vision of yourself?

Do you see examples of the SciJourney process in different areas of your life? Looking for credible sources? etc.

How do you use the strategies you used during SciJourney to do research in science class, other classes, or in your home life?

Why did SciJourn have such a huge impact on your writing skills, your confidence in writing, and/or your interest in science?

Appendix C

Focus Group Questions

These interviews will begin with an ice-breaker that includes sharing what everyone is “up to”, how they are enjoying high school, etc. The interview will then move to sharing preliminary remembrances of the science article writing the students did in 8th grade and their experiences. Questions will be developed based on the initial individual interview analysis conducted previously and will remain flexible.

1. As a group, it is sometimes easier to remember your 8th grade SciJourn experiences if we all begin to share. Can anyone share what you remember about writing your science news article?
2. What do you continue to remember about your experience in writing a science news article in my class last year?
3. What learning (which includes researching, presenting, pitching your idea, editing, revising, working with a partner, etc.) stands out to you the most?
4. How was this experience valuable in either creating an interest in science or increasing your writing skills?
5. What part of the SciJourn process have you been using in either your high school science class or language arts classes this year?
6. You stated last year that you thought the SciJourn process was fun and engaging. What do you believe about the process now?
7. What is your overall reaction to having persevered in completing the assignment and being published on the SciJourn.org website. What was/is your family’s reaction?
8. Would you recommend that the Scijourn process be taught in 6th, 7th and 8th grade? Why?
8. Is there anything else you would want to share with me?

Appendix D

LOUISVILLE

501 E. Broadway
 Louisville, KY 40202-1798
 Office: 502.852.5188 Fax: 502.852.2164

DATE: November 03, 2015
TO: Lori A Norton Meier
FROM: The University of Louisville Institutional Review Board
IRB#: 15.0940
STUDY TITLE: An examination of the retention and use of writing skills from middle to high school
REFERENCE #: 426480
DATE OF REVIEW: 11/03/2015
IRB STAFF CONTACT: Name: Jacqueline S. Powell
 Phone: 852-4101
 Email: jspowe01@Louisville.edu

This study was reviewed on 11/03/2015 and determined by the Chair of the Institutional Review Board that the study is exempt according to 45 CFR 46.101(b) under category 1: Research conducted in established or commonly accepted educational settings, involving normal educational practices..

This study was also approved through 45 CFR 46.117(c), which means that an IRB may waive the requirement for the investigator to obtain a signed informed consent form for some or all subjects if it finds either:

- That the only record linking the subject and the research would be the consent document and the principal risk would be potential harm resulting from a breach of confidentiality. Each subject will be asked whether the subject wants documentation linking the subject with the research, and the subject's wishes will govern; or
- That the research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context.

This study was approved for children under category 1. 45 CFR 46.404 - Research not involving greater than minimal risk. No greater than minimal risk to children is presented, only if the IRB finds that adequate provisions are made for soliciting the assent of the children and the permission of their parents or guardians, as set forth in Sec. 46.408. This category requires the assent of child (7 years and older) and at least one parent signature.

Documents/Attachments reviewed and approved:

Submission Components			
Form Name		Outcome	
IRB Study Application		Exempt	
E-mail text to students	Version 1.0	10/08/2015	Approved
Protocol	Version 1.0	10/06/2015	Approved
Assent	Version 2.0	10/26/2015	Approved
Consent	Version 2.1	10/26/2015	Approved

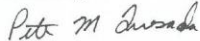
If this study will take place at an affiliated research institution, such as KentuckyOne Health, Norton Healthcare or University of Louisville Hospital, permission to use the site of the affiliated institution may be necessary before the research may begin. If this study will take place outside of the University of Louisville Campuses, permission from the organization should be obtained before the research may begin. Failure to obtain this permission may result in a delay in the start of your research.

Please be advised that any study documents submitted with this protocol should be used in the form in which they were approved. Since this study is Exempt, the documents do not contain the IRB approval stamp.

Since this study has been approved under the exempt category indicated above, no additional reporting, such as submission of Progress Reports for continuation reviews, is needed. If your research focus or activities change, please submit an Amendment to the IRB for review to ensure that the indicated exempt category still applies. Best wishes for a successful study. Please send all inquiries to our office email address at

Thank you for your submission.

Sincerely,



Peter M. Quesada, Ph.D., Chair

Social/Behavioral/Educational Institutional Review Board

PMQ/jsp

*Full Accreditation since June 2005 by the Association for the Accreditation of
Human Research Protection Programs, Inc.*



JCPS_DRMS: A COMMENT HAS BEEN LEFT FOR YOU

JCPS_DRMS@jefferson.kyschools.us

Wed 12/2/2015 1:46 PM

To: Buerger, Marsha R <marsha.buerger@jefferson.kyschools.us>;

A comment has been left for you on your data request. The contents are as followed:

Research Approval

Your research is approved. Thanks for submitting the IRB documentation from a FWA/certified Human Subject Protection institution, IRB #15.0940. Please continue to comply with our Human Subject Protection Program.

Please visit the [JCPS_DRMS web site](#) and login to respond.

Appendix E

TAJAH HINES-SHELLEY AND INDIA BIBBS
Farnsley Middle School (Louisville, KY)

LOL, TTYL, :-). These are all texting emoticons used pretty much everyday. Jessica Borelli and Emily Metcalfe, 7th graders at Farnsley Middle School, both agree that texting is a fun and fast way to communicate with friends and family.

"Texting is a new thing for me and it's just a simple way to reach someone," says Jada Saunders, a 5th grader at McFerran Preparatory Academy. "I just love it."

Texting is fun, but is it safe?

Dr. Dean Fishman, a chiropractic doctor at the Plantation Spine and Sports Rehab in Plantation, FL, wrote in a May 21, 2010, article in *Dynamic Chiropractic* that texting affects your spine. In Fishman's words, "text neck" leads to a reversed cervical curve with mild degenerative changes. This means that the curve in your neck is bent forward, instead of its regular slanted curve, which slightly bends back. This causes the muscle tissues to stretch, leading to neck pains. Fishman says he has seen many cases of text neck.

Adam Tanase, a chiropractor from St. Louis, MO, wrote in an article on Mabledia.com, a website that gives insight and opinion on today's technology, that "A head shuffled forward an extra inch and a half, is going to be applying 20-25 pounds of extra pressure around the neck area, which is essentially like wearing a truck tire around your neck."

Text neck or forward head posture (FHP) causes soreness in the neck. FHP causes headaches and tightness across the shoulders. Increased pressure on the muscles in the neck and shoulders comes from the holding the phone at a downward angle when texting. Text neck

can result in permanent injury to the spine. Your head bends forward, while your spine stays straight up. Too much of this can cause your spine to eventually crack, which can lead to paralysis, according to Fishman.

"I first started noticing a trend of younger patients coming in to the office with similar complaints of head, neck, and shoulder and arm pain around 2008-2009," Fishman said in an email response. "The similarities were that most of the patients were between 15-27 years old, and they were all avid texters and portable gamers. The complaints were similar and the X-ray findings were similar. The amount of negative changes in the structure of the cervical spine was far more advanced than that of what would be considered 'normal' for that age group. When taking the patient history, I started to notice the amount of time that these patients were spending with their heads hung forward and down in what is now known as the text neck posture."

Fishman says that text neck can be treated. "We successfully took two groups of patients through X-rays, digital range of motion and digital muscle testing. Group 1 was given specific chiropractic adjustments and a set of four exercises to do three times a week for four weeks. Group 2 was given the same treatment, but asked to view their text message devices at eye level and not in the text neck posture. After one month of care, both groups improved in the post X-rays in regard to the restoration of a curve in the neck, and they improved in the range of motion and strength, as well, but Group 2, the group that changed their viewing angle of the devices im-



ISTOCKPHOTO.COM

She's smiling now, but she could be in a lot of pain in the future.

proved a considerable amount more than that of Group 1."

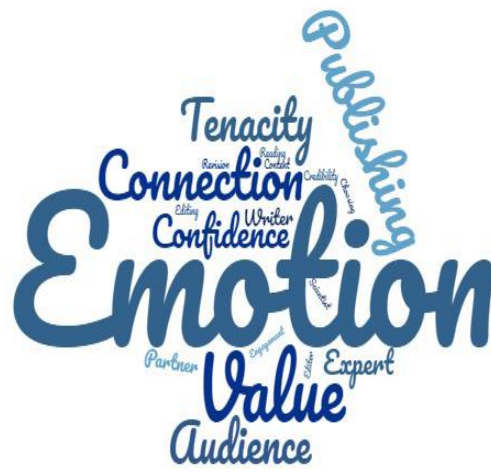
Chiropractors advise their patients with text neck to text in a raised position, inform their chiropractor of stress on the spine and learn ways to relieve stress.

Fishman has created a smart phone app to warn texters when they need to correct their posture, called Text Neck Indicator. When bad posture is imminent, a red light at the top of the screen flashes, and when corrected, it turns green. It is designed to improve the muscles in your neck that are affected by text neck. It keeps tabs on your posture and tells you when your posture is at risk. It uses text neck scores and pie charts to track your percentage of good versus bad posture. You can find the app at Google Play.

Fishman adds that the app is not essential to treating text neck. "Remember, both groups improved, so the chiropractic adjustments and exercises helped, but the changing of the posture is the most important component."

Appendix F – Brandi’s Data

Below is a Word Cloud that reveals Brandi’s most powerful categories. She saw value in the process and showed significant emotion when talking about the SciJourn process.



The following six excerpts from her first interview indicate that Negotiation with Self is a prevalent key understanding. Negotiation with Self involves the process of meaning making where Brandi not only shows the emotion she feels over the number of people who are reading her article, but also, develops her identity as a writer/author – one who has insight into her processes and has learned to control them -- justifiably proud of her accomplishments.

R: *I also printed out your article today and it has 4,335 hits!*

Br: *Oh my god! That is a lot! I didn't even know because I haven't looked in like a really long time.*

Negotiation with self

Living language – showing emotion, publishing, having an audience

R: *So, what do you remember about your experience?*

Br: *I remember when I had to write the paper over and over again and I was like super frustrated. But like right now I am doing a paper and to get some points that I missed I have to re-do it again. So, it's like teaching me patience and how to re-write my paper. Like the first time isn't always the best time.*

Negotiation with self

Learning language – revision, understanding the writing process

Living language – showing emotion, gaining tenacity

Br: *I think that doing with was like an important experience because like I said, it could help with future writing, with patience and revision, but like it also was one of the biggest papers I have ever written and so it was really important.*

Negotiation with self

Learning language – writing, revision

Living language – showing emotion, gaining tenacity, seeing value

R: ...and then picking your own topic. Was that important?

Br: Yes! I think if I had to do something that had nothing to do with me then I wouldn't have been as engaged in it.

Negotiation with self

Living language – having a connection, choosing own topic, increasing engagement

R: So, what was your overall reaction in having persevered and having the article be published on the site?

Br: I was actually super excited! Like I remember like being really happy that I got published and it was like a really big deal because I hadn't been published before and I never thought I was a good writer. So, for me to get published it was like super important.

Negotiation with self

Living language – showing emotion/pride, publishing, identity as writer/author

R: Do you think it is valuable?

Br: Yes, definitely. I think it is very important to start working on things like this at a younger age because it gets you ready for this in the future. That way you have done it, and like it looks great on applications for high school if you get it done early enough. So, it was really important.

Negotiation with self

Living language – showing emotion/pride, seeing value

Negotiation with Family

In the following two examples, Brandi was clearly showing emotion as her article was connected with her family. Negotiation with family indicates that including an

assignment that connects not only with herself, but also with her family creates a memorable and emotional experience.

R: *So, what was your family's reaction?*

Br: *I remember my sister being like super happy because she commented on here and she was super happy, really, really excited!*

Negotiation with family

Living language – showing emotion, having a connection

R: *So, people are reading these and someone made a really nice comment on yours... it looks like a mother that had a child that had Noonan Syndrome and they understood it better.*

Br: *My sister commented (laughing). Actually it was my sister! (Her sister is the mother of the child with Noonan's.) That makes me really happy!*

Negotiation with family

Living language – showing emotion, having a connection

Negotiation with Self, Family, and Audience

Complexity of the SciJourn process

The following excerpt indicates the complexity of the SciJourn process and the significance of Negotiation as a key understanding. Brandi negotiates not only with herself in showing the emotion and desire she had in wanting to publish but also with her family and her audience by indicating the importance of having the freedom to write about a personal topic that involves her family and sharing her expertise with an audience.

Br: *I think I really wanted to publish it because, well, Noonan Syndrome is part of my family...my niece has it, so it was really important for me to publish it, you know. But like, it's like, it's one of those things no one knows about so I wanted to really be one of those people who knows about it and puts it out there as well.*

Negotiation with self

Negotiation with family

Negotiation with audience

Living language – showing emotion/pride, publishing, having a connection, identity as an expert, seeing value

Second Interview – Brandi

Context: The second interview was difficult to set up as she was extremely busy. We finally met and talked near the beginning of her sophomore year. We again met at her house and her mother was present. She continued to show significantly more confidence and her maturity as a young woman.

In the second interview, Brandi continues with Negotiation with self and Negotiation with Family as prevalent key understandings. In addition, the key understandings of Negotiation with Peers, Negotiation with the Editor, and Negotiation with Audience are explored and show the complexity of the SciJourn process as several of these negotiations will be indicated in a single excerpt. The category of showing emotion which is indicated under the Living Language theme emerges continually and was surprising to me. I will discuss this in more detail in my analysis of the interviews.

Negotiation with Self

In the following six excerpts, Brandi indicates that publishing and learning about her chosen topic was an emotional one. She shows confidence, tenacity, and pride in her accomplishment of publishing her article.

R: *How would you describe how you viewed writing before SJ and has your view changed?*

B: *Well, before SJ I didn't even like reading as much as I do now. I was only into fiction writing...I wrote a lot of short stories and **then I started this and I actually really had fun writing it because I was learning more about Noonan Syndrome** then what I had known about it....what was the question? (both laughing)*

Negotiation with self

Learning language – writing

Learning through language -- content

Living language – showing emotion, having a connection

R: *Could you describe the most important lessons you learned about writing.*

Br: *One, is not to get behind. Like for a while there I was really behind because **I did not have a partner** for a lot of it (she was absent from school) and I was doing my own research, checking it, and then writing it and re-writing it. I really felt swamped and it was very hard keeping up for a while. So, yeah, I would say to not get behind.*

Negotiation with self

Living language – showing emotion, gaining tenacity, having a partner

R: *In talking about some of the things I have found in the interviews was: a gain in confidence, they had fun, learning about credibility,..*

Br: *Yeah, like that website is not credible – that website where weird gorillas eat people – that is not real! Squids in trees are not real! (Both laughing)*

Negotiation with self

Learning language – credibility

R: *Then, did you discover any strengths through the SJ process that you had but didn't know about?*

B: *I found out that I was good at swimming and not sinking!! I really wanted to get this published, like that was my goal... get this thing published. So, I was working really hard to do that. I was doing everything I could to make sure that no matter what, I was published. I had to make it perfect.*

Negotiation with self

Living language – showing emotion, gaining confidence, gaining tenacity, publishing

R: *Do you think it is something inside of you? Or...?*

B: *Yes, and no. Like I have always known that I wanted to be really, really, really good at things and I am so bad at writing! So, I guess it is like, you do this you are better in a way. I wanted to self-improve myself.*

Negotiation with self

Living language – gaining confidence, seeing value

R: *Did it change any of your ideas about science?*

Br: *I don't like science (laughing), it is not my best subject. But, when I was doing this, I was literally like looking at a bunch of things I had no idea what I was reading and it really made me hate science a little more 'cause I didn't know what it was....it made me a little more confused. But once I understood it, understood how this happens, and who it could happen to, that it (Noonan's) is random and it's not at the same time, then it made me understand more and so that it went negative and then positive again.*

Negotiation with self

Learning through language – learning content

Living language – showing emotion, seeing value, gaining tenacity, having a connection

Negotiation with Editor

Negotiation with the Editor is a key understanding that is indicated below. Brandi values the contact and interaction with the editor and clearly shows how this negotiation impacted how she views the SciJourn experience.

R: *I noticed that one of the things students were talking about was the fact that they had an editor...that there was a real editor that was looking at their writing. Did that have any impact on your thoughts about this?*

Br: *The editor looked at my paper and then sent it back with revisions. He was like the person who was helping me the most, because I was like this guy was helping me here and I got this! He was helping with grammar and that helped me a lot because as long as I keep sending it, he will keep sending it back. I always have that little help. I liked it. It made it easier, I think.*

Negotiation with editor

Learning language – editing (grammar)

Living language – showing emotion, having an editor, gaining confidence

Negotiation with Audience

In the following three excerpts, Negotiation with the audience emerges more significantly from this second interview. Brandi sees value in becoming the expert on her topic and shows emotion and pride in her ability to publish a science article that informs and helps other people who read her article.

R: *What was that drive? Where did it come from?*

Br: *Um, I don't know, I just feel like I wanted to do something, like, I don't know where it came from. Just like I really wanted to inform other people and inform myself better.*

Negotiation with self

Negotiation with audience/world

Learning through language – content

Living language – showing emotion, having an audience

R: *And then publishing, now that you look back at it, does it still have that same meaning to you about having been published?*

Br: *Yeah, um, like I said I always knew I wanted to be remembered in some way. I wanted something out there that is out there forever even when I am gone, or my kids are gone, it is still there, my name is on it forever. It makes me really proud.*

Negotiation with self

Negotiation with audience

Living language – showing emotion/pride, seeing value, publishing

R: *So, I was wondering, what does the count do for you? I would say that your count would be up over 6 – 7,000 by now if not more.*

B: *Yeah. So, it is like I published a paper and no one read it, I would feel kinda like, I just did something for nothing. But, if I published a paper and at least one person read it, then I know that they are a little more informed (about Noonan's) just like I was more informed from writing it. It is like a helping thing and I like that when the number goes up, I know that more people are learning more about this rare disease that could very much affect them and it makes me proud. I still have the article that you re-printed hanging in my room.*

Negotiation with self

Negotiation with audience

Learning through language – content

Living language – showing emotion/pride, seeing value, publishing, identity as an expert, having an audience

Negotiation with Self, Family, Peers, and Audience

The following two excerpts from the second interview clearly show the complexity of the SciJourn process. The combination of negotiations in these two passages would not allow me to pigeon hole them into any one Negotiation understanding. She voices that working with a partner, writing about a topic that included a connection with family and sharing that with an audience were significant to the meaning she found in the assignment. Therefore, these help to clarify the impact of SciJourn and the key understandings that are included.

R: *What would you think I should tell students now, because I am just starting again, what do you think I should tell them about this that makes it different, special...?*

Br: *Well, when I did mine, I did have my niece, she was the reason I wrote it, but I would say that even if you don't like science and you are only doing it because it is a grade, you are going to learn something. You are going to learn about this thing you didn't know about and it is going to become big and it is really important because even if you inform that one person, you are changing how that one person saw it. You are helping that one person so you are helping people, which is always a good thing. So, you know, that is what I would say.*

Negotiation with self

Negotiation with family

Negotiation with audience

Learning through language – content

Living language – showing emotion/pride, seeing value, having an audience, identity as an expert

Negotiation with Self, Peers, and Audience

B: *Actually, the thing **I am most proud** of is that **I have a published paper**, you can look at it, it is **beautiful**, so, I would say that I am not a confident person, but **I am confident about my paper**. This is **what I did** and you can't be like, "no you didn't" because it is **right there**. So, **I am confident** about that. And **I do feel** like **I was part of a bigger science community** when I was writing it. Now I did this thing, and **I am practically a scientist!** Just a **notch below one!** So, yeah, mine was more **frustrating** than hard, it was **fun**, but it was more frustrating than fun because I didn't have a **partner**. I wish I had a **partner** through a lot of it. Once I got a **partner**, it **became fun** because we were like **working together**.*

Negotiation with self

Negotiation with peers

Negotiation with audience

Living language – showing emotion/pride, gaining confidence, having an audience, having a partner, identity as published author/scientist

What I learned from Br was that negotiation with self to find meaning in the assignment was a key understanding. She gained confidence in writing and research, she found meaning in publishing, she felt connected to her topic, her family, and the audience, the science community and Brandi saw great value in her ability to choose a topic that was directly concerned with her family (having a connection). She also showed emotion and pride in her accomplishment of publishing and her identity as an expert on her subject, a published author, and as a scientist.

As you can see from these categories, emotion emerges often. I was definitely surprised by this especially because of the passage of time.

Appendix G – Diane’s Data

In Diane’s Word Cloud gaining confidence is indicated as a category that she voiced in her two interviews. She also showed emotion and tenacity as she interacted with experts on her journey to publishing her article.



First Interview -- Diane

Negotiation with Self

Even though it has been about four years since Diane was involved with the SciJourn process, she was not hesitant in voicing her emotion and pride in being a published author and the value she found in the assignment. In the following five excerpts she clearly knows the exact number of hits on her article, sees value in increasing her knowledge of the writing process/structure, and indicates that the significance of SciJourn on her connection with and identity as a scientist.

R: *So, it's been awhile since you have done the Scijourn thing. It is pretty impressive that you have, what, 27,000 hits on your piece or something?*

D: *Yeah, 27,163!*

Negotiation with self

Living language – showing emotion/pride, publishing

R: *From this project, what did you learn that you are using in high school now?*

D: *Probably, I think just having the right sources and editing, I don't know...just having the right resources and researching really helped me especially with this project since I got published really helped me during high school with some of my research papers and stuff like that.*

Negotiation with self

Learning language – credibility of sources, editing, research

Living language – seeing value, publishing

R: *Do you think it has helped your writing skills in high school? Did it make you any more interested in science or looking up research on science stuff?*

D: *Actually, this did help me with my English and my punctuation and after this I did feel more connected with science because I want to be a marine biologist.*

R: *Exciting!*

D: So, this really just pushed me to look more into the future of science.

Negotiation with self

Learning language – writing (English), editing (punctuation)

Living language -- increasing interest in science, identity as a scientist

R: You were unique in that you got published and you are like four years out from it, something like that. Would you recommend this kind of an assignment all through middle school and then do it in high school? Like 5th, 6th and all the way through? What is your opinion on that?

D: I think it would be beneficial if they started it during like an early age because I know doing this in 7th grade really helped me with my English and my researching and having the right sources and facts. So, if I had that in elementary school, then **I would come into middle school smarter** than what I am today.

Negotiation with self

Learning language – writing, research, credibility (of sources)

Learning through language -- content

Living language – seeing value

R: When you were published...so do you think you might use this on your college application?

D: Of course!! Definitely will use this! Especially if I am going into the field of science. I feel like this would be a booster for my application. It will stand out more.

Negotiation with self

Living Language -- showing emotion/pride, seeing value

Negotiation with Family:

In the following excerpt, Diane shares the excitement and pride her family showed for her accomplishment in publishing her article. This also demonstrates the complexity of

the SciJourn process as negotiation with family is also included with negotiation with the audience.

R: *And what happened when you found out that you were published?*

D: *I went shopping! (laughing) they were really excited and I wouldn't say they weren't surprised but they were just impressed that I could me and (other author) could have an article that was published and everyone can see it – all the work that we have done.*

Negotiation with family

Negotiation with audience

Living language -- showing emotion/pride, having an audience, publishing

Negotiation with Experts:

In the following two excerpts, Diane indicates the significance and impact of the interaction she had with an expert on her topic.

R: *What are some of the things you remember from being in my room?*

D: *The thing probably that I most remember is emailing the chiropractor in Florida...in Plantation, Florida and just having feedback from him which is really cool just to have the actual facts especially from someone who is not in Louisville.*

Negotiation with experts

Living language – showing emotion, connecting to experts

R: *Did that give you any more confidence in being able to reach out to people? I know that I would never have dreamed of doing that even when I was in college or now!*

D: *Yes, it did. Because during all my other research projects from Freshman to my Junior year, I would have to go out and talk to people and email them just to ask them, like, how do I do this or what are the certain things we have to do for it and it just made me feel very confident that I would have somebody respond back to my questions.*

Negotiation with experts

Living language -- gaining confidence, connecting to experts

Negotiation with Self, Experts, and Peers:

This exchange shows the complexity of the SciJourn process. Diane reiterates the importance of her interaction with an expert and adds the value of having a partner.

R: *Okay, well, is there anything about the experience that you would want me to know?*

D: *Well, probably, I think I have two things. One thing is that actually emailing Dr Fishman and him responding back not once but multiple times. It really helped me build up my confidence and courage to continue writing. And also, my partner because she was really dedicated and it just helped me to keep up the fight and researching.*

Negotiation with self

Negotiation with experts

Negotiation with peers

Living language -- gaining confidence/courage, having a partner, gaining tenacity, connecting to experts

Second Interview -- Diane

Context: This interview was also held in my room at school. It was easy for their father to drive them in together. They seemed amused about seeing their words in print when I showed them their first interview to member check and to make sure I had captured what they wanted to say. I also explained the process of researching and analyzing their interviews. When I saw their dad the following week, he stated that he was thankful that I had “let them in” on how research is done and that they had talked about it all the way home.

Negotiation with Self

In the following 8 excerpts, Diane confirms her identity as a scientist and **adds** her increasing identity as a writer/author. She also indicates that this was an emotional experience and significantly expanded on her developing confidence in her ability to write and communicate with others.

R: *So, some of the things you were saying in your (first) interview had to do with getting the responses back from the chiropractor, communication...you were very clear about the fact that communication was important and that you learned some things from that -- that you actually learned about writing, that you felt more connected to science...you actually increased your interest in science?*

D: *Yes.*

R: *How did that increase your interest in science?*

D: *Well, I do want to go into the marine biology field. I know that with this – being a published author – I know it is going to help me with my further research in whatever marine animal I decide to study – whether it is going to be a shark, an octopus, or a dolphin...I know that I can write a full report on that and have patience and know how to put a research paper together so that I know it can be published.*

Negotiation with self

Learning language – writing, research

Living language -- gaining confidence, gaining tenacity/patience, publishing, identity as published author/writer, increasing interest in science

R: *One of the things you talked a lot about was about learning patience.*

D: *Yes, patience is definitely key when writing a research paper! **Definitely.***

Negotiation with self

Living language – gaining tenacity (patience), gaining confidence

R: *Do all scientists write?*

D: *I definitely think all scientists write.*

R: *Did you think that before SJ? What was your thought of what a scientist was before we did this?*

D: *Before I thought they were just sitting in a lab with their lab coats just conducting major experiments with chemicals, just chemicals. That's all I thought, really. And I wasn't thinking that, like, the broader picture of going outside of what they do.*

Negotiation with self

Learning through language -- increasing understanding of science practice/scientists

R: *If you were to do SJ now do you think you would be more comfortable with it?*

D: *Yes, I think I would be...I've learned patience, I have increased my English skills, in my research and my science...so, I think that I would definitely improve my paper more than what I had in middle school.*

Negotiation with self

Learning language -- writing process, research

Learning through language – science content

Living language – gaining tenacity (patience), gaining confidence

R: *What are some of your strengths and weaknesses?*

D: *My strengths are definitely credible research and having the patience. My weaknesses are probably...like just putting it all together, definitely. Because I know just breaking it down individually, I know that is going to be easy but then having to put all of the work you did together is just...I don't know. I think that is the tricky part...that's the part where you go, "Oh my gosh" when is it going to be over!*

Negotiation with self

Learning language – research, credibility

Living language -- showing emotion, gaining confidence, gaining tenacity

R: *Do you see yourself as a scientist?*

D: *Yes, most definitely. I do.*

R: *Did the SJ process affect the vision of yourself? Did it help you to see yourself differently?*

D: *I think it did...but it **definitely changed my perspective** on what **scientists have to go through every day** and **I now can take what I learned from SJ and then put it into the field** I want to go into.*

Negotiation with self

Learning through language -- understanding science practice

Living language --identity as a scientist, gaining confidence

R: *Do you see examples of some of those things in SJ anywhere else in your life?*

D: *Yes, all the **research projects** I have to do (laughing). Just having **credible resources** and **sites** and oh, definitely **citations!** You have to **cite your sources** always! You **cannot miss a beat** with that – **you cannot!***

Negotiation with self

Learning language -- credibility, citation

Living language – gaining confidence

In this excerpt, Diane wanted to share that experiencing the Scijourn process has significantly helped her in high school. In fact, she directly attributes her success with being accepted in the senior research project at her school because she could indicate on her application that she was a published science author.

R: *Okay! Is there anything else that you want to tell me that I haven't asked you?*

D: *Um, well I think that **the SJ project is really going to help me with my big project** that I will have senior year 'cause **I just got accepted** into the Senior Independent Project where **we pick a topic** and **do a project** for a whole year! And then, it is a **huge project** that you have to do whether you are learning sign language, or just a different language, you have **to present** it to a board of committees and they'll see if you pass or not – if you learned anything from it. So, **I know that the SJ project and the research** from there would **definitely help me** with the **research on my project** that I am going to do next year.*

R: *And, how did you get picked for that? Is it everybody?*

D: *If you want to do it, then you have to send in an application and you have to write a two-page letter about why you should be picked for the SIP project.*

R: *Well, that is cool!!*

D: *Thank you!*

R: *And, you wanted to do it?*

D: *Yes, I did and about fifty girls sent in their application and only about 10 girls were picked.*

R: *Really!! Congratulations! You gave me chills!! So, did you feel more confident to do this because of the SJ?*

D: *Yes, I did. I knew that I had the background, I knew that I had that little thing in my pocket where I can put it in my letter, in my application that I was going to send them and they knew right away that, “Oh, this girl has some background with her” and so I am sure they just picked me from that!*

R: *Did you put it in that you had done research before...that you were published?*

D: *Yes, I did!*

R: *Wow!! That just made my day! Congratulations ...that is amazing!*

Negotiation with self

Learning language – writing, research

Living language -- showing emotion, gaining confidence, seeing value

Negotiation with Experts

Diane indicates in the following two excerpts that she gained confidence in interacting and communicating with outside experts.

R: *Did you discover any strengths that you had when you were going through the SJ process?*

D: *A strength that I probably had was contacting others, like just different scientists on that topic. Because I know that when I was contacting or emailing the chiropractor in Florida...which is really far from Louisville...I worded it in a way that I knew he would respond back. I thought that was pretty cool.*

Negotiation with experts

Living language -- gaining confidence, connecting with experts, increasing communication skills

R: *We've hit this over and over again, so I am going to say it one more time! (all laughing) you talked about your confidence in writing and your confidence in science – can speak a little bit more about that?*

D: *Well, the confidence that I gained in both is definitely, like I said communication skills, reaching out to other people. ' Cause I know that if I didn't have that confidence, then the project or research paper I was working on at that point would not have been put together if I am just researching from a computer, just clicking every site on the computer, instead of like broadening my perspective and going outside of the computer screen itself.*

Negotiation with experts

Living language -- gaining confidence, gaining communication skills, seeing value

In looking deeply into the data, Diane clearly indicates the power and authentic assignment that include publishing for an audience and the impact of interacting with an expert in the field. In addition, she expressed the value she found in this experience to build her confidence, increase her communication skills, and help her in the future.

Appendix H – Robin’s Data

Although Robin showed less emotion when discussing the SciJourn process, she indicated that she valued publishing and learning the process of writing -- credibility, research, and writing for an audience -- the Learning Language theme of this research.



First Interview -- Robin

Context: Robin was a freshman at the time of the interview and was not as focal or sure of herself as her sister. She often struggled to come up with something to say and Diane often felt she needed to prompt her. However, as the second interview and especially the group activity took place, I could see growth and more focus each time we met.

Negotiation with Self

In the following two excerpts, Robin indicates that she being able to choose a topic to research and learn more information on this topic increased her engagement.

R: *What do you remember most about the project?*

S: *Ummmm, probably, I remember like researching about the topic and how interesting it was and I was like, this is cool to talk about and write about and stuff.*

Negotiation with self

Learning language – writing, research

Living language – choosing own topic, increasing engagement

R: *So, when you got done with your article did you understand Noonan Syndrome better?*

S: *Yeah, because when I first heard about the topic, I didn't have any clue as to what it was and then when I researched it, I learned what it was about and what it can do to children.*

Negotiation with self

Learning Language -- research

Learning through language – learning about topic/content

Negotiation with Peers

In the following excerpt, Robin indicates that having a partner helped her complete the assignment.

R: *What helped you get all the way through this?*

S: *Well, um, having a partner because it's like it helps me more to have a partner to like work through everything together.*

Negotiation with peers

Living language -- having a partner

Negotiation with Self, Peers, and Audience

In the following excerpt, Robin shows the complexity of the SciJourn experience showing emotion concerning her accomplishment of being a published author, working with her partner, and having an audience that wants to read her work.

R: *It doesn't have 27,000 hits but it does have over 4,000 hits. How does that make you feel?*

S: *That we actually, like, that people actually want to read this and learn from what we wrote about.*

R: *So what did you feel like when you were published?*

S: *I kinda felt like happy because we worked hard on this and I was like I hope this gets published and stuff.*

Negotiation with self

Negotiation with peers

Negotiation with audience

Living language -- showing emotion, gaining tenacity, publishing, seeing value, having an audience

Second Interview – Robin

Context: As described above, this interview was also held in my room and their father dropped them off together. They seemed amused about seeing their words in print when I showed them their first interview to member check and to make sure I had captured what they wanted to say. I also explained the process of researching and analyzing their interviews. When I saw their dad the following week, he stated that he was thankful that I had “let them in” on how research is done and that they had talked about it all the way home. Robin shared that she loves to sing and is in her high school choir and is interested in becoming an oceanographer. Diane again helped prompt her sister’s answers, however, she was somewhat more comfortable with the process and provided some additional information.

The following excerpt provides a brief view of how Diane comes to her sister’s rescue and their interaction.

R: *So, was it more the actual writing that you learned, the language and that kind of stuff or was it more researching and putting it together. What do you think you have really improved on since this?*

S: *Ummmm. I think **my writing skills**...I have **improved on that**. Making it....I don’t know how to put this. Like...*

D: *(Diane jumps in!!) ...like writing a formal research paper???*

S: *Yeah.*

D: *Punctuation?*

S: *Yeah (all laughing!)*

R: *I love how you are helping her out!*

Robin’s Second Interview

Negotiation with Self

In the following five excerpts, it became apparent that publishing had an impact on Robin and she shared the emotion of writing and publishing an authentic assignment.

R: *Were any of those stand out more than others?*

S: *Um, Yes! -- having a chance to publish the article.*

R: *What did that mean to you?*

S: *It was my first time and it was like really important. It made me feel excited to what would happen and what they would do.*

Negotiation with self

Living language -- showing emotion, publishing, seeing value

R: *So when you heard about...if you can remember back...so this is the hard part because you are removed from it...when you first heard about writing this do you remember if you were feeling, Oh my goodness...were you scared...were you anxious?*

S: *Well, I was anxious because it would be really exciting to have like your article published on like a web site where everybody can see it.*

Negotiation with self

Living language -- showing emotion, having an audience, publishing

R: *Okay, so, since last year or the year before...how have you grown as a person, how have you changed, just in general.*

S: *Um...my researching 'cause we did a lot of researching for a topic, um, the sources, like seeing if you can trust the site.*

Negotiation with self

Learning language -- research, credibility

R: *When we talk about...so we are going to go back to writing a little bit. How did you view yourself as a writer before the SciJourn project?*

S: *Um, I didn't really like...I wasn't into writing that much cause like I was not that good at writing but I think that this really improved a little bit on my writing and researching.*

Negotiation with self

Learning language – writing, research

Living language – gaining confidence

R: So, if you were going to do SJ right now...what would you focus on and how would you feel about it?

S: *Um, I would focus on...well trying to find a topic to talk about and see if I actually want to know more about it or be interested in it. I think it would be easier because I had done it before so I would know what to do, like what to improve on.*

Negotiation with self

Learning language – writing process

Living language -- gaining confidence, seeing value

Negotiation with Self, Editor, and Audience:

The following excerpt indicates the complexity of the SciJourn process as Robin again shows the emotion involved when writing an article for publication that involves an audience outside of the teacher that includes the editor and her readers.

R: *So, why were you anxious?*

S: *Because it is nerve-wracking to like write a good article for them to read and accept it. So, it is kinda hard. You have to make them want to read it.*

Negotiation with self

Negotiation with editor

Negotiation with audience

Learning language – writing, understanding audience needs

Living language -- showing emotion, having an editor, having an audience

Appendix I – Helena’s Data

Helena saw value in the SciJourn process showing emotion and increased confidence in her writing knowledge (research, writing, credibility). She voiced that working with an Editor increased her engagement and interest in the SciJourn process.



First Interview – Helena

Helena worked with her partner on her SciJourn article and they were published after the usual 8-9 edits and revisions. As this was my first interview, I was focused on skill retention. This focus changed as I continued to interview students and talk with my committee about my research questions. The following are excerpts from her interview that reveal her thinking and meaning making when discussing the SciJourn process. I have presented these first under the key understandings of Negotiation: Negotiation with Self, Negotiation with Peers, Negotiation with Family, and Negotiation with Editor and begin with the most notable category of Negotiation with Self. I then follow with the initial categories and themes that show where the student has expressed learning under the Learning Language, Learning Through Language, and Living Language with revealing categories. At the end of this section, I will sum up with a Samef discussion of the reflections and both interviews.

Negotiation with Self

The following three excerpts indicate that Negotiation with Self is a prevalent key understanding that was also noted in the previous three cases. These excerpts reveal the student's thinking and the process of meaning making where Helena not only learns the writing process and structure (research, citation, revision) but also sees value in the process with increased engagement and gaining confidence. There may be an overlap with Negotiation with Self and the other negotiation elements -- when that occurs, the emergence of the new categories will be emphasized.

R: *I really want to know what you guys thought about it. And so, what do you remember about your experience in writing the article in my class last year?*

S: *Well, I had to do **a bunch of research** and make sure **my sites were credited** because if they weren't they wouldn't work and then I had to go through and **revise a bunch of***

*times to make sure that my paragraphs were in order, and that I had sentences where they needed to be and make sure that **I was precise on everything and I didn't** give any *vague answers*. And....that's pretty much it. **I just had to make sure** that everything was set up right.*

Negotiation with self

Learning language – writing process/structure, research, citation, revision

R: *Do you think you had an advantage because you had gone through this?*

S: *Yes, because the first time I did it I was not sure what to do at all but then **after you have done it before** you can come back and say, okay, well, **this is credible and I can cite this and know how to do it and I know how to quote it, and everything like that.***

Negotiation with self

Learning language – credibility, citation,

Living language -- gaining confidence

R: *Do you think teachers should do more of this kind of writing?*

S: *I think **they should do more of it because it keeps the kids engaged, they don't realize that they are actually like revising papers, and they don't realize it when they are engaged in something cause **it doesn't seem like it is just classwork**, it seems like, okay, I need to do this and this, and it is actually something that you enjoy, it's not like about how to fix a chair or something, it is actually important to us so **we tend to do a better job** about it.***

Negotiation with self

Living language – showing emotion, increasing engagement, seeing value

Negotiation with Peers

In the following two excerpts, Helena expresses emotion she feels in having a partner and increasing her engagement in the project.

R: *So what specific skills from researching, presenting, pitching your idea, editing, revising, working with a partner, do you believe you have retained from this process?*

S: *I actually believe I have **retained** a lot of it because whenever we have to do reports for certain classes I have to go and have **credible sources**, that way **my information is right**, and then I use a lot just to study and kinda just get what other people say that way it can help me for tests. And then we **work with partners** a lot to make sure that **everyone understands** it and **everyone can get together** and **know** what the subject is so that **we don't work by ourselves individually**.*

Negotiation with self

Negotiation with peers

Learning language – credibility, research

Living language – having a partner

R: *I just remember you and (her partner) sitting over at the computers and just working like little bunnies. I will never forget that image I have in my head of you two. It was very awesome.*

S: *It was **fun, too**, with **partners** because you were **able to talk and laugh** if we messed up and it was **fun**.*

Negotiation with self

Negotiation with peers

Living language – showing emotion, increasing engagement

Negotiation with Family

In the following two excerpts, Helena expresses that it was a “pretty big deal” in getting published and how proud her parents were for her accomplishment. In addition, she thought it was important that she could choose a topic tied to her family and how it increased her engagement.

R: And, what was your reaction in your family?

S: *They were actually **really proud**. My **mom**, whenever I told her I got **published**, she wanted to go on the site and **she wanted to read it** and **see how many views** there were and **she was excited** and **she called my Dad** and was like, “**Your daughter** just got something **published!**” So, it was a **pretty big deal**.*

Negotiation with self

Negotiation with family

Living language -- showing emotion/pride, publishing

R: *And, then, most people thought it was fun and it was engaging because they were working with a partner, they were getting to research something they were interested in?*

S: *Yes, I think that is **better actually** because **I got to choose** what **I wanted to do** and it wasn't just what **you assigned** because this is a **personal piece for me** because **my mother** had it, therefore, **I wanted** to get **as much research** as I can because **it happened to my mother**.*

Negotiation with self

Negotiation with family

Living language – choosing own topic, having a connection, increasing engagement

Negotiation with Editor

The following two excerpts indicate that having an editor increased her pride in her accomplishment. This outside interaction provided her with someone other than the teacher who would be reading her article which increased her engagement.

R: *So, having the editor read it? Was that something that made a difference, that it wasn't just me as a teaching reading it?*

S: *Yes, it did because then you felt like...you know **teachers** are there with you every day and you are **really comfortable**, but when an **editor does it** you feel like you have to **make sure that it is good** because **he doesn't know you** and **you want to make sure that you look good**, have a **good impression**.*

Negotiation with self

Negotiation with editor

Living language – showing emotion/pride, having an editor

R: *Cool! And do you think it was valuable in either creating an interest in science or um, maybe, even increasing your writing skills?*

S: My writing skills definitely because I realize that **I had to be formal**, and you **couldn't just write anything** on my paper, I had to make sure that someone professional would be reading it so you can't just say what you would say to your friends, you have to actually say that, like a principal was reading it.

Negotiation with self

Negotiation with editor

Leaning language – writing process/structure

Living language – seeing value, having an editor

Negotiation with Audience

In the following excerpt, Helena indicates that publishing and having an audience increased her confidence and she showed the pride she felt that she was able to persevere.

R: *So, as far as the perseverance goes, what made you finish all the way to the end where maybe some other students didn't?*

S: I wanted to get it published because once you set your mind to something you want to see it through and if it is good enough you want it to be shown, thataway, you can say , "I did that!" and it was good and it was good enough to get it published.

Negotiation with self

Negotiation with audience

Living language -- showing emotion/pride, publishing, gaining tenacity, having an audience, gaining confidence

Second Interview with Helena

Negotiation with Self

In the following three excerpts, Helena indicates that she gained confidence in the writing process through the SciJourn experience. She also indicates the importance of having a personal connection to her topic which resulted in an increase her engagement. Like Diane, she also gained an understanding of science practice.

R: *Have you discovered any strengths that you have that you didn't think you had during this process?*

S: *Yes. I was able to like **before** I actually did this project, **I didn't really think** I could come up with a **decent story** on it because a lot of people have their own problems, solutions, causes...it is pretty basic. But when **you write it** you were able to **add on exactly what happened** in more of like certain people and **their personal life**. It wasn't just based on statistics or facts, it was more like **this actually happened**.*

Negotiation with self

Living language – gaining confidence, having a connection

R: *What do you think scientists do now that you have been exposed to some of the research. How do you see scientists?*

S: *It is **extremely hard** because, you don't exactly know the causes to everything and you have to try and get down to the bottom of it and **figure out** what it is, what medications you can use to try and stop it or how you **can try to prevent it**. And you have to try and **spread the word out** and **that's a lot of work** because, I don't know if I could do that because you have to **have a lot of time and energy**. And you have to be able to **look at all the statistics** and **interview a bunch of people**, and **get a bunch of people's information** about it. It seems like a **very long process**.*

Negotiation with self

Leaning through language – understanding of science practice

R: *Do you think you remember other assignments as clearly as you remember this one?*

S: *No. Not really, because this, I mean, you **actually like it**. Like this really **related to me** so it is something **I remember better**. It is not just an assignment that is like...This is due Friday. This is like **your piece, it affected you, it is about you, so it is more important**.*

Negotiation with self

Living language – showing emotion, having a connection

Negotiation with Peers

In the following two excerpts, Helena shows emotion as she discusses the importance of having a partner.

R: *Well, it was wonderful to see you again. (I Samng out her article again and we look it over)*

S: ***I remember this like it was yesterday. I still remember being in class with (her partner) and saying, “Does this sound okay?” What about this? What about this? And then we would write it out and say it doesn’t sound right. We would scratch that and write it again.***

Negotiation with peers

Living language -- showing emotion, having a partner

R: *Can you remember any others?*

B: *I remember...we did a PP in Mr. H., I don’t remember what it was about. We did the foldable flashcards in your class. I remember that because that actually helped. I actually use flash cards in high school now whether they say to or not because it helps. But, other than that, no. Like **this was really just special to me. It was important. I came home and I worked on it some and my partner and I would stay on the phone until 10:00PM working on this trying to make sure that it sounded good.***

Negotiation with self

Negotiation with peers

Living language -- having a partner, increasing engagement, seeing value

Negotiation with Family

In the following excerpt, Helena expresses the importance of having a connection with her family and herself.

R: *Do you think that this Samngs up any kind of emotion when you first think about it? When you look at it? When you were researching it?*

S: *Well, yeah, because **my mom actually went through it and it was good to know what she went through and the type of things she had to deal with, how she even thought about dealing with pre-eclampsia and all the effects that it had. It was also important because when we were at the hospital, me and her both could have actually died***

because of how severe her pre-eclampsia was. So, thinking like I made it but what were the causes of it, how can we prevent it, and things like that you are just curious and you want to do it versus you just getting a thing that you are supposed to want to research but you don't actually want to research it because you don't really care. But this actually happened so you want to know how can I prevent it, am I more likely to have it if I have kids. What are the main causes of it.

Negotiation with family

Learning through language -- content

Living language -- showing emotion, having a connection, increasing engagement

Negotiation with Editor

In the following **five** excerpts, Helena really brings out the importance and value she sees in having an editor approve of her work.

R: *So, you were just talking about working with an editor.*

S: *Yes.*

R: *What did that add to the project?*

S: *Well, it is a little scary because you have someone who knows exactly what they want and they are reading your stuff. But it was really good because once he approved of it you felt good enough to be published and you felt like...it boosts confidence because you think, well if they think the writing is good then maybe it really is good. So it really boosts confidence, 'cause I never thought my writing was good. Ever.*

Negotiation with self

Negotiation with editor

Living language -- showing emotion, gaining confidence, having an editor, publishing, identity as writer

R: *Can you describe some of the most important lessons that you learned about writing, learning, or science?*

S: *Well, you learn a lot about science because preeclampsia has to do with the medical version of science and we can work on like you were interested in how to try to figure out different ways to solve this you could go into the science field to learn more about*

***their research** and then **writing wise it helped** because **they actually gave you** what **you needed to fix it** and **why you needed to fix it** and **certain errors** you were making.*

Negotiation with self

Negotiation with editor

Learning language -- revision

Learning through language – content

Living language -- having a connection, increasing engagement, seeing value, having an editor

R: *So, do you think this would be something that they should insist be in the curriculum because it gives you the skills you need?*

S: *Yes! I feel like **this is important** because first of all, it shows you **how to research topics**, and **how to get the correct information, not biased information**, and it really does work **with confidence** as far as...because it is **not like your mom** saying you did a good job, you know, your **mom is supposed to say that**. This **editor** is a person who **doesn't really care how you feel** and **they are saying that it is good**. So, **confidence wise** especially nowadays, **you need confidence** in order to become something because people get down on themselves and this leads to bad situations. So, we do need to **put more confidence in the schools** and **this is one** of the **easy ways** to put it in there. And, **they like doing it**. It is **not like you are forcing them** to write an essay or whatever on a **certain topic that you give them – you are letting them choose**. So, yeah, **I definitely think** it needs to be part of the curriculum somewhere.*

Negotiation with self

Negotiation with editor

Learning language – research, credibility

Living language – showing emotion, gaining confidence, having an editor, increasing engagement, choosing own topic, seeing value

R: *If you were doing SJ now, how comfortable would you be with the process?*

S: *I would be **pretty comfortable** because I have already been through it once so **I already have an idea** of how it is and **I have an idea** of how the **editor** prefers things*

written. Like, for example, when my mom was pregnant with me and I put in the parentheses (Helena), I was putting it like in third person versus me. So, I kinda know what he wants and it should be like...and another thing! You don't end it in like a closure type deal. You just end it in more facts. That was different because I usually always end pieces with my opinion or how life is now. You just strictly end it with statistics.

Negotiation with self

Negotiation with editor

Learning language – writing structure

Living language -- gaining confidence, having an editor

R: So did you think that was important to include if you were to do any other kind of writing assignments – not just this one. That you include that kind of outside interaction?

S: Yes! Because this person doesn't really know you so they don't have to be like, she's a good student so we should give her an A. It is more like, I don't know you so I don't really care how exactly your feelings are. So, it is better to hear that this writing is actually good because they don't know you personally.

Negotiation with self

Negotiation with editor

Living Language – showing emotion/pride, gaining confidence, identity as a writer, having an editor

Negotiation with Audience

In the following excerpt, Helena discusses the change in confidence she gained after becoming a published author where thousands of people are reading her article.

R: So, how did this process affect your vision of yourself?

S: It did because at this point in time when I wrote this article, I remember in 8th grade, I was not confident at all...like in anything not just in related to school. But, whenever you see that other people are reading the stuff that you are putting out there and they like it and they enjoy it. Because I did look at the hits for a long time until they took it away. But it is really nice to see people do it because they don't know me but they like

my work. They feel like I am good enough to be on the thing and they don't even know me. So, yes, it does really help with confidence.

Negotiation with self

Negotiation with audience

Living language – showing emotion/pride, gaining confidence, having an audience, identity as a writer/author

Negotiation with Self, Editor, and Audience

The following excerpt, demonstrates the complexity of the SciJourn process. The Negotiation with Self, Editor and Audience are all wrapped up in this one statement. It is apparent the power that SciJourn has on students even after over a year after the experience.

R: *Do you think that is what you are seeing from this particular assignment? Gaining confidence and learning about credibility and how to put a research paper together?*

S: *As far as **boosting confidence**, yes, that one **is huge**, like I said because **they don't know you** so **they don't have to like your work**, but **they thought you were good enough to be published** and **they felt that your work was good enough**. And that **it is good** because **not everybody looks at you** and says, **your writing is really good** and then they move on. So, it was **really good** to see that **other people like it** and **it is good** to see that **people around the world** are **seeing your stuff** not just in the United States.*

Negotiation with self

Negotiation with editor

Negotiation with audience

Living Language – showing emotion/pride, gaining confidence, seeing value, having an editor, having an audience, identity as a writer

Appendix J – Jordan’s Data

Jordan voices emotion as she sees the value in the SciJourn process and expresses that she has gained confidence in her knowledge.



First Interview -- Jordan

Negotiation with Self

The following seven excerpts indicate that Jordan has clearly internalized her learning and that having a connection when writing increased her engagement. She shows emotion when speaking about the experience and also indicates that this experience has increased her interest in going into a scientific field and in understanding science practice.

R: *We will get more details later but really what was it that sticks out in your mind when you think about writing SciJourn?*

S: *Learning how to research actually. It has really helped me a lot in high school trying to go through things and find out more things. I found it interesting also trying to find out more information about my situation let alone, anybody else who could learn anything. But learning how to research and finding more information to help other people and help myself, even, was very interesting, I found. And I enjoyed it a lot.*

Negotiation with self

Negotiation with audience

Learning language – writing, research

Living language – showing emotion, seeing value, having a connection, increasing engagement

R: *Oh, cool! So working with a partner? Some of the other students have said that this has actually created an interest in going into some science field....*

S: *Yes! I actually majored in science this year. When scheduling I declared science.*

R: *Do you think that had any influence from the SciJourn experience?*

S: *Actually, yeah, because I don't know, I find it really interesting to go deeper in health because I want to be a nurse anyway and I like learning about the body and I thought it was interesting in going back and seeing how our brains worked and how our bodies can do stuff that I didn't even know they could do. I just found it interesting that anything science related I didn't even know that it was science related. So, I did major in science.*

Negotiation with self

Learning through language – learning content, increasing understanding of science practice

Living language – increasing interest in science, increasing engagement

R: *Well, that's really neat. So, what about Language Arts? Do you use anything in that class in particular?*

S: *Yeah, the same thing basically. The outline and how to move stuff because we actually had to do research in English and it helps – the stuff you taught us about research – actually helped a lot knowing what websites not to use, what websites are credible and not credible and to know what information is helpful or not and who the article was by and we actually use that a lot in English.*

Negotiation with self

Learning language – writing, research, credibility

Living language – gaining confidence, seeing value

R: *That is really cool (both laughing). And so, last year you wrote about it and most people thought it was fun and engaging and do you still think that this process was fun and engaging?*

S: *Yes! I loved it. I love learning new information and I thought it was really good knowing how to do all that because it really does prepare you for high school knowing how to set up a writing piece because you are going to be doing writing pieces through high school and college and knowing how to research, and put in information, and just learning about the information was just awesome, I loved it a lot!*

Negotiation with self

Learning language – writing, research

Learning through language – content

Living language – showing emotion, seeing value

R: *So what do you think made you keep going?*

S: Actually, what I think kept me going was that I was almost finished, I already have a page and a half and if I can just get in one more page or I am almost finished and have my closing paragraph. And also, I just wanted to, you know, say I had something published. I thought that was really cool that, it's like, really cool that I get to be a published author. So that is what kept me going at least.

Negotiation with self

Living language – showing emotion, gaining tenacity, publishing, identity as author

R: Would you recommend for me to keep this up?

S: Yes! I definitely think so. I think it is a great learning tool for people who are coming into high school especially to know that information beforehand so that you are not behind everybody else. Like, I was always ahead of people with writing because they didn't know they had to say who the author was and you can't know if a .com is credible, you need to use credible sources, and you need to know how to set up a paper, and you need to have facts, and you need to have several different ideas and I think that is a really good strategy to have for going into high school and college.

Negotiation with self

Learning language – writing, research, citation, credibility

Living language – showing emotion/pride, seeing value, gaining confidence

R: So, I always thought it would be beneficial if they started this in 5th, 6th grade and continued through. Do you see any advantages to maybe having it go all the way through each grade?

S: I actually think so because I always had good writing skills but for some reason I don't have like, it grew from 7th to 8th grade. My scores got better in how to write because I knew how to set up a paper so I think if you started in 4th or 5th grade and you are just beginning KPREP and test scores get harder. I feel like that is very useful because you start writing as each grade gets going, when you write longer essays for tests and I feel like that is very helpful because you know how to make your pages lengthy without just using, like not using information that is not really relevant. I think that is helpful.

Negotiation with self

Learning language – writing, research

Living language -- seeing value, gaining confidence

Negotiation with Peers

In the following two excerpts, Jordan directs us to the significance of working with a partner and how that has impacted the confidence with how she works in groups in high school.

R: *I learned a lot about your situation from reading it. So we did some specific things during this like we did research, we presented, we pitched ideas, edited, revised, we worked with a partner. Have you used any of these when you went to high school?*

S: *Yes, actually **working with partners**, I wasn't really familiar with that before 8th grade. I just like was used to working on my own. And now in **high school** we actually **get in groups** a lot and it is **easier** to like **let my ideas and opinions flow without trying to say**, "Just let me do that"! It is **easier** to say what **I have to say** without saying well, that's not what I want.*

Negotiation with peers

Negotiation with self

Living language – showing emotion, gaining confidence, having a partner

R: *So, do you think you use anything from SciJourn in science? Do you do any writing in your science classes right now?*

S: *So, it **helps actually**, so like before me **and my partner** wrote our article we set out an **outline** of what we are going to write about and **that is what I do now** when I write about this and then I just **put in order** of how I want to write it. I want to start off my writing piece like this and then **I will have a writing piece** eventually.*

Negotiation with self

Negotiation with peers

Learning language – writing

Living language -- gaining confidence, seeing value, having a partner

Negotiation with Family and Audience

In the following excerpt, Jordan describes the interaction with her family and the importance of writing about herself and sharing that with her audience.

R: *So what did your parents think when you were published?*

S: *Well, **they were very happy for me** when I actually got **published** and that **I had wrote an article about myself to help other people through my condition.***

Negotiation with family

Negotiation with audience

Living language – showing emotion/pride, having a connection, publishing

Second Interview -- Jordan

Negotiation with Self

In this second interview it was, again, apparent that she had considered and deeply thought about the impact of the SciJourn experience and what she gained from the experience. In the following eight excerpts, she indicates that Negotiation with Self was a powerful key understanding by showing her emotion, increased confidence and her identity as a writer/author.

R: *How would you describe how you viewed writing before you went through the SciJourn process?*

S:***I didn't know how to really write**, not necessarily an article, but a piece – **nobody really taught me** how so I knew **when SciJourn came** that being able to be **published** that it was something taken **seriously**, that I really **needed to focus** on what **I was doing** and **it wasn't something just for some grade in class**, that it really was a **big deal** and it would **teach you** actually how people are **supposed to be writing papers** and essays and articles and **I found it interesting** that there is a program that can do that. It is students*

like me that want to learn how to research or know more about a topic and they can just submit their article and it be published!

Negotiation with self

Learning language – writing process, research

Learning through language – content

Living language -- showing emotion/pride, publishing, gaining confidence, seeing value, increasing engagement

R: *What do you understand more about science itself from what you learned.*

S: *That it is very, very broad. There are so many things that have science in it and I didn't even know. I had no idea! And that everything, for the majority, is broken up to scientific facts and that everything has a cause and an action, and it just all wraps around back to each other. There is a reason for it and most of it is science!*

Negotiation with self

Learning through language – expanding view of science/practice

Living language – showing emotion, seeing value

R: *And, what do you understand that scientists do?*

S: *They do a lot of research. A lot! And I feel like they are some of the smartest people. A scientist has to be extremely smart to know and memorize a lot of stuff they look over and they have a lot of determination, too. I feel like they want to know more and they want to know why stuff happens and how it happens and it is amazing that so many things happen and you just want to know more about it. I feel like scientists are extremely smart and great, altogether.*

Negotiation with self

Learning through language -- expanding view of science practice/scientists

Living language – showing emotion/pride

R: *And you were talking about going into nursing? Are you still interested in that?*

S: Definitely, yes. I find it...I like to help people a lot. I love to help people. Plus, all of the science behind it. I like to know everything! My parents always say...you don't need to know everything and I am like...Yes, I do need to know everything! (both laughing) Plus, helping people and knowing things about science and how that body works. That interests me so much!

Negotiation with self

Living language – showing emotion/pride, seeing value, increasing engagement

R: So, if you were doing SciJourn now, how comfortable would you be with the process?

S: Oh, definitely more comfortable, yeah. Because I am familiar with the system and how it works and definitely since I have grown as a writer that I feel like it would be a good experience to do it again.

Negotiation with self

Living language – showing emotion/pride, gaining confidence, identity as a writer

R: Do you see examples of the SciJourn process in other areas of your life? We talk about credible sources, or maybe not in high school, but working with people outside of school?

S: Yes, credible sources is definitely cause since the more and more research I do...I didn't know there was so much research going into high school, but there really is, and I, like you said, you can't use .com. I didn't know that before I had to publish an article. I had no idea. I knew I couldn't use google as a source because it is a search engine but like .orgs and .edu and everything...I didn't...I know those are the best sources to go to look for information because they are not somebody's opinions or just something somebody can write on there. That has been extremely helpful knowing what websites I could use and if they are credible or not.

Negotiation with self

Learning language – writing, research, credibility

Living language – gaining confidence, seeing value

R: Okay. Why, we are kinda wrapping up now...um, what was so different about SciJourn that it had such a huge impact? What could you say about that?

S: That you could choose anything you wanted to do to write about. ***I loved that!*** 'Cause I always thought that if you have to write about one specific thing that it is so much harder...

Negotiation with self

Living language – showing emotion/pride, choosing own topic, seeing value

R: So, is there anything that I haven't asked you that you want to tell me or that you remember?

S: I would definitely tell you to do it with all of your classes. I would recommend it for any class, any science class, any writing or English class. I would definitely recommend it. It is a very good activity to do, I think, it is extremely important. Especially, it is an accomplishment to be published actually. ***Not a lot of people...when I tell somebody they are like, what? You are actually published? Yeah, you can be! At fifteen, you know, I love it, I loved doing it.*** I would recommend it to anybody.

Negotiation with self

Living language – showing emotion/pride, seeing value, publishing, identity as a writer/author

Negotiation with Peers

In the following excerpt, Jordan indicates that she sees value in having a partner.

R: Do you think having a partner in SciJourn helped with that in high school?

S: ***Oh, yes!*** Cause it is kind of easier to have somebody else with what they think and their opinions on stuff and not do everything by yourself and wonder if you are saying the right things or if people think the same thing as you. ***It is a lot easier!***

Negotiation with peers

Living language – showing emotion, seeing value, having a partner

Negotiation with Audience

In the following two excerpts, Jordan indicates she has gained confidence in understanding her audience's needs and the significance of publishing and informing people of her topic.

R: Do you think SciJourn helped you with that (writing in high school)?

S: Yes, definitely. I can totally expand more on what I am saying because it can't be really short because it would be what about this – and you **don't want your reader to have questions that aren't answered** so with that I learned that you need to answer the questions because if you are reading it and you can't even answer your own question then you need to definitely have more detail. That has helped a lot to make my papers full of information.

Negotiation with self

Negotiation with audience

Learning language – writing, audience awareness

Living language – gaining confidence, having an audience

R: So, what are the strengths that you discovered that you had through this SciJourn process?

S: I think the determination I had always made me...because the fact that SJ was being published, I could have it published, that even though I was kind of struggling at several points that it was going to be published so I was like, okay, I can do this, I can do it and it just kept me going and that I could research more and get more information in there to inform more people because of the SciJourn I just thought it was a really great thing to do.

Negotiation with self

Negotiation with audience

Living language -- showing emotion, gaining tenacity, publishing, having an audience

Appendix K – Sam’s Data

Emotion played an integral part in Sam’s experience with the SciJourn process. She saw value in the assignment and gained confidence in her writing knowledge.



First Interview -- Sam

During her first interview, I brought out both her seventh and eighth grade reflections to help remind her of her middle school SciJourn experience. I was relieved when she immediately recognized her change in perspective from the seventh to eighth grade. Below she is discussing that she didn't need to read her seventh grade reflection because she had a better experience in the eighth grade.

R is me, Sam is the student, P is the parent

R: *So, I was trying to pull out the important things from them {the reflection letters} also for my own benefit so that I know and I can change things each year based on student feedback. So, you started off..."this is really hard", "there is a lot of revision and editing"but then, in the 8th grade....*

S: *It was definitely different...I don't have to read this one.*

R: *You don't have to read this one?*

S: *Nope. It was more like we got it and we just have to do it **because (her partner)** was a very good writer and we both had very good ideas and kinda knew what we were doing. I remember also in 7th grade, I came in late. So, it was kinda different.*

I begin with excerpts from the interview that demonstrate the key understanding of Negotiation with Self that consistently flows through all of the interviews. In order to find meaning in their learning, students have an **inner conversation with themselves** concerning what they remember and want to pull forth in their interviews. The themes of Learning language, Learning through language, and Living language follow the key understandings of Negotiation to indicate where in the interview the categories emerged that are essential for understanding the SciJourn experience. I then follow with excerpts

that indicate the other Negotiation understandings of Peer, Family, Editor, Experts and Audience.

Negotiation with Self

In the following five excerpts, Sam has internalized her learning as she shows emotion and pride in her increased knowledge and confidence in her writing and researching ability. She emphasizes the importance of being able to choose her own topic which she believes increases engagement.

R: *What do you remember about your experience in writing a science news article in my class. What was the big overall impression?*

S: *I was excited about it because I do love writing and I do also love science and the fact that we got to choose the topic – it wouldn't be boring. Because if I was forced to do a certain topic that I had no interest in, you're not going to get a good paper.*

Negotiation with self

Living language – showing emotion, choosing own topic, increasing engagement

R: *So exciting. That's really neat. So, when you were able to become part of the science community with your article...did that make it feel a little more real? Or...*

S: *Yes. Because in most things in science you have to create your hypothesis of it or you have to present your idea on paper and this was doing so...it was presenting your information, describing it, backing it up and that's what science is.*

Negotiation with self

Learning through language – understanding of science practice

R: *What skills do you think you will be using in your **high school** science class or your language arts class this year.*

S: *It is actually funny, because on the first day I actually, I did need to use it because in AP HG – that is kinda language arts. It's **Advanced Program Human Geography**. It's very interesting. It is my favorite course actually. And, on the first day we had to do a research paper on obituaries and you have to make sure that the person you are doing it on, all the information you get about them is credible and that the sources, you know, is*

*a **real source**...which is of those things you reminded us about plenty of times, a lot! So... (laughing)*

P: (Chimes in!) *But she **didn't have any trouble** with the assignment.*

S: *Yeah.*

P: *This is a college course actually. So, she is in the IB program at her {high school} so that this is her **first college course**.*

Negotiation with self

Negotiation with family

Learning language – research, credibility

Living language – gaining confidence, seeing value

R: *You have a unique perspective because you did it in both 7th and 8th grade.*

S: *I remember in 7th grade you said that, it was **only high schoolers** that got to do it, and then it went **down to middle school** and they were **so very impressed**. And **I feel** that if you even drop that down to **elementary school**, the **whole thing would grow** and it would be **even more impressive** of our **excellent writers** starting at young ages.*

Negotiation with self

Living language – showing emotion/pride, seeing value

S: ***I feel I can** do this **in one day!** (laughing)*

R: *That's wonderful! That what the professionals have to do, they have to write articles in one or two days to put them out. So you really do think you can do the same thing now in one day?*

S: ***Yes, I really do!***

R: *That gave me chills (all laughing)*

Negotiation with self

Living language – showing emotion/pride, gaining confidence

Negotiation with Peers

In the following excerpt, Sam was the only student who mentions that presentation to her peers was an important aspect of the SciJourn project.

R: *So, what specific skills do you believe you have retained from the writing process.*

S: *I feel like the **actual research part** and making sure that things are **credible** and that they are **real** and **making sure** that you know that. And then the **presentation part...I am a very shy person** and to **get up there** and to **have to share your idea** and have it **possibly shot down...that was a life thing**, because that is something **most people will have to do in life** – **present their ideas**. So, **I thought** that was an **important** part of it.*

Negotiation with self

Negotiation with peers

Learning language – research, credibility

Living language – showing emotion, presenting to peers, seeing value

Negotiation with Family

When Sam's mother began to chime in during the interview, I thought this gave an added dimension to the interviews and a significant finding on the importance of Negotiation with Family.

P: *Yes, this is a baccalaureate, if you want to be specific. But you would think, first, going in as a freshman in high school, that it is **really intimidating** because it is a **big transition** and then you know you are going in and your sixth period is a **college course**. And then, **on day one**, in school of the **freshman year** you have a **college course** and they tell you you **have to write a research paper** that was due the next day was it not? (asking Sam) ...they only gave you a **couple of days**?*

S: *Two days.*

P: *And you had to write a two page paper but I think that **everything that she learned through the SciJourner program, she was able** to come home and she like, **sat right down**, and **banged it out**. And, um, she **didn't appear to be intimidated** at all by it.*

Negotiation with self

Negotiation with family

Learning language – writing, research

Living language – gaining confidence, having family support?

R: *It's huge!*

P: *It's a huge deal. And, it just takes a little effort.*

S: *I also like how my partner's dad saw it and he commented on the site.*

Negotiation with family

Living language – showing emotion/pride, having family support?

R: *What did you think about her being published?*

P: *I think it is completely amazing. I remember her working on this, I remember them on the phone, whatever, trying to figure out what they were going to call their paper. I mean, just the simplest little detail.*

S: *It was her idea actually, to call it...*

P: *It was not my idea but we all talked about it, and I was listening in, and hearing you hash everything out and um, when she had 4,000 people looking at it I didn't even know what to say, cause that is pretty crazy if you think about it. But then, sitting here today, and seeing how it has over doubled what it was...with still more to come...but, I am just hoping she realizes that that is really cool and being published is really a big deal.*

Negotiation with family

Learning language – writing process

Living language – showing emotion, having an audience, publishing, having a partner

Negotiation with Editor

Having interviewed several students before this interview, I had noticed a Samef mention of having an editor. I wanted to explore this more in Sam's interview. She was very clear that interacting with an editor improved her article and helped her to become published.

Offering this on her own --

S: *I mean in sixth grade you don't write a lot of papers. It's worksheets and this was the first, like, impressive paper, I feel like I have written with help of course...you can't forget. (laughing)*

R: *Well, I had help too from the editor... Did having an editor, a real editor, help?*

S: *Yes. Because as soon as he pointed out something, well, I thought that was dumb. Why did we do that? You know. It kinda opened my eyes...this does have to be laid out a certain way for it to sound professional and for it to just flow well and I feel like the editor really helped out with that 'cause without that person, it would be a completely different article.*

Negotiation with self

Negotiation with editor

Learning language – writing, revision

Living language – showing emotion/pride, gaining confidence, seeing value, having an editor

Negotiation with Self, Peers, Audience

The following two excerpts demonstrate the complexity of the SciJourn process. Sam is showing emotion over her and her partner's accomplishment in being published, her ability to choose a family member as her topic, and having an audience that has expanded beyond her teacher.

R: *You persevered in completing the assignment and you got published, so, what was your overall reaction to being published?*

S: *Wow! (both laughing) I didn't really know what to think. I don't know. It was just me and my partner did this together and it turned out great and people can see it. It is just really cool.*

P: I am curious to know now how you feel that 10,000 people have read your work?

S: Yeah, at least, cause it counts one of you on one computer. That's crazy.

Negotiation with self

Negotiation with peers

Negotiation with audience

Living language – showing emotion/pride, having a partner, having an audience, publishing

Negotiation with Self, Peers, and Family

S: And then, we actually got to choose our person, and I chose my great grandmother, so, that was the choosing your topic part, kind of about it that SciJourney also allowed you to do. And I like that.

R: That sounds really cool. So, you kind of thought, from what I read, how engaging do you think it was? I know that the topic helped you stay engaged, do you still believe that...that it was engaging?

S: Yes. I think it really depends on your partner, your topic, your skills with writing in science. There are a lot of factors into how engaging it can be.

Negotiation with self

Negotiation with peers

Negotiation with family

Living language – showing emotion/pride, having a partner, choosing own topic, having a connection, increasing engagement

At the end of the interview, Mom felt that she needed to share additional information on her impression of the SciJourn process. She was very passionate and clearly knew what she wanted to say. Having a parent perspective helps to see the deeper impact of SciJourn not only on the students involved but also their families. I was thrilled that she shared her thoughts with me.

P: I think these are life-long skills. You know. I have gone through college myself, even recently and to write, to be able to read, comprehend, and write your thoughts about something into an organized paper, possibly present in front of a group of people, not matter how big or large, to collaborate with fellow students is huge. These are life-long lessons. And I think the sooner that our kids get to experience them, it's only going to make it easier and better for them and have them more prepared as they move into higher education. It's not just something that you can get from junior high into high school. You can take these skills into college and beyond and continue to build upon them and be successful with it. Wouldn't you say (turning toward daughter)?

S: Yeah. I couldn't have said that better. (laughing)

P: Because she wasn't hesitant on day one. She literally sat at the table and banged it out. She couldn't have done that if she didn't have this preparation through this program. Without a doubt. It gave her the confidence and that is huge.

S: Yeah. Confidence is important.

P: If you are confident, you are going to get it done. And, she knew that she could do it.

R: (awed)...thanks. It's kind of that release thing. We got you through it and then, hopefully, it releases so that you have that really strong foundation. So, that is very cool, thank you for sharing that with me.

P: Please continue. Please, please work towards getting them to get it sooner for these kids.

R: Yeah, I am really trying (laughing)

P: Good. Don't give up.

For me, this was the perfect ending for the first interview. Sam's mother voices and reiterates the importance of understanding the writing and research process in order to be successful and confident in high school and college for both her and her daughter.

What I learned from Sam in this first interview was that Negotiation with Self to find meaning in the SciJourn process occurred in the majority of excerpts. She often showed emotion and pride in her work and saw value in her increased confidence and understanding of the writing process/structure. In addition, her interaction with her

partner, the editor and her family increased her engagement and the memory of her experience. She was the only student who voiced the impact of the presentation aspect of SciJourn.

Second Interview -- Sam

Context: This interview followed several weeks after the group interview and group activity that Sam participated in. When Sam came into my room at school this time, she was without her mother. This gave me a chance to speak with Sam alone and probe her experience without having the influence of a parent in the room. She was becoming for comfortable with me and shared what she values as a person.....

I value acceptance and equality – that everyone is equal no matter what you are or who you are. I feel like, as a person, that is definitely up there for me.

I provided Sam with a copy of her first interview and the group interview to see if I had captured what she wanted to communicate to me – and she stated,

*Sure. I definitely say the same things.
We definitely agreed on a lot. We said the same things.*

Negotiation with Self

In the following seven excerpts, Sam clearly expresses her change of perspective on scientists and science practice indicating that the ability to choose her own topic and discover that she had access to so many science topics has increased her interest and engagement in science. Sam was the only student to share that she is now reading more science articles.

R: *So, what do you think scientists did before and how did your ideas change from SJ?*

S: Well, before, like I said, **I pictured** just some **man** in like a **white lab coat** and really **big googles** just like **chemistry**, mixing stuff. That is what I pictured – **I pictured Einstein with crazy hair!** Then, afterwards, **I thought that like -- everything else!** You could be **a teacher** and **still be a scientist** because you are **still studying** these things because **that is what science is** – you are **learning things**. And, you can be in **marine biology** or **astrology** – **two completely different things** but **still, science and scientists**.

Negotiation with self

Learning through language – expanding view of science practice/scientists

R: And, how did you discover that?

S: Well, when we were **searching for our topics**, we had a large amount of **options**. Just **seeing all of that** – **I never thought about all of that** and it was just **interesting to see...cause I never thought about it**.

R: So, just looking for a topic just taught you a lot.

S: Yeah.

Negotiation with self

Learning language -- research

Learning through language – expanding view of science practice/scientists

R: So, what do you think scientists do?

S: I think they **learn** and **teach** and **research** and **hypothesize** and study.

R: Do you think they write?

S: Yes.

R: What kind of things do they write?

S: Their **opinions** on things, their **predictions**, maybe **their reasons** for things...things that they **discover**.

R: Who is their audience, do you think?

S: **Everyone!**

Negotiation with self

Learning through language – expanding view of science/scientists

R: *What makes SJ have such an impact....because it really does seem to...even in the reflections of students who do not get published...seem to have such a positive view of this. What were the elements about this thing that was so impactful?*

S: *I feel like because it was different. And, often not a lot of kids are that huge into science so, I feel like, just having the freedom to at least pick your own subject can make it 100 times better. Because if you are interested in the topic, you are going to be more engaged in it and you are going to actually care about it. If it is something you don't care about, you are not going to put that care into what you are writing.*

Negotiation with self

Living language – choosing own topic, increasing engagement

R: *So, what do you understand about science and writing now that you have published an article?*

S: *I read a lot more about science articles! I read one on the way here!*

R: *Did you really? (both laughing)*

S: *Yes. I read one on black holes and things and space. It was awesome! But I just actually...I am googling science news articles now and am actually interested in it. I didn't really know it was a thing, I guess, until we did this, so that just opened a whole other door of my love for science... 'cause there is more access.*

Negotiation with self

Learning language – increasing scope of reading in science

Learning through language – content, expanding view of science practice/scientists

Living language – increasing interest in science

R: *If you were doing SJ now, and you did 7th and 8th ...you came in the middle of one year and had one topic kind of die on you...but how comfortable would you feel with the process right now?*

S: Very comfortable! The hardest part is picking a topic. I mean because it is so indecisive, but, once I get that topic, once you go with it, you are good.

Negotiation with self

Living language – gaining confidence, choosing own topic

R: And then, do you use any of the things we have learned in SJ in your everyday life?

S: Credibility!! Definitely. Even if I am not writing a paper and I need to look something up, I want to trust that what I am reading is real and you never really know. So, I feel like with that extra knowledge of these are the things to look for, it just makes things easier.

Negotiation with self

Learning language – credibility

Living language – seeing value, gaining confidence

Negotiation with Peers

This interview followed the group interview and activity (discussed later) of which Sam was a part. I was concerned how Sam viewed this experience as she had been such a quiet and non-verbal student in middle school. I was pleasantly surprised that in the following three excerpts, she discusses the value of sharing ideas with her peers.

R: So when you first meet people it is really hard...they wanted me to do a group interview to make everyone more comfortable but I think in some instances, it makes you less comfortable.

S: Yeah. I liked hearing what they had to say, though, because it helped me to have more ideas. I was like, “Oh, yeah!” I like group things.

Negotiation with self

Negotiation with peers

Living language – showing emotion/pride, having partners, seeing value

R: *When we were doing the group project and you were looking at someone else's article – did that come right back to you?*

S: *Yeah. I remember that...we traded articles a lot to peer review and that was the first thing that came to mind.*

Negotiation with self

Negotiation with peers

Learning Language – peer review (editing and revision)

R: *We wanted to see you “doing” it and to see how that impacts your memory of what you did. And, you did it with the other two...you told me that you liked hearing other people's opinions about it?*

S: *Yeah.*

R: *Could you expand on that a little bit?*

S: *Well, two heads are better than one and we had three! So, just hearing what they had to say...it just ran some of my thoughts even further into different ones and it just made me think more. So, I just kind of...I was influenced by what they said and incorporated it into my thoughts.*

Negotiation with self

Negotiation with peers

Living language – showing emotion/pride, having partners, seeing value

Negotiation with Audience

In the following two excerpts, Sam indicates her belief that there is value in having a published article with an authentic audience and how this will help her in the future.

R: *Do you think this will be of value...just the fact that you got published?*

S: *Well, yeah. for resumes and just showing it to people. It just looks, it just looks good and it's, like I said, it is just rewarding to know that and if you are applying for certain things and they see, like, she's a published author – that's impressive. So, that just knocks you up a couple more places to be successful in that application.*

Negotiation with self

Negotiation with audience

Living language – showing emotion/pride, seeing value, publishing, identity as writer/author

R: *So, what are some of the strengths that you discovered about yourself through this process?*

S: *That's a good question. I think once I actually started writing, **I was never a really great writer**...I always **struggled** with what to say next...so, I feel like even rough drafts of doing this, **I feel** like I just **become better at writing** things and **explaining myself** to where **others could understand**. So, **I feel like I did a lot better**.*

Negotiation with self

Negotiation with audience

Learning language – writing process, audience awareness

Living language – showing emotion/pride, gaining confidence, having an audience

Negotiation with Self, Peers, Audience

The following excerpt demonstrates the complexity of the SciJourn process. Sam indicates the emotion and pride she felt in having a partner to share the work load involved and the accomplishment of publishing the article for an authentic audience

R: *When you got published, I know you were really frustrated...what was that like to overcome that and go from frustration to being published?*

S: *I was **very relieved** at first that we didn't have to work on it any more (laughing) and that **frustration** was kind of gone but it was also **very rewarding** knowing that, like, **we worked on this together** and **we did this together** and it was **good enough** to have it **published** and so **many people see it** and it is just **very interesting**. Like, **I don't know who these people are** but **they took time to at least click it**, maybe not read it but they **at least clicked it to see what it was!** That makes me **happy**.*

Negotiation with self

Negotiation with peers

Negotiation with audience

Living language — showing emotion/pride, seeing value, having a partner, gaining tenacity, publishing, having an audience

R: Is there anything else that you would want to tell me that I haven't asked you?

S: *Thank you for the struggle* (both laughing) *for your struggle and my struggle for it works out for both of us in the end. I just wanted to say that.*

Negotiation with self

Living Language -- seeing value, gaining tenacity,

Another perfect ending.

Appendix L -- Group Interview

Obvious that Robin was less verbal in the group until the activity!!

Negotiation with Self, Peers, Editor, Experts

Group Interview and Activity -- Diane, Robin, Sam

R: I wanted to start off by saying thank you again for coming. I appreciate it so much! I printed out your articles again and this one has – this one is for Robin – and it has 5,191 hits on this one. And, this one is Sam's and it has 10,619 hits. What was it the last time?

Sam: It was about 5,000 I'm pretty sure.

R: And Diane's it up to 27,453 hits. 27,000!!! That is amazing to me! We are going to start out with a few questions and then an activity. Something you should be familiar with but it helps me see you doing science and how you remember and make meaning of what you learned.

Interview. This is where I saw the following

Negotiation with Self

R: And what do you remember most?

Sam: Probably, **how frustrating it** was the first time because we had to change a bunch of things but it was definitely **less frustrating** once we got it all sorted out and I think that **relief** of it's okay now. That was nice.

R: That's kinda interesting! So, what would be the most important lesson you think you learned from this and I will just go this way again?

D: The most important lesson I learned was probably having **better communication skills and better language arts.**

R: Did you learn any science from this?

D: **Yes, I did! I learned more about the neck and how if you bend down it is putting strain on your neck. So, I learned that anatomy of the neck basically.**

So, what was the most important learning you got from this?

Sam: **Patience is key!** Because writing in general can just take a while sometimes and then having **to edit it** a bunch of times, and **having to wait to get that email back**. You definitely have to stay patient with it because it gets better.

D: I agree with that. We were just **very agitated because I know that the Dr. was busy to respond to two girls who emailed him from Louisville but once he emailed us we felt relieved** because we could finally put the whole thing together.

R: Yeah, something I learned, too! Did you learn anything about science or how it is practiced?

Robin: Like I. said, like how **they have to do all the work and like to publish it** and be **patient**.

Sam: I feel like it **changed it in my mind**. Because when **you think scientist you think white coat and in a lab** and there is **so much more than that**. You can be like a neuroscientist or you can be an astronaut. Those are two different things. So, I feel like **going through subjects trying to write about just the field of science you already learn a lot more about it just Samefly going through those things**.

R: So, does anybody here see themselves as a scientist?

D: **I do, yeah!**

Sam: **Yes**.

Robin: I don't know...

R: Two out of three ain't bad! R: What do you think J.? What are your interests?

Robin: I don't really know what I want to be when I get older. I am still thinking about it. But, I was thinking **about being an oceanographer** but, I don't know.

R: Cool! Do you see yourself as a scientist?

D: I would like to go into **the marine biology field** when I graduate.

Sam: **Either marine biology or astrophysics**. I am just a total nerd when it comes to that stuff and it just really excites me. **I would just love to do that**.

Negotiation with Peers

R: So, how did you negotiate it with T. (her partner) when you were writing your piece. How did you work that out as a group of two?

D: Well, we kinda split up half of the work so that if one day she wanted to do research she would do research and I would probably email the person or the doctor that was in Florida. And so we would **switch off doing** that and just having **better communication skills** – it **really helped putting it all together**.

R: How did you negotiate with your partner on who was going to do what?

Robin: Um...well....we just kind decided together on the research and stuff.

R: How did you work together?

Sam: **We did everything together**. Because **we didn't always agree so we both had to be there when making a decision on something just to be sure we were both okay with it**. And like whenever one of us researched the other one was like “that sounds good, let's include that”. We kinda did **everything at the same time and slowly paced**.

Negotiation with Editor

R: What sticks out most in your memory from your experiences?

D: Mind would have to be **sending in the rough draft and waiting for it to come back**. That was **nerve wracking**.

Negotiation with Experts

R: So, when you communicated with that Dr. you were working with the science community so did you feel that connection was an important learning...?

D: Yes, it was because it just **gave us more information** just to be **more clear** about what we were writing about so we could get **a better understanding** instead of just writing something and just be done with it.

R: Do you see yourself growing as a person?

D: **I definitely have to say yes** because just like I said, it helped me further **my communication skills** with different people and helped me get **out of my comfort zone**. So, when I have questions or if I want to learn more about something, then **I will ask**

somebody about it. Or, if I am working with a partner, then we will work together and communicate better. I feel I learned a lot and progressed a lot with it.

Sam: I think I did too, especially with communication because I always wanted to say something if I felt like I needed to say it but especially recently, I have been more open to actually saying what I want to say and I never really liked writing until like 7th and 8th grade because of this. And, I just enjoy writing now. It is easier for me to do it and I feel like this has helped.

R: What do you understand more about this as a practice – what scientists do and what kind of activities they do and how it is practiced? Did you learn anything about this from this process?

D: I can say that when scientists have to do labs and then put in a report and try to publish articles in news journals and stuff like that I know it takes a lot of time for them to do that and a lot of editing and patience! I thought it was just...they wrote something about what they observed in the labs. I thought it was just like that but it wasn't. It is a lot of time.

Themes	Diane	Robin	Sam
Learning language	Writing Research		Writing Research Editing
Learning through Language	Content Expanding view of science practice/scientists	Expanding view of science practice/scientists	Expanding view of science practice/scientists
Living Language	Increasing communication skills Identity as scientist Showing emotion Connection with experts Having a partner Having an editor Seeing value Gaining confidence	Having a partner	Gaining tenacity Seeing value Identity as scientist Showing emotion Increasing Communication Skills Gaining confidence

Confidence

Learning Language

Learning Through Language

Living Language – confidence, emotion,

Appendix M

<p>Group Practice Activity</p> <p>I am going to give you a few minutes to look over it and read it and use your highlighter and we will talk about what you think you see when you get done with that. Okay?</p> <p>Three students reading and getting the markers ready. The two sisters are whispering and reading and B. is working on her own.</p> <p>R: Yeah, do the whole sentence. We want to see all or maybe see all the colors on this. And, you can disagree! (laughing) Alrighty! (about three minutes later) What color do you see most on your paper? Anybody talk out whenever.</p> <p>I and R: Blue</p> <p>R: Okay, blue. So, blue happens to be where you see the science behind the topic explained. And, what is the next one you see the most of?</p> <p>I and R: Green</p> <p>R: Green, and that is the author's connection? And then, do you see much yellow?</p> <p>I and R: No, I think that is the problem</p> <p>R: Okay, so let's talk overall. What do you see that this person has done well ?</p> <p>D: Probably, just researching all the facts to put into the article.</p> <p>R: So, facts about the lead and what is going on?</p> <p>S: Definitely researching again. I didn't know lead could do some of these things.</p> <p>R: Okay, so you think it is kind of</p>	<p>Shortened introduction to Peer Review activity</p> <p>All engaged , reading and highlighting</p> <p>The students worked on this for about 20 minutes...when the students appeared to have completed the assignment, we began a conversation as to what they saw in the rough draft article.</p> <p>Blue: Identifying where the science is explained</p> <p>Green: Identifying the author's connection Identifying that there the author's connection is weak.</p> <p>Yellow: Sourcing/citation</p> <p>Identifying where there is a problem with sourcing</p> <p>Analyzing the student article and observing that the author did well with including research.</p> <p>Learning about content</p>
--	--

<p>informative?</p> <p>S: Yeah.</p> <p>R: Okay, what would you advise him for any improvements. What do you think he needs to improve?</p> <p>D: I would definitely improve putting more sources where you found all these facts because I may not believe that lead is a metal poison. You have to put down who said it or where you got it from.</p> <p>R: Absolutely.</p> <p>S: I would also say explaining what some of these things are. If a person doesn't know what a pre-frontal cortex does and how important it is, it is just important to know to get your point across and I feel like if they were to just explain some of the more uncommon things, it would make more sense.</p> <p>R: And on the lede, does he really make a connection to himself that you can see?</p> <p>D: I got confused with the green highlight but, after he explained it, he doesn't make any sort of connection with himself but he makes connections with other people.</p> <p>R: Okay, does the lede draw you in?</p> <p>R: Yeah, it is interesting.</p> <p>S: Especially with what happened recently in Michigan but they just destroyed this generation of kids with that lead poisoning.</p> <p>R: So, you would suggest pulling in some more recent things?</p> <p>S: Yeah, I would put that in here.</p>	<p>Ability to analyze peer article and identify that there may be a credibility issue. Sourcing/citation</p> <p>Analyzing the text : Author needs to explain the science in more detail. Students give specific evidence from text. Audience awareness.</p> <p>Analysis of lede – identifying there is not a connection to self but there is a connection to other people -- having a connection</p> <p>Connecting to current events</p> <p>Confident in suggestion</p>
---	--

<p>with what you remember science writing needs to have included. Talk about it, discuss it, disagree...</p> <p>D: Should we highlight?</p> <p>R: You certainly can because with the highlighter activity, when you give it back to the author, they can immediately see if there is a color missing and see what they need to fix. Whispering....</p> <p>R: <u>Right there.</u></p> <p>D: Yeah, that is what <u>you highlight.</u></p> <p>R: He is referring to a <u>source.</u></p> <p>D: Or she, it doesn't say.</p> <p>D: This person already <u>started out well.</u></p> <p>R: Oh, they used <u>Wikipedia!</u></p> <p>R: Remember, I told you that you can use Wikipedia in science and that it is really well controlled.</p> <p>R: Oh, yeah, I remember.</p> <p>D: He didn't use it as a <u>major source,</u> he only used it for <u>background information.</u></p> <p>R: Okay, if you look at the first two paragraphs, discuss what you guys see.</p> <p>R: Where he starts off with, um, a person, wait, no, <u>personal experience.</u></p> <p>S: They <u>get to the point. I like that. It still starts off intriguingly.</u></p> <p>D: <u>I agree</u> with that.</p> <p>R: Why does that intrigue you?</p>	<p>Students working together – having partners Identifying sources</p> <p>Students show concern about credibility of sources.</p> <p>Understanding that Wikipedia can be used for background information in science.</p> <p>Identifying author's connection to the topic. Identifying an interesting lede. Discussing this as a group.</p> <p>Agreeing with peers</p> <p>Analyzing the lede and connection with family</p>
---	---

<p>S:I am just a curious person and for me, hearing about someone else, especially his dad, I thought that was interesting.</p> <p>R: Do you see anything else in the first paragraph?</p> <p>D: That he didn't overpower in the first paragraph. It was just simple and straight to the point and it leads into all the research that he is going to explain in the other paragraphs.</p> <p>R: Okay, so looking at the second paragraph? So, it is a different color that you have there.</p> <p>R: A lot of sources.</p> <p>S:A lot of research in there and he is citing his sources.</p> <p>D: They are credible because you can trust a site that is what? Is it .org or something?</p> <p>R: Just because it is a .org doesn't mean it is credible!</p> <p>D: Isn't like a government site or something?</p> <p>R: J. what do you remember?</p> <p>R: Oh, there is...I think I remember you showing us a site about like a spider or something, no, actually it was an octopus in a tree.</p> <p>D: An octopus in a tree?</p> <p>R: Yes, it lived outside the ocean so, I was like, that's not true.</p> <p>D: So, it might not be credible.</p>	<p>Identifying transitions and "good" writing</p> <p>Identifying resources, research, citation</p> <p>Students agreeing and building off each other's statements.</p> <p>Remembering the basics of credibility. Reminding each other</p> <p>Remembering the lesson on credibility</p> <p>Robin was one that in her interviews was more reticent and seemed not to have gained as much from the assignment. However, here, she is active and participating and appears confident in</p>
--	---

<p>R: Yes!</p> <p>R: So a .org...we showed you a tree octopus.</p> <p>R: Yeah! It was really creepy.</p> <p>R: I don't think we had this lesson when I was here. So, I showed a tree octopus website and it had pictures and it had stories...so you were right J. Excellent!</p> <p>R: There is one mistake we found though.</p> <p>R: What?!</p> <p>R: Well, he didn't put the Dr's name 'cause he said "doctors have found another symptom" and we don't know what they are!</p> <p>D: We don't know!</p> <p>R: Excellent.</p> <p>D: Could be a neurodoctor or something?</p> <p>D: <u>When he or she states</u> a sentence that <u>involves facts, you always have to have your sources.</u> Like this first sentence has a fact. "CTE is commonly found in people who play football or who box and it was first diagnosed in a boxer." Like, <u>how am I supposed to know</u> if that is even true?</p> <p>S:I feel like you <u>can't overpower sources</u> though. Like if every ending of a sentence comes from a different source especially if you use the <u>same source over and over again.</u> So, <u>I feel</u> like it just depends on how you word it.</p> <p>D: <u>I was wondering</u> because <u>I don't know</u> if it is just football and boxers. Like there is multiple sports that can accommodate brain</p>	<p>what she is saying.</p> <p>Identifying an error on citation</p> <p>Robin again offering her own idea as to what is missing</p> <p>Agreeing</p> <p>Understanding citation/credibility</p> <p>ALL VERY ENGAGED!!</p> <p>Providing evidence from text. Understanding citation and credibility</p> <p>Showing confidence</p> <p>Giving a different opinion</p> <p>Discussing citation of sources</p> <p>Showing confidence</p> <p>Deep conversation concerning what they see in the article concerning sources</p> <p>Asking questions of the article</p> <p>Robin speaking out of sources, expressing an opinion! Showing</p>
---	---

<p>injuries in it. I was just wondering where did he get this source from.</p> <p>R: And I also feel like, um, his sources are like in one paragraph. I know it's not but most of the sources are and I think they should be spread out through the paper.</p> <p>S: That is what I was thinking, too.</p> <p>R: This will so help the author. What else do you just see in there?</p> <p>D: He has a lot of great facts and he has a lot to back up his research. I liked how in the fourth paragraph he connected with the movie. I feel like that would make you want to keep reading.</p> <p>S: He has a lot of sources. Like a lot!</p> <p>D: So, is this about brain injuries as related to football?</p> <p>R: Isn't that a good question because it has CTE up there right? So, maybe...</p> <p>D: Because he says chronic traumatic something.</p> <p>S: I like that they just source everything, like a lot! The main thing I am confused about is the title – CTE. I feel like if it were Chronic traumatic that... you would know what it was and I feel like if it is CTE it is kinda boring at the same time. It is like, What does that stand for? So, I feel like it really just depends on if he should change that title.</p> <p>R: It will be interesting to see what the editor thinks.</p> <p>S: Yeah.</p> <p>R: I hope this doesn't sound too mean. We</p>	<p>confidence</p> <p>Building on each other's ideas</p> <p>Identifying the areas that the author did well. Facts and research and connection to the movie that provide interest. Audience awareness</p> <p>Noticing the number of sources</p> <p>Asking questions of peers</p> <p>Discussion of sources and title</p> <p>Asking questions of the text. Audience awareness. Would the title inspire an audience to read this? Offering advice. Showing confidence.</p> <p>Concern for author's feelings! Understanding important of peer editing.</p>
---	--

<p>are just <u>helping them out.</u></p> <p>R: What do you think about how he ends it?</p> <p>S: <u>I like the ending.</u> It is <u>parallelism.</u> He <u>starts it off</u> and then he <u>ends it the same way</u> and <u>I like that.</u></p> <p>R: Is there a conclusion?</p> <p>S: Well, it <u>sums up</u> what CTE is.</p> <p>R: <u>That's weird. I don't like it. He needs to change the ending</u> because that is <u>just too hard.</u> It is <u>not working very well.</u></p> <p>S: That's the thing about it, <u>it is interesting but...</u></p> <p>D: (all talking at once!) Maybe he can <u>incorporate this into another paragraph</u> and have a <u>better ending.</u></p> <p>R: So why?</p> <p>S: I feel like...<u>sorry you can go first</u></p> <p>R: It's like, <u>it makes you feel bad, it's not working well,</u> but like <u>it should end off on a good point</u> instead of like a bad point.</p> <p>S: <u>To me</u> every piece of <u>writing is a story</u> and <u>I feel</u> like in every story <u>you expect a good ending</u> and it is almost like a bad one so it's kinda...</p> <p>R: But is it the truth?</p> <p>S: Yeah, and <u>that's important</u> but still I am like <u>ehh....</u></p> <p>D: I feel like he was... the <u>whole passage was interesting</u> and then you have <u>all these facts</u> and then you <u>just simply end it just like that.</u></p>	<p>Expressing opinion, showing confidence</p> <p>Understanding writing process and structure. Parallelism!</p> <p>Robin showing confidence!! Expressing an opinion. Understanding the ending. Robin being assertive.</p> <p>Expressing opinions. Understanding writing structure</p> <p>Working well in a group</p> <p>All sharing ideas</p> <p>Explaining her position, showing confidence</p> <p>Sharing opinion, Discussing conclusion</p> <p>Agreeing with peers</p>
---	---

<p>R: Yeah.</p> <p>S:That's true.</p> <p>D: It's just not... I don't know. It just makes me feel like, Oh, this person, I don't know. It <u>just didn't end right</u> because everything that you have learned....<u>I love how it pulls it back to his dad</u> but <u>you learn so much and then it ends with a simple sentence.</u></p> <p>R: so, maybe he could kind of expand on that?</p> <p>R: Or, just like <u>cut that part out</u> and <u>add different words.</u></p> <p>D: Or, <u>have like a relation</u> to it in the <u>last paragraph</u> because <u>I know</u> when I was reading the <u>last paragraph</u> it was just <u>so random</u> that at the end...it was like my dad...I just read about the NFL and then you are Samnging <u>back to your dad.</u> I think having an <u>easier transition</u> into it would probably help.</p> <p>R: Yeah. It's like a random sentence.</p> <p>S:(all laughing and agreeing) Also, the sentence before it gets to...it ends in another fact,</p> <p>I & R: Yeah...</p> <p>S: I have a hard time getting to what the <u>fact actually is.</u> It could end well but this one is <u>not a good ending</u> even without that last sentence.</p> <p>R: So even in that second to last paragraph?</p> <p>D: It also can probably...the fact that it ends with a fact, then I feel like <u>he will have to go more in-depth with the fact.</u> It depends on that because if you are trying to end a</p>	<p>Still discussing ending and providing evidence from text. Showing confidence.</p> <p>Robin giving advice! Still discussing ending of article and sharing ideas</p> <p>Showing confidence. Writing structure -- transitions</p> <p>Giving suggestions to improve article</p> <p>All agreeing</p> <p>Interactions between peers. Ability to communicate -- discuss, listen, agree, disagree and working in a group.</p>
--	---

you said the whole year was, “Is it credible?” and I just (all laughing) I just remember you saying it so much!

R: Yeah, and you had me for two years so you really heard it a lot! So, B had me in both 7th and 8th grade.

D: And did you do it both years?

S: Yes, but the second year I didn't get published. We didn't finish it.

D: Oh.

R: So, why do you think you didn't get published the second year?

S: For one, **there wasn't for sure research** on music and if it really does benefit the brain. There **were still too many questions** being asked and **too many things being researched** to actually make like an **actual information article** on it, so I feel like that was **definitely the biggest thing.**

R: Actually **deciding there wasn't enough there?**

S: Yes

R: Well, that was awesome! I thank you so much.

What we can see from this activity is that the students were definite in their understanding of author's connection, credibility and sourcing, and science explanation that is essential in a science news article. They built off each other's comments and negotiated with each other (Peers) in a congenial and helpful way. I was surprised at their level of commitment to the activity and how intense they were in showing what they knew. They did feel the responsibility

Understanding the need for **credible research** and **enough information** to write an article.

Showing confidence

<p>of helping a fellow writer (peer) in improving their writing. Showing confidence!!!</p> <p>Ability to communicate</p> <p>Learning Language – writing, citation, sourcing</p> <p>Learning through Language – learning content</p> <p>Living language – improving communication, showing emotion, gaining confidence</p> <p>Negotiation with Self</p> <p>Negotiation with Peers</p> <p>Negotiation with Audience</p>	
---	--

Appendix N

Example of Coding for Group Interview:

Living Language

Authentic Audience 111

Feeling pride/accomplishment/rewarding 11111111

Connecting to experts/getting a response 1111

Publishing 11111111

Increased interest in science 11

Working with a partner 1111

“Doing Science” 11

Building confidence 1111111111111111

Building tenacity/worked hard 111111

Connecting to World 1111

Choosing own topic/freedom 11111111

Having a connection 1111

Showing enjoyment 1111

Increasing engagement 11111

Seeing Value 111111

Identity as an Author 11

Major in Science 11

Reading 11

Science practice 11

Becoming an Expert 1

Having an Editor 11

CURRICULUM VITA

Marsha R. Buerger
7500 Oak Park Rd.
New Salisbury, IN 47161
(502) 727-6933

marsha.buerger@jefferson.kyschools.us

Academic Background:

Bachelor of Arts, Biology
University of Louisville
1998, 3.83 GPA

Rank I
Science Literacy
2009, 4.0 GPA

Master of Arts in Teaching
University of Louisville
Secondary Education/Science
1999, 4.0 GPA

Ph.D. Candidate
University of Louisville
Curriculum and Instruction
Science Literacy

Teaching Certifications:

Biological Science, Grades 8-12
Middle Grades Science, 5-9

Professional Experience:

Science Teacher, 7th Grade, 17 years, Noe Middle, Iroquois Middle, Farnsley Middle
Science Chair Person – Iroquois Middle – four years
Instructional Leadership Team – Farnsley Middle – two years
Team Leader – 8 years – Noe, Iroquois, Farnsley Middle
KTIP Mentor Teacher – 7 teachers – Science, ELA, Social Studies
Student Teacher Cooperating Teacher – 5 teachers
GEMS Teacher – 1 year

Additional Professional Experience:

Adjunct Instructor, Bellarmine University, MAT 596/598: EDUC 348/349
Teaching Middle School/Secondary Science

Co-Director, Louisville Writing Project (LWP)

SciJourn Director, Kentucky Writing Project (KWP)

Louisville Writing Project Fellow -- Participated in competitive Invitational Summer Institute, collaborated with teachers to create lesson designs, review peer writing, and analyze presentation demonstrations, and presented demonstrations of classroom instruction at fall and spring conferences.

Teacher Consultant -- Louisville Writing Project (LWP), Kentucky Writing Project (KWP) – Created and presented approximately 15+ Professional Development sessions on various reading and writing literacy strategies at LWP conferences, retreats, and week-long PD sessions.

Teacher Consultant -- National Writing Project (NWP), Advocate for Writing Science Literacy and selected to evaluate and create a Science Analytical Writing Continuum Assessment for science writing

Presenter – NSTA Convention in St. Louis, May, 2013 on increasing science literacy through science news writing

Presenter -- NCTE Conference, November, 2015 – with Jean Wolph, Director of Louisville Writing Project (LWP) and Kentucky Writing Project (KWP), Disciplinary Writing and the NSF-funded Literacy Approach of SciJourn

Facilitator – Leveraged Adolescent Literacy and Learning Initiative (LALLI), two-week, summer institute, 2012, 2013, 2014, 2015 sponsored by the Collaborative Center for Literacy Development. Graduate level literacy instruction course that provides support for content area teachers to promote deep understanding of literacy demands in the disciplines tied to the Common Core Literacy Standards.

Facilitator – Louisville Writing Project, Write Camp, 2015, 2016, presented to teachers and students the disciplinary writing practice of science journalism – SciJourn.

Director – KWP Writing Project Teacher Institute, “Science Literacy through Science Journalism”, designed to support teachers in engaging students in meeting the Common Core Standards of science literacy

Selected Member – “Becoming a Core Advocate”, 2013, sponsored by Student Achievement Partners

Selected Participant -- University of Missouri, St. Louis, National Science Foundation grant on improving science literacy through writing science news articles -- first middle school students published in the high school newspaper -- SciJourn

Selected Participant – LWP Content Area Literacy Action Research Team, National Reading Initiative, Carnegie Foundation

Selected Participant – Bill and Melinda Gates Foundation Grant, Common Core State Standards, Literacy Design Collaborative (LDC)

Awards:

Highest level of achievement for the Kentucky Green and Healthy Schools program, Commonwealth of Kentucky, Energy and Environmental Cabinet

Farnsley Middle School, Champions for Children Award

America's Greenest School Contest -- submitted student created video and voted in the top ten out of 1,400 elementary, middle, and high schools in the nation

Grants:

Michelin Educational Grant, \$17,129.00 for Solar Pond at Farnsley Middle School, 2016

Commonwealth of Kentucky, Energy and Environmental Cabinet, \$600.00 for Outdoor Classroom and \$300.00 for aluminum can recycling containers.

Lowe's Grant -- \$2,500.00 for outdoor classroom and raised bed gardens as sponsor of the Environmental Club

Additional committees and groups:

JCPS Writing Task Force, The KY Writing Projects Network Symposium of Writing Instruction in KY, Middle School Science Alliance, Magic in the Middle, Science Inquiry Institutes, Aquabots training (UK), Project Restore (Univ. Wisconsin)

Publications:

Buerger, M. R. (2016). Examining science news writing through the lens of writer's craft, writer's meaning, and writer's engagement, *Journal of Literacy Innovation*, 1(1), 19-24.

Buerger, M. R. (2006). Achievement gap: are we asking the right questions? *Kentucky English Bulletin*, Kentucky Council of Teachers of English/Language Arts, Vol. 55.

JCPS Global Connections, Celebrating Earth Day, 2008, and 2009.