

THE IMPACTS OF STRENGTH-JOURNALING
ON THE MIDDLE SCHOOL SCIENCE ENVIRONMENT

by

Nathan Loetz

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ABSTRACT

The VIA Institute on Character (VIA) is a non-profit organization that focuses on the scientific study of character strengths and virtues. It provides a framework for identifying and developing individual character strengths through interventions, one of which is strength-journaling. Strength-journaling is a reflective practice designed to enhance personal growth and deepen relationships. In this capstone, a strength intervention was administered in a middle school science classroom to improve the social-emotional quotient of the teacher, increase the salience of learning, and deepen relationships with students. The teacher wrote a journal for each student which highlighted one strength they demonstrated. The journal described the strength exhibited, expressed appreciation for it, and encouraged its development. A Likert-styled survey and an open-ended survey were conducted both before and after the students received the intervention. A t-test analysis of the resulting data did not reveal any significant change, with all data points falling below the critical value of 1.716. Positive results emerged from a thematic analysis of the open-ended survey and additional personal interviews which were conducted after the treatment period. The thematic analysis revealed that students value emotional engagement and social interactions as key factors influencing the retention, recall, and application of learning. Students also commented that teacher-student relational connections significantly contributed to their learning experience, and they expressed appreciation for attempts to deepen those relationships. It was concluded that the positive results were significant enough to continue experimenting with strengths not only with students, but also with staff members in the school. In the future, more strength journals will be written about students, and a special focus will be placed on discussing the VIA strengths with students who are new to the school. Communicating about strengths will become a part of the onboarding process for new teachers, and the development and integration of individual strengths will become a target for all staff members.

INTRODUCTION AND BACKGROUND

Context of the Study

The trend to focus on student-centered learning in K-12 science classes has brought many valuable improvements to school culture, but it often neglects the importance of student-teacher relationships. We should take time to consider the science teacher's role in establishing a healthy learning culture (Bellocchi, 2017). Be it a lecture, a flipped-classroom, or a project-based learning lab, we all can acknowledge that the social and emotional capacities of the person running the class makes a difference. Social-emotional abilities are something which can be continuously developed (Fredrickson, 2001), and all science teachers could use interventions to help them in this matter. Just as we are life-long learners of science, we should also be life-long self-improvers. Through a broadening of emotions and building of our social resources, we will become better communicators of science and more effective leaders of scientific culture.

To begin working on social-emotional improvements in my school, I implemented The VIA Institute's method of strength-journaling in my class of 20 junior high biology students (ages 13-14) in The Vienna European School in Vienna, Austria. The VIA's strength-journaling intervention is a positive-emotion and relationship-building practice which comes from the field of positive psychology (Niemic, 2017). If I found that strength-journaling positively impacted the quality of social-emotional resources in my classroom, I could use that success to inform the implementation of a school-wide program based on similar practices. I could utilize my position as curriculum coordinator to build a program at my school which would address the development of character strengths to help students to thrive academically, socially, and emotionally.

The Vienna European School (VES) is a private AHS school which resides in a peaceful district in Vienna, Austria. AHS is a type of Austrian school which is held to the highest academic standards provided by the government. To get into an AHS, students must earn above average grades in an elementary school (City of Vienna, 2023). While academics is a focus-point at VES, the school's mission goes beyond that and aims to provide "an education, which consists of the development of the mind, the body and the character" (Vienna European School, n.d.). I decided to introduce strength-journaling to address VES's broader goal to nurture the students' holistic development and create a positive learning environment.

While starting with strength-journaling may seem like a small step towards developing school-wide wellness, I think it would be imprudent to introduce a larger program into school culture without having had any personal experience. I think the first step towards starting a self-improvement program is to go through a period of 'living-it' myself. This time 'living-it' would not be wasted as research has shown that individual teachers who exercise positive psychology interventions experience increased social-emotional wellness which translates to improved academic achievement in their classrooms (Osher et al., 2020). Once I feel like I have internalized the values of positive psychology through experiences in my biology class, I could create a grassroots campaign with other teachers which could lead to a school wide change in culture.

Focus Question

My focus question was, How can strength-journaling impact the quality of social emotional resources and capacities in a science classroom?

My sub questions include the following:

- 1.) How can strength-journaling impact the emotional salience of students' science learning?
- 2.) How can strength-journaling impact the depth of social-emotional relationships between science teachers and students?

CONCEPTUAL FRAMEWORK

Overview

Science teachers have a valuable tool at their disposal in the form of strength-journaling, an intervention rooted in positive psychology. By incorporating this practice into their routine, science educators have the potential to enhance not only their own well-being of teachers but also the social and emotional dynamics of the learning space. Since learning intricately intertwines with emotions and social interactions, the positive impacts of strength-journaling have the capacity to contribute to an enriched and more meaningful learning experience.

Introduction and Origins of Positive Psychology

To improve psychology programs in schools, we need to rethink the idea that schools are constantly facing overwhelming challenges. The need for psychology programs is often established by painting a picture of schools in utter peril with students in the deepest pits of languishing and burnt-out staff members in full crisis mode, but a pessimistic outlook simply creates more outrage and perpetuates the negative parts of a school's culture (Johnson et al., 2019). While depression, anxiety, and other mental health issues are valid concerns, there are plenty of people in schools who do not have serious issues but could benefit from evidence-based well-being practices. Moreover, there is plenty of evidence of a decrease in the incidence of mental illness over the course of the past several decades (Pinker, 2019). Rather than approaching psychology as a way to solve problems, a school could focus on using positive psychology to broaden the emotional skills of its students and teachers and improve social relationships. A more socially authentic and emotionally relatable school experience could be

gained through developing positive psychology programs (Seligman, 2018), and that gain could lead to more memorable and applicable learning (Immordino-Yang, 2016). The best way to implement such a positive psychology program might be to start with individual teachers rather than start with something school wide. Through research-backed positive psychology interventions such as strength-journaling, science teachers can improve themselves and those self-improvements can lead towards a grassroots movement which changes the entire school's culture.

When Martin Seligman became the president of the American Psychological Association (APA) in 1998, he set out to change the organization's focus on solving problems to a focus on self-improvement. Seligman and Csikszentmihalyi (2000) defined positive psychology as being about

well-being, contentment, and satisfaction (in the past); hope and optimism (for the future); and flow and happiness (in the present) ... the capacity for love and vocation, courage, interpersonal skill, aesthetic sensibility, perseverance, forgiveness, originality, future mindedness, spirituality, high talent, and wisdom... civic virtues and the institutions that move individuals toward better citizenship (p. 5).

Then in 2011, Seligman (2018) published a framework for implementing positive psychology which uses five pillars to form the acronym PERMA. These five pillars are Positive emotion, Engagement, positive Relationships, Meaning and Accomplishments. Since publishing the PERMA framework, research has shown that people who do interventions based on these pillars show improvements in well-being and life-satisfaction (Seligman, 2018). By addressing these pillars in a school setting, students and teachers may begin to flourish, leading to improved communication and deeper learning. As a starting point, science teachers can begin by implementing strength-based interventions to address the P and R pillars, positive emotions and

positive relationships. When Seligman later founded the VIA Institute on Character, he created several strength interventions which science teachers could use in the school setting (Seligman, 2011). Not only can science teachers experience improved P and R from these interventions, but they can also improve the salience of their learning objectives.

Mind, Brain, and Education

The emotional and social benefits of positive psychology interventions can have a great impact on learning and cognition in science classrooms. A student in a science class can study facts in school but without a wide range of emotions and social relationships, they might not be able to properly consolidate, recall and apply that knowledge. Research has even suggested a positive correlation between having a high socioeconomic status during childhood and increased brain development (Chan, 2019; Nelson et al., 2014; Rakesh & Whittle, 2021). These increases in brain development could be the result of those children having lived in environments which are rich in social and emotional experiences. Neuroscientist Immordino-Yang (2019) supports this claim and she suggests that, “it is largely socially transmitted, emotionally salient epigenetic triggers that teach the brain how to grow and think” (p.196). This belief in epigenetically-triggered development drives curiosity around the possible impacts of positive psychology interventions such as strength-journaling. If socially transmitted emotions have such an impact on brain growth and learning, it could benefit science teachers to practice psychology interventions to develop their social and emotional resources.

The theory that emotions influence cognition wasn't always acknowledged, and this possibly contributed to an undervaluing of social-emotional health in education. Up through the 1980s, it was thought that behavior and cognition originated in the brain in a higher-order

thinking system which functioned separately from a lower-order emotional system (Immordino-Yang, 2016). It was the belief that the higher-order thinking system ruled the mind and governed the lower-order emotional system to keep it in check. As neuroscientific research progressed, the old paradigm was challenged by a series of studies which suggested that the mind's logical systems are firmly intertwined with its emotional systems (Damasio, 1994; Eslinger & Damasio, 1984). These studies were done on patients with lesions on their ventral medial prefrontal cortex (vmPFC). The vmPFC is associated with emotional and social processing and, consistent with that association, the patients with lesions there showed difficulty understanding the emotions of others and they struggled to honor social conventions and follow ethical rules. Conversely, it was noticed that the patients had also developed difficulty making logical decisions. These results were initially confusing because there was no damage to their dorsal lateral prefrontal cortex (dlPFC), the region of the brain associated with logical thinking. Furthermore, when tested, these patients had not lost any core knowledge of facts which would influence their rational thinking. The facts were still there in the patient's memory, they just were not being recalled and applied in the appropriate situations.

These findings lead towards an updated paradigm of education which includes a focus on embodied emotions. Damasio (1994) started to believe that the emotions and social interactions processed in the vmPFC work to influence the way information is processed by the dlPFC. It was suggested that emotions and social situations create embodied markers and frameworks which guide people's consolidation and recollection of information. Damasio called this embodiment concept the somatic marker hypothesis. The somatic marker hypothesis suggests that, during cognition, the mind plays out scenarios to ask the question 'how would that feel' when it decides

which information to use and how to implement it (Damasio, 1996). According to this hypothesis, for learning in a science classroom to be memorable and applicable, a student must be able to connect their classroom learning with emotional and social experiences. These embodied emotions and social experiences then later serve as cues for how and when a student should use that learning in the future.

Since Damasio first introduced the somatic marker hypothesis, more research has emerged which shows that embodied emotions and social experiences serve as cues for memories. One example of the hypothesis in action comes from an experiment done with mathematicians (Zeki et al., 2018). These mathematicians were put in an fMRI scanner and asked to make quick judgements of equations. While in the scanner, the mathematicians judged some equations as being beautiful and elegantly formulated while others were ugly and awkward. Zeketi et al.'s (2018) scans showed that the mathematicians were activating the same regions as are activated when people have a subjective reaction to the beauty of a painting. The results of this study suggested that the mathematicians' judgements were made based on socially acquired interpretations of feelings (Zeki et al., 2018). Since these feelings were influenced by social and emotional experiences had in a music classroom, it follows that the emotions experienced during a science class also influence how learning is consolidated and recalled. If that learning was especially salient, the emotion associated with that information might help cue learners to retrieve and apply information from long-term memory in the future.

When a student is presented with a problem, the brain might quickly ask, 'how would it feel to use that mathematical formula? Would it work in this social context?' If the emotions

associated with that formula and the current context match, that formula might be accessed from memory and applied. As Immordino-Yang (2016) puts it,

because these choices are grounded in emotion and emotional thought, the physiology of emotion and its consequent process of feeling have enormous repercussions for the way we learn and for the way we consolidate and access knowledge (p. 40).

It is not enough to simply know facts, there must be some emotional and social connection with that information for logical cognition to happen.

Considering this connection between feeling and knowing, it would be of benefit for science teachers to implement strength-journaling to improve their well-being so that they can express a broad range of emotions and develop high-quality social relationships with their students. The broader a teacher's emotional range is and the deeper their social connections are, the more likely their learning objectives would be remembered and subsequently applied in later situations. A cross-campus focus on positive psychology would have a great impact on learning in a middle school, but it is best to start with personal interventions like strength-journaling before implementing a school-wide comprehensive program.

Implementation of Positive Psychology in Schools

Over the course of the past fifteen years, several positive psychology programs have been designed and implemented in schools around the world and these programs have had varying results. One significant variable seems to be the level of importance placed on teachers having a period of doing positive psychology interventions themselves (living-it) before they try to teach those interventions to their students.

Geelong Grammar School

Geelong Grammar School implemented a school-wide positive psychology program in Australia. It has been heralded as a flagship program which has shown great success (Hoare et al., 2017). This program was designed by Seligman in 2008 to promote student and staff wellbeing and flourishing by addressing each of the five pillars of PERMA and infusing them into daily classes and a school's overall culture. This infusion was achieved through a four-stage cyclical process of learn it, live it, teach it, embed it.

In the first stage of implementation, 'learn-it,' school staff members are expected to study the research behind an evidence-based positive psychology intervention such as strength-journaling. Next, school staff members tried doing the intervention during a 'live-it' part of the process. Only after that could the school staff members move on to teaching it to students and embedding it in the school's culture. Hoare et al. (2017) stated that,

the live-it component allows individuals to become authentic role models. Pos Ed concepts become genuine and experiential for school community members, through which sustainable change is more likely to occur (p. 62).

Science teachers will not be effective if they simply stand in front of a class and follow a prescribed wellness program; the teacher must have already had personal experiences with interventions. Not only does this make the 'teach it' stage of implementation more authentic, but it also serves to broaden the emotional range of the science teacher and increase their ability to connect with their students and communicate learning.

While the end-goal of implementing a positive psychology program in a school might be to eventually change the culture of the whole school, benefits could already be realized through individual science teachers practicing positive psychology interventions themselves. Jennings et al. (2017) stated that, "teachers with high levels of social and emotional competencies are able to promote high quality classroom interactions that promote student learning" (p. 1021). In this

study, it was found that teachers who took part in positive interventions based on positive emotions, mindfulness and social care had increased well-being which transferred to the improved social and emotional wellbeing of the class. Since students benefit from the time science teachers spend ‘living it,’ this time is not simply wasted while preparing for a broader integration of larger programs. The period of ‘living-it’ leads science teachers to experience increased social and emotional competencies which impact the learning of their students.

The Compassionate Schools Project

Not all programs have been implemented as well as the one at Geelong Grammar School. Implementation of some programs, such as the Compassionate Schools Project, forego stages of living-it and begin right away with embedding it. The Compassionate Schools Project was initially piloted in several schools in the United States in 2015 with the goal of helping K-12 students develop skills and attitudes that promote well-being, compassion, and positive relationships with others (Compassionate Schools Project, 2022). The program is divided into five pillars: (1) mindfulness, (2) compassion, (3) body awareness, (4) healthy eating, and (5) exercise. As with many other positive psychology programs, the philosophy behind these pillars is informed by Maslow’s (1943) concept of a hierarchy of needs which must be fulfilled before the student can self-actualize. Through fulfillment of needs, it is thought that students can achieve wellbeing and reach their potential. This philosophy has many corollaries with the values behind the PERMA pillars used at Geelong Grammar School, so it can be assumed that variations in the success of the program are more likely to be related to the way it was implemented rather than problems with the program itself.

While Geelong Grammar School implemented its program in a four-step process which included a stage of living-it, the CSP program is simply implemented simultaneously without the teachers having built an authentic relationship with the practices. Forgoing of a stage of living-it, has had negative consequences on the implementation of the CSP program. In a critique of the implementation of CSP, Mischenko et al. (2021) pointed out that there was a lack of buy-in from students because teachers were not already practicing the positive psychology interventions themselves. Mischenko et al. stated that teachers, “expressed feelings of low self-efficacy when they initially began to deliver the curriculum because they were overwhelmed with the newness of the content provided to them and the amount of content they were expected to instruct” (p. 1664). A similar problem arose in the implementation of mindfulness program studied by Dariotis et al. (2017). In their analysis of the program, Dariotis et al. stated that the teachers were not ready for the implementation of the program and that the school should have taken time to possibly involve teachers in the program before it was implemented. Without a stage of living-it, the school was not ready to teach and embed the practices and values of positive psychology interventions such as strength-journaling. These problems with buy-in and ‘readiness’ contrast with the successes of the program at Geelong, which included an established period of ‘living it’ before teachers were expected to ‘teach it.’ If science teachers seem inauthentic to the students, then their social relationships may suffer, and their interventions might not resonate with the students emotionally. Such negative experiences could hinder the salience of learning in a science classroom. It is best to begin with more personal interventions such as strength-journaling rather than large school-wide programs. Through beginning with strength-journaling,

science teachers will build an authentic connection to positive psychology which could lead towards effective implementation of larger, school-wide programs.

Strength-Based Positive Psychology Interventions

Science teachers could write strength-journals for their students as positive psychology during their stage of 'living it.' This intervention addresses the research supported values behind both the P and R pillars of PERMA by encouraging positive emotion and increasing the quality of student-teacher social connections (Seligman, 2018). Through journaling about strengths, the teacher could gain an increased sense of positive emotion, purpose, and engagement in their relationships with their students. Evidence shows that taking part in interventions based on character strengths can lead to improved social-emotional health, engagement in school and even higher grades (Darwish, as cited in Niemiec, 2017). The improved social-emotional competencies gained through strength-journaling can lead towards more salient learning experiences for the students.

The first step to writing a strength journal is to identify the character strengths of the student using the VIA Classification (VIA Institute on Character, n.d.). Simply taking the time to think about a student's positive qualities and providing focused examples can help to build a high-quality connection. Since Jane Dutton first coined the term in 2003, research has shown that High Quality Connection (HQC) interventions can have a positive impact on well-being (Dutton, 2014a). Dutton characterizes high-quality connections as instances where both participants feel a sense of vitality while being held in positive regard during a shared experience of mutuality (Dutton & Heaphy, 2003). HQC are meant to be achieved through exercising a targeted focus on showing curiosity and interest in others. By providing an anecdote of a time a student showed

strength, teachers demonstrate that they are curious about their students and that they have an interest in their character. Similar strategies were also tested in three studies done by Major et al. in 2018. All three studies suggested an association between social flourishing and what they call positivity resonance. Major et al. (2018) define positivity resonance as, “a type of interpersonal connection characterized by shared positivity, mutual care and concern, and behavioral and biological synchrony” (p. 1633). Through positivity resonance, HQCs not only increase a sense of social well-being, but they also have the dual function of contributing to an emotionally positive learning environment. Such an emotional environment could help facilitate the categorization of learning in a science classroom and prepare that learning for future application. Aarrestad et al. (2015) state that HQC interventions,

achieve this dual function by, respectively, enhancing emotion carrying capacity, reciprocity, and sensory-motor connectivity in knowledge creation. In short, people experience being more productive and alive in knowledge creation when there is room for more emotionally intense and overlapping interaction (p. 96).

While it may seem strange to write about a student’s character, teachers who focus on targeted strength interventions might gain positivity resonance which they would bring to their classroom. This resonance could increase the salience of the emotional connections the students make with the learning objectives, and lead to a more authentic, embodied learning experience.

The second step in writing a strength journal is to express appreciation for those character traits. Studies have shown that reflecting on and expressing feelings of gratitude for others can serve as a base from which deeper, meaning filled relationships can grow (Layous et al., 2017; Ma et al., 2017). The success of this intervention is based on the broaden-and-build theory developed by Fredrickson (2001) which states that, positive psychology interventions can make one more open to novel positive experiences in the future. If a teacher takes the time to express

positive appreciations for a student's strengths, those positive emotions might create a space for new thoughts about novel ways to develop their relationship further. Through exercising those novel social behaviors with a student, the teacher could build new social skills which they can use as a resource.

The benefits of expressing gratitude for character strengths goes beyond improving the wellness of the students, it also has an impact on the learning environment. A series of studies conducted by Caleon et al. (2019) showed that expressing gratitude improved the relatedness of social partners in schools and improved the culture of the school as a whole. Caleon et al. claim that "promoting a grateful orientation towards life can go a long way in terms of inducing the occurrence of cascading effects on adaptive school outcomes that can help learners to flourish" (p. 310). If learners are flourishing, they might be more receptive towards new social connections and having novel emotional learning experiences. Through those new connections and experiences, students could gain new ways to categorize and apply their learning. While Caleon et al.'s research was conducted in Singapore, similar results have been found around the world. Michailidis (2021) conducted a similar study in Greece and they concluded that

it seems that gratitude is a two-dimensional concept, as it is related to children's personality traits, such as the self-concept, and at the same time it is a feeling that contributes to the emotional stability and to positive social and interpersonal relationships among children (p. 214).

Through gratitude interventions, students could build themselves up and, in doing so, also broaden their emotional and social awareness which may lead them to develop novel connections in their peer group. Equally so, if teachers practice gratitude journaling during a 'living-it' stage, they may also be successful in developing positive social relationships in their classroom and thus deepen the emotional connections surrounding their learning objectives.

Conclusion

Strength-based journaling would improve the social-emotional resources and capacities of science teachers which, in-turn, would improve the emotional salience of learning during discourse in science lessons. The development of research in line with the somatic marker hypothesis has lead science education researchers such as Bellocchi (2022) to make bold claims such as, “social bonds and knowledge construction are the same phenomenon” (p. 771). Considering the connection between emotions, socializing and learning, science teachers should strive to improve their emotional range and develop their social interactions with their students. As Hufnagel (2017) puts it, we need to address the expression of emotions as those emotions are the framework for science learning in our classrooms. One way science teachers can attend to this expression is through writing strength-journals. Once we science teachers have cultivated better social and emotional capacities, we can lead through example (Bellocchi, 2017). If we build an authentic relationship with positive psychology, we can more effectively lead our students in developing themselves. Through ‘living-it’ by writing character strength journals, we express feelings of gratitude and build high-quality-connections with our students. These feelings and relationships will help us exude an authentic positivity and improve the emotional atmosphere and cultural effervescence in the classroom. Once we science teachers have reached this point, we can engage others in the narratives of our research and share our encounters and experiences (Bellocchi, 2017). If we truly internalize the PERMA values behind strength-journaling, we can then embark on a grassroots campaign to teach others about the cognitive benefits of positive psychology and work to embed it in our greater school culture.

METHODOLOGY

Introduction

The aim of this research was to examine how positive psychology interventions impact the qualities of social-emotional resources and capacities in a science classroom. The goal was to determine the extent to which journaling about students' strengths could foster more robust social-emotional connections, resulting in deeper student-teacher relationships and a more meaningful learning experience. The benefit of this research was that emotionally salient learning experiences would be more memorable, and those memories would be more likely to be recalled and applied in the future. In this study, psychology interventions were not being used to solve problems, but rather to improve on an already stable situation. The research methodology for this project received an exemption by Montana State University's Institutional Review Board and compliance for working with human subjects was maintained (Appendix A).

Demographics

The students used in this study had already developed a well-established relationship with their teacher. By the start of the treatment period, I already had an academic relationship with my students for five and a half years; this being my fourth year as their science teacher. As such, they knew and trusted me. Additionally, I have held a position of authority as the original teacher in this school when it was just eight students. Considering the depth of their relationships and their previous connections with me, I was able to collect authentic and honest data throughout this social-emotional study.

At the start of this study, the students already had their basic socioeconomic, linguistic, and academic needs fulfilled, which ensured their foundational well-being. They came from a wealthy, urban, private junior high school in a peaceful neighborhood in Vienna, Austria. Most of the students at this school were ethnically Austrian and they held German as their mother-tongue, but they also spoke fluent English. The students were of a high academic level, as this school was an AHS level school. AHS is a type of Austrian school which is held to the highest government standards. To get into an AHS, students must earn above average grades in an elementary school (City of Vienna, 2023). The completion of this program is comparable to AP level classes in America. The school had 127 students in total, and the grade used for this study, JHS4, contained 38 students. The ages of JHS4 kids ranged between thirteen and fourteen years old. This JHS4 group was split up into a 4A class which contained 20 students and a 4B class which contained 18 students. Since the demographics of the two classes were very similar, the 4A class was chosen to be a treatment group while the 4B was left as a control. Both classes received the same academic lessons from the same teacher, while only the 4A was given the social-emotional based treatment. Students in both classes were highly motivated to achieve academically because of their plans to attend university, and their general curiosity. Additionally, both groups had a strong connection with their teacher based on a years-long foundation of positive experiences together. This healthy environment and previously fostered dynamic provided an apt environment for positive psychology-based research in a classroom where needs were met, and trust and rapport were already well-established.

Treatment

A strength-journaling intervention was employed in the treatment group to study its impacts on the social-emotional resources and capacities in a science classroom. In his book on character strength interventions, Niemiec (2018) writes that recognizing someone's strengths and expressing appreciation of those strengths serves the purpose of "boosting positive relationships" (p. 232). Niemiec describes strength-journaling as being a process which follows three steps: (1) recognize strengths, (2) write about how you noticed it, and (3) express why that strength is important to you. To implement Niemiec's process with the treatment group, the students' strengths were identified using the VIA Classification as a guide (Appendix B). Afterwards, I wrote a short paragraph which included anecdotal evidence of those strengths and an expression of appreciation for those character traits (Figure 1). The journals were written during the first two weeks of the treatment period and shared with the students immediately afterwards. To assess treatment effects, gathering both pre and post-test data is crucial (McKinley, 2016). Therefore, Google Forms was utilized to conduct student surveys before and after the treatment period. Data from those surveys was analyzed along with data from post-treatment personal interviews to determine the impact of the intervention.

Words from your science teacher:

Student, I had a really hard time deciding what your strength is because there are so many really great things about you but, while thinking about that, I realized that your strength is your **humility**. You are amazing on so many levels, but you never feel the need to brag about it and draw attention to yourself. Maybe that sounds silly, but this is a strength that a lot of people do not have. You also don't let your success blind you – you know that everyone is capable of mistakes so, when bad things happen, you notice it and you work to correct the problem. This humility is what helps you be so wonderful. You have a sense of who you are, and that helps you grow. I want you to take a second and think about this strength that you have. Think about ways you can use your humility to inspire others to be ok with having made a mistake sometimes. Work to inspire people to calm their egos and be a bit more real like you. Help them see that they don't always need to be 'the one who was right' and that, instead, they should take some time to connect with others and share the spotlight with them. Through using your humility, you help build a healthy and positive community for us. Great job at being the best at not always needing to be the best! I want you to know that I've always been thankful for that, and I appreciate what you bring to our class.

-Mr. Loetz

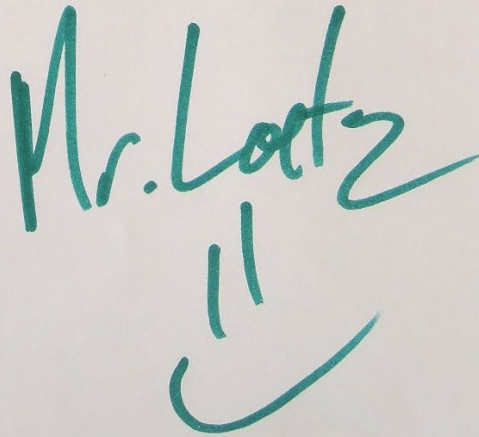


Figure 1. Example letter printed on half-letter sized paper, highlighted and signed.

To collect valid, insightful data about social-emotional experiences during the learning process, the research required a quasi-experimental design. This design balanced both quantitative and qualitative data and was triangulated to provide a comprehensive understanding. Quasi-experimental designs are commonly employed in the realm of educational research, particularly when investigating emotional states (Mayeaux & Olivier, 2016; Persaud, 2016). Mayeaux and Oliver (2016) places a special emphasis on the importance of mixed-methods design when doing research, and they focus on the utilization of qualitative data to complement and reinforce information derived from quantitative data. To study complex topics such as emotions, sociality, and relationships, it was not sufficient to simply quantify that data in numbers and leave it without support. Analysis of complex experiences required that nuanced qualitative data was also collected to provide comprehensive insights and understanding. The numerical data showed the presence and magnitude of the impact, while the qualitative data served to explain why and how there was an impact at all.

Additionally, it was considered insufficient to assume that changes in the treatment group's data were attributable to the intervention. Including a control group gave the results of the experiment increased validity, as it provided a comparison with a similar sample space. The students in the control group shared the same demographics as the treatment group, and they experienced the same lessons. While the control group was considered non-equivalent since the students were not randomly assigned, this aspect of quasi-experimental design has proven to be an effective method for research in schools (Denny et al., 2017). The use of the control group ensured that the results of the analysis were representative of the terms of the study, and not open to confounding factors such as variations in the lessons' topics or the time of year.

Data Collection and Analysis Strategies

As previously stated, a quasi-experimental design was employed for this study. One advantage of this design was its suitability for collecting and triangulating both quantitative and qualitative data, which is particularly crucial for research that depends on communicating complex emotional states. The data collection methods utilized in this project are identified in Table 1. Quantitative data helped keep the analysis objective, while open-ended survey questions and personal interviews gathered more nuanced information about student impressions.

Data Collection Methods

Table 1. Data Triangulation Matrix.

Data Collection Instruments	Focus Questions		
	How can positive psychology-based interventions impact the quality of social emotional resources and capacities in a science classroom?	How can strength-journaling impact the emotional salience of students' science learning?	How can strength-journaling impact the depth of social-emotional relationships between science teachers and students?
Impressions Survey	x	x	x
Open Response Survey	x	x	x
Personal Interviews	x	x	x

Five Primary Themes. The data collection instruments in this capstone measured social and emotional qualities which were categorized under four themes, and the phenomenon of closeness was recognized in the fifth theme. The five primary themes were organized as follows:

1. Initial Engagement – What impressions did the students have about social and emotional qualities experienced at the *start* of a science lesson?

2. Experience During Learning – What impressions did students have about social and emotional qualities experienced *during* a science lesson?
3. Impact on Retention and Application – What impressions did students have about the impacts of social and emotional qualities on their ability to recall and apply learning?
4. Teacher’s Social and Emotional Capacities – What impressions did students have about their teacher’s emotional and social qualities?
5. Depth of Relationship with Teacher – What impressions did students have about their closeness with their teacher?

To address the focus questions of this capstone, it was important to look for trends in the data within the context of the five themes. If an analysis showed that there were significant changes in student impressions under themes one, two and four, that would suggest that the treatment impacted the quality of social-emotional capacities in the classroom. If an analysis showed significant changes in the data from theme three and four, that would suggest that the treatment impacted the salience of learning. If there were significant changes in the data from themes four and five, that would indicate that the treatment impacted the teacher’s ability to connect with the students on a social-emotional level. Data related to these five themes was gathered using Likert surveys and expanded upon with open-ended surveys and personal interviews with students. Since relationships are a sensitive matter, the surveys were done voluntarily and anonymously. The interviews were also voluntary, and student names were not included in the data. These measures ensured the comfort of the students and increased the validity of the data.

Impressions Survey. An Impressions Survey with Likert-scale questions was utilized pre and post treatment to collect numerical data on emotions, sociality, and relationships (Appendix C). The goal of the Impressions Survey was to give a numerical value to the impact that strength-journaling had on the social and emotional aspects of learning science. Hampson (2014) suggested that Likert-scale surveys could be effective ways to collect data on emotional experiences so long as the subjects did not have difficulties with communication and literacy when compared to average students. Since the students sampled in this capstone were academically advanced, there should have been no problem with the validity of the data which was collected via the Impressions Survey. Likert-scale surveys have also been shown to be effective ways to assess sociality and closeness (Miczo & Burgoon, 2008). This style of quantitative research was successfully used to collect numerical data in a study which judged social expressions of guilt and relational closeness. While the experimental model in that study demonstrated that Likert surveys helped researchers analyze closeness and sociality in private relationships, this same model can provide a valid framework for collecting data in academic relationships.

In addition to responding to traditional Likert-style questions, the students were also asked to report on how strongly they associated with emotions and situations depicted in images. Cameron (2016) had success collecting student impressions of athletics by asking them to rate how well photos represented their feelings about sports. Drawing inspiration from Cameron, this capstone utilized Microsoft's Image Creator to create the images for Likert surveys. Image Creator uses an AI algorithm to create its images based on a very large and diverse dataset of images collected from all around the world (Ehrenkranz, 2021). Using this tool helps ensure that

the images were unbiased representations of emotion and sociality. While the explicit goal was to collect authentic data, AI art also provided a unique opportunity to try something new and exciting.

Open Response Survey. Since it was not sufficient to simply quantify complex emotions with numbers, the Open Response Survey was utilized pre and post treatment to add depth to the results of the Impressions Survey (Appendix D). The Open Response Survey included questions which the students could answer using their own words rather than just numerical values. Mayeaux and Olivier (2016) wrote that they used to hold quantitative data from surveys in a higher regard than open-ended responses, but their position on this matter matured as they realized that they had a lot of questions which they couldn't answer with numbers. Mayeaux and Olivier wanted to do research on attitudes in school, but quantitative data alone did not provide them with information which was adequate to form meaningful conclusions. Once Mayeaux and Olivier began using open-ended questions, they found that the most exciting elements of their studies came from qualitative data. Similarly, the Open Response Survey used in this capstone utilized open-ended questions to gather student impressions. These questions were designed to generate a large sample of broad responses which could be thematically analyzed and compared to the results of the Impressions Survey. Quotes and keywords were organized to correspond with the five primary themes established for this study, and that data was analyzed to establish trends and patterns. According to Tyson and Burchett (2019), thematic analysis of open-ended survey data provided them with valuable information about trends and patterns in attitudes from parent feedback. Similar results were expected from the design of the open-ended student surveys used in this capstone. The patterns and trends which emerged from analysis of the Open

Response Survey responses were then to be expanded upon during interviews. These interviews were designed to provide even further insight into emotions, sociality, and relationships in a science classroom.

Personal Interviews. To pull together the data from the Open Response Surveys and Impressions Survey, Personal Interviews were conducted with the students after the treatment period had ended (Appendix E). Similar to the previous two instruments, the questions in the Personal Interviews were written to align with the Five Primary Themes. The goal of this alignment was to maintain clear study criteria which could be expanded upon in depth. Mayeaux and Olivier (2016) stated that interesting trends which emerged from thematic analysis of survey data could be expounded upon with data collected during interviews. They suggest that interviews should serve to create a more extensive analysis than the one which was previously completed (Mayeaux & Olivier, 2016). To collect novel data, the Personal Interview questions were designed to gather detailed anecdotes which other surveys wouldn't have collected. The telling of anecdotes comes more naturally when done face-to-face rather than on a written survey. In this way, the Personal Interview instrument is not simply a redundant form of the Open Response Survey instrument. Rather, it provided a unique set of data which helped explore the five primary themes in more detail so that a full and comprehensive analysis could be made. Pre-formed questions served as a guideline for the interview and provide structure, but additional spontaneous prompts were provided when the students needed a question to be clarified. The students were also encouraged to think out loud, and this helped the interviewer notice if they were understanding the question correctly. Franc et al. (2018) found that this approach elicited more meaningful data when conducting cross-cultural interviews with children about their well-

being. The research found that employing purely structured interviews in various European countries sometimes led to cultural misunderstandings. In contrast, semi-structured interviews, where children were prompted to express their thoughts aloud, proved valuable. This approach helped reveal misunderstandings stemming from the wording of questions, and the benefits of using probes to guide children towards more meaningful responses (Franc et al., 2018). Since the Personal Interviews done in this capstone were conducted between people of different cultures, it was beneficial to use such a semi-structured format.

The interviews were conducted one-on-one in the teacher's break room. A sample of five students were randomly selected for this interview, and the interviews lasted around 10 minutes per student (Kvale, 2007). To accommodate for comfort, students were told that they could decline to participate in the interview. To accommodate for privacy, the interviews were not recorded and names were not collected. Rather, notes were handwritten in a notebook. After the interviews were completed, a thematic analysis of quotes and keywords from the notes was made using the five primary themes. That analysis was then later triangulated with the data from the Open Response Survey and Impressions Survey to see if strength-journaling had a meaningful impact on the social-emotional aspects of science learning.

Analysis Strategies

To provide a comprehensive understanding, a combination of qualitative and quantitative analysis was completed. The qualitative aspect allowed for in-depth exploration and interpretation of nuanced factors, while the quantitative analysis provided statistical insights. Together they offered a robust and well-rounded approach to capture a more holistic interpretation of the research findings.

Quantitative Analysis. To analyze the quantitative data collected during this study, *t*-tests were conducted on the Likert score survey responses. Denny et al. (2017) implemented *t*-tests in their study on students' impressions of the multiple intelligences teaching approach. One-tailed paired *t*-tests were employed in Denny et al.'s study to compare data from the pretest and posttest results, and unpaired *t*-tests were used to compare with the control group. Since the research methodology used in this capstone also focuses on student impressions, the analysis strategies for this capstone were designed to utilize those same techniques.

The Impressions Survey was administered before and after the treatment period to both the treatment and control groups. The results of these surveys were to be analyzed using both paired and unpaired *t*-tests. The paired *t*-tests were used to show if there was any significant change in impressions of the students in the treatment group while the unpaired *t*-tests were to be used to determine whether there were significant differences between the treatment and control groups after the treatment.

The null hypothesis (H₀) posited that there would be no significant difference in student impressions under themes one, two, and four, which would suggest that the treatment did not impact the quality of social-emotional capacities and resources in science classes. The null hypothesis (H₀) posited that there would be no significant difference in the data from themes three and four, which would suggest that the treatment did not impact the emotional salience of learning objectives in science lessons. The null hypothesis (H₀) posited that there would be no significant difference in the data from themes four and five, which would indicate that the treatment did not impact the depth of social-emotional relationships between science teachers and students.

If the results of the analysis show a t-value that exceeds the critical value of 1.761 under themes one, two and four, then the alternative hypothesis would be supported, suggesting that the treatment had an impact on the quality of social-emotional capacities and resources in science classes. If the analysis of theme three results in a critical value which exceeds 1.761, that would suggest that the treatment impacted the emotional salience of learning objectives in science lessons. A critical value over 1.761 from the analysis of responses under themes four and five would suggest that the treatment impacted the depth of social-emotional relationships between science teachers and students.

Qualitative Analysis. Themes which emerged from the data gathered by the Open Response Survey and Personal Interview instruments were analyzed to look for trends. These themes were organized by utilizing *a priori* coding to align with the five themes previously established. In contrast to *in vivo* coding which helps eliminate researcher bias, *a priori* coding is more appropriate when the researcher wants to confirm or invalidate previously established beliefs (Saldaña, 2015). Since the goal of this capstone was to test the validity of claims about the benefits of strength-journaling, it followed that the analysis should focus on themes previously established in those claims. This thematic analysis allowed for contextual nuances to be discerned. Persaud (2016) wrote that this approach is similar to how one judges the performance of a player during a basketball game. The player might not have scored many points for the team himself but, through a qualitative analysis of his efforts, his contributions towards the team's success might become more apparent. Similarly, numerical data about emotions, sociality and relationships might not tell the whole story of what is happening in a classroom. To provide a clearer assessment, the responses to the Open Response Survey and Personal

Interviews were thematically analyzed to find patterns and trends which tell a more detailed story than the Impressions Survey could provide alone. To look for significant changes in the Open Response Survey data, student responses were numerically coded to compare within and between the study groups. As each theme was mentioned in a survey, the response was coded with a positivity score which ranged from 1-3 with 1 being negative, 2 neutral, and 3 positive. The scores from the pretests were averaged and compared with the average posttest positivity score for analysis. Majaro-Majesty (2018) asserts that combining the use of a *t*-test with thematic analysis is a valid way to analyze data about complex relationships. Combining the use of both thematic analysis and *t*-tests lead towards the building of a rich, meaningful interpretation of the qualitative data.

DATA ANALYSIS

Quality of Social-Emotional Capacities and Resources

The null hypothesis posited that there would be no significant difference in student impressions under themes one, two, and four, which would suggest that the treatment did not impact the quality of social-emotional capacities and resources in science classes.

T-Test

A *t*-test was performed to see if there were significant differences in student impressions of the quality of social-emotional capacities and resources. The analysis of pretest and posttest Impression Surveys responses revealed that there was no statistically significant change observed across any of the three themes. The *t*-test results yielded values of 0.189, 0.221, and 0.169 for the respective themes, all of which were above the alpha of 0.05. Since all data points were above significance level, it could not be quantitatively demonstrated that the intervention impacted the quality of social-emotional capacities and resources.

Content Analysis Coding

A form of content analysis was used to quantify qualitative data collected in the Open-ended survey. The analysis of the Open-ended Survey responses utilized a coding system ranging from 1 to 3, where 1 represented negative responses, 2 represented neutral responses, and 3 represented positive responses. The average scores were calculated for each theme on both the pretest and posttest. The results showed highly positive scores across all three themes in both the pretest and posttest. For example, theme 1 had an average pretest score of 2.8 and post test score

of 2.9. Theme 2 had a pretest score of 2.8 and a posttest score of 3. Theme 4 scored 2.8 in the pretest to 2.7 in the posttest (Figure 2).

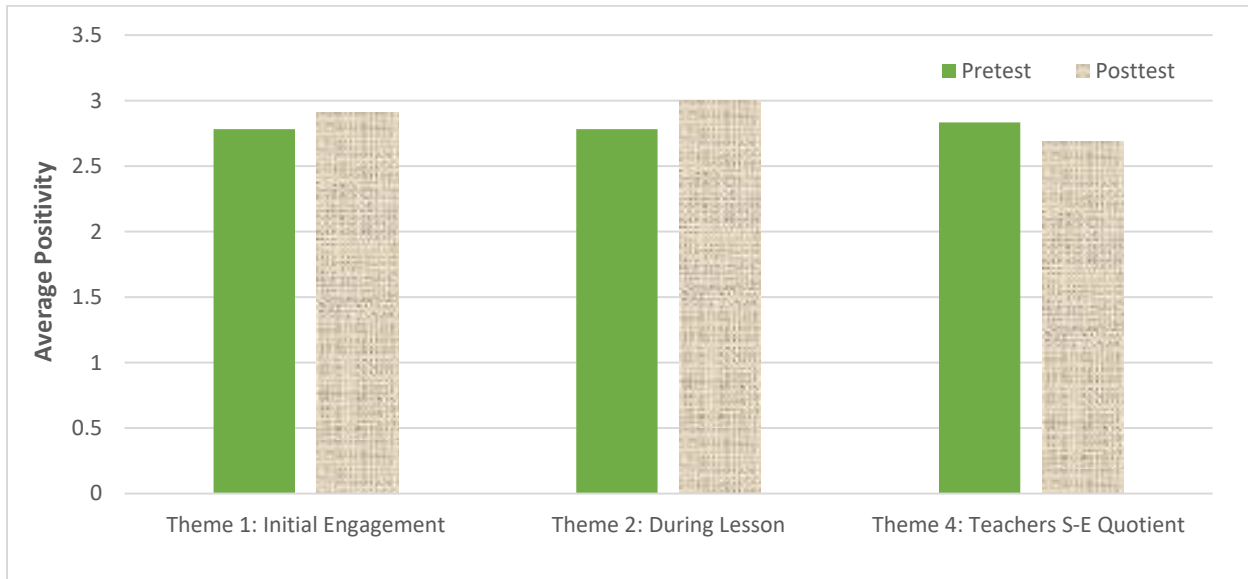


Figure 2. Average Positivity of Open-ended Responses to Themes 1, 2 and 4. Insignificant changes in average positivity of responses to Themes 1, 2 and 4 when comparing pretest and posttest data, ($N=11$).

The findings indicated that students' positive perceptions regarding the quality of social-emotional capacities and resources remained largely unchanged.

Individual Student Responses

Individual responses to the Open-ended Survey suggest that there was no significant change to the positivity of the student impressions concerning the quality of social-emotional capacities, while responses to the Personal Interview indicated a positive change not observed in the quantitative data. One student responded to the Open-ended Survey by stating, "no changes. He is always in a good mood." These quotes were aligned with the quantitative data seen in Figure 2, but quotes from the Personal Interview showed that there might be additional nuances

not captured by the content analysis coding. During the Personal Interview, one student remarked, “you have changed for the better. You showed that you care when you did the letters.” The high degree of positivity in both the pretest and posttest might have obscured the effects of the treatment on the students, and might account for the marginal degree of change in the data. While analysis of the Open-ended survey showed insignificant changes, the results of the thematic analysis showed that students noted a positive change in the quality of social-emotional capacities and resources. Similar results were found in the analysis of data relating to the emotional salience of learning.

Emotional Salience of Learning Objectives

The null hypothesis posited that there would be no significant difference in the data from theme 3 and 4, which would suggest that the treatment did not impact the emotional salience of learning objectives in science lessons.

T-Test

A *t*-test was performed to see if there were significant differences in the emotional salience of learning objectives. The analysis of pretest and posttest Impression Surveys responses revealed that there was no statistically significant change observed across the two themes. The *t*-test results yielded values of 0.231, and 0.169 for the respective themes, both of which were above the established significance level of 0.05. Given that all data points remained above the alpha, there was no quantifiable evidence to show that the intervention influenced the emotional significance of the learning objectives.

Content Analysis Coding

A form of content analysis was used to quantify qualitative data collected in the Open-ended survey. The responses to the Open-ended Survey were coded and averaged for the pretest and posttest, and the results showed highly positive scores across both themes. Figure 3 shows that the results indicated a degree of high positivity both before and after the treatment period. Theme 3 had an average pretest score of 2.8 and post test score of 2.9. Theme 4 had a pretest score of 2.8 and a posttest score of 2.7.

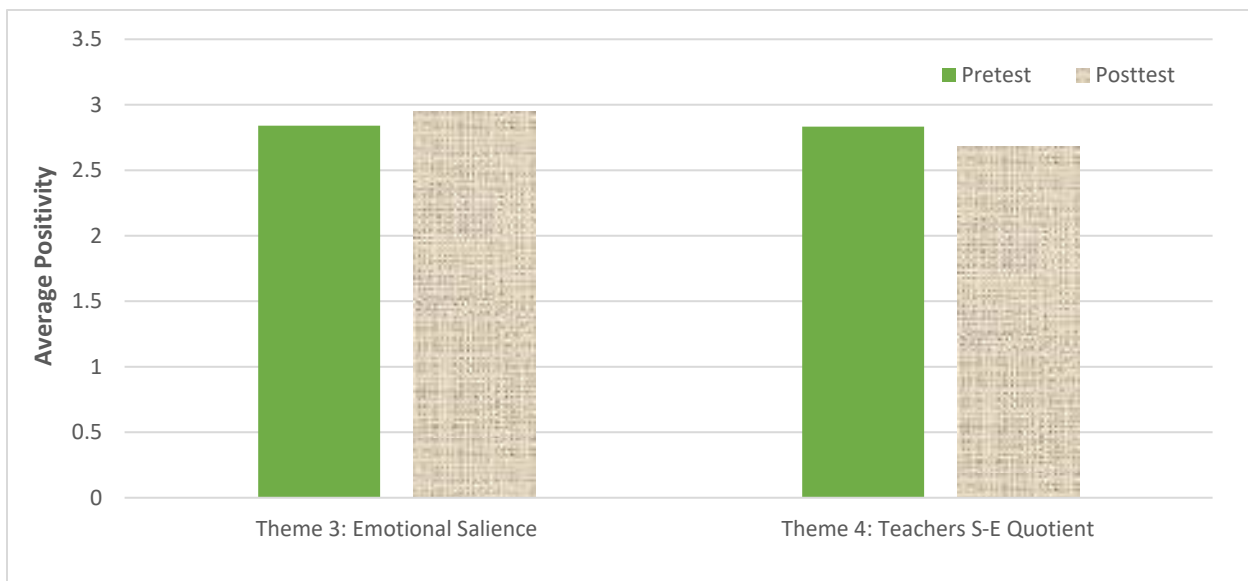


Figure 3. Insignificant changes in average positivity of responses to Themes 3 and 4 when comparing pretest and posttest data, ($N=11$).

These results demonstrated that there was no significant change to the positivity of student impressions about the emotional salience of learning objectives.

Individual Student Responses

A thematic analysis of the qualitative data showed that students valued the importance of storytelling. In both the pretest and posttest responses to the Open-ended Survey, students commented on how personal stories help them remember information. One student stated,

Sometimes he tells us a funny story that happened to him that relates to what we're learning. The reason why I remember this is because he taught us himself... your brain remembers emotional experiences very well. So if a story is funny or exciting [you are] more likely to save information.

The importance of storytelling also emerged from a thematic analysis of the Personal Interviews. During one interview, a student corroborated the value of stories when they stated, "you try to explain it in your own words with stories, so we remember it better." While the positivity of the quantitative data might not have changed much between the pretest and posttest, the efficacy of storytelling was emphasized as a key component for learning. As storytelling is inherently a social-emotional phenomenon, it was demonstrated that the students value emotions as a part of their learning experience. Similar results were found when analyzing the significance of relational depth between teachers and students.

Depth of Relationship

The null hypothesis posited that there would be no significant difference in the data from themes 4 and 5, which would indicate that the treatment did not impact the depth of social-emotional relationships between science teachers and students.

T-Test

A *t*-test was performed to see if there were significant differences in the depth of relationships between the students and their teacher. The analysis of pretest and posttest Impression Surveys responses revealed that there was no statistically significant change observed

across the two themes. The *t*-test results yielded values of 0.169, and 0.178 for the respective themes, both of which were above the alpha 0.05. As all the data points fell above the significance value, there was no quantitative evidence to suggest that the intervention had an effect on the strength of the social-emotional connections between the students and their teacher.

Content Analysis Coding

The qualitative data gathered from the Open-ended survey was quantified through another round of content analysis. The survey responses were coded using a positivity scale of 1-3 and the average scores were calculated for both the pretest and posttest. The outcomes revealed consistently high ratings in both thematic areas. Theme 4 had an average pretest score of 2.8 and a posttest score of 2.7, while Theme 5 had a pretest score of 2.6 and a posttest score of 2.7

(Figure 4).

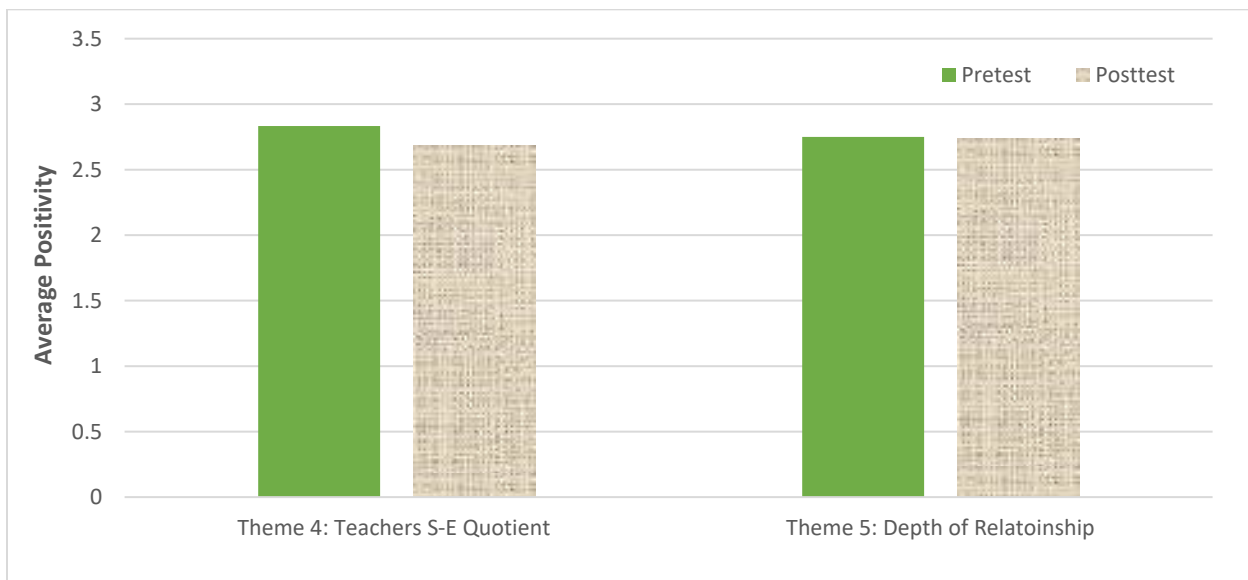


Figure 4. Insignificant changes in average positivity of responses to Themes 4 and 5, (N=11).

The findings indicated that the students' perceptions regarding the depth of their relationship with their teacher remained consistently positive without any notable alterations.

Individual Student Responses

A thematic analysis of data collected by the Open-ended Survey and Personal Interview once again indicated positive changes in sentiment which were not observed in the quantitative data. Student responses to the Open-ended Survey also showed a high degree of relational positivity both pre and posttest with one student remarking, "I think that my relationship with my science teacher has always been very good." Insights gathered from the qualitative data pointed towards developments not captured in the quantitative analysis with students commenting on the "nice notes about us" in the Open-ended Survey. One student noted that, "he has been focusing on our strengths which has given me confidence and a boost of motivation," while another commented, "the teacher has improved their relationship with the entire class." The Personal Interview collected similar responses with one student stating, "you make everyone feel included so they are more likely to listen." A thematic analysis revealed nuanced changes to student-teacher relationships that were not apparent in the quantitative data. Despite the uniformly high positivity scores in the quantitative findings, it was uncovered that some developments had been made. This pattern held true for all three focus questions: from the main question regarding social-emotional quotient, through the sub question on salience of learning, and on to question that encompasses the depth of relationships. In each of these analyses, the quantitative results indicated simply high positivity before and after the treatment, while the qualitative analysis brought to light possible subtle impacts in all three areas.

CLAIM, EVIDENCE, AND REASONING

Claims

The findings of this study yielded inconclusive results, suggesting that it is not clear if strength journals have an impact on the quality of social-emotional capacities and resources in middle-school science classes. It is similarly unclear if strength journals have an impact on the emotional salience of learning objectives and the depth of social-emotional relationships between science teachers and students. Nonetheless, sufficient evidence was collected to support continued research on the impacts of strength-journaling and its application in a school setting. Further, the interventions used in this study garnered enough positive impressions to justify a school-wide focus on strengths in the coming years.

Evidence

The results of the *t*-tests from the Impressions Survey did not show a significant enough change in student impressions to reject the null hypotheses. However, that may have been due to a lack of precision in the instruments. Both the pretests and posttests had results which skewed far towards the positive end of the spectrum with data points continuously averaging close to the top positivity score of 5. These consistently high scores left very little space for variance between the pretreatment and posttreatment values. Additionally, the Open-ended Survey and Personal Interview responses from students illustrated broad positive impressions both before and after the treatment period. Such uniformity in the data may have obscured the nuances of the impacts of strength-journaling.

Qualitative analysis of the Open-ended Survey and Personal Interview provided student quotes in support of the impacts of strength-journaling. Some students expressed that they

appreciated the journals and they noted that they impacted student teacher relationships for the better. One student commented that the teacher improved their relationship with the entire class. While that student might not speak for everyone, the impression that the journals had a positive impact on all the students was expressed. The students not only commented on the benefits of the strength-journaling, but they also expressed values in line with the research behind the intervention.

Value of Social-Emotional Capacities and Resources

The Personal Interviews collected responses from students which echoed the importance researchers put on the impact of social-emotional qualities in the context of learning. One student commented that, “the teacher's mood at the beginning of the lesson makes me engage in class more or not.” Another student responded, “you know those teachers who speak in a monotone voice, just reading the PowerPoint? You won't remember it.” These comments are aligned with the importance Fredrickson (2001) puts on broadening and building spaces for new emotions and creating novel ways to develop our relationships further. This broadening and building was the goal of the strength journal intervention. As Niemiec (2017) suggests, character strength interventions can lead towards improved social-emotional health and thus increased engagement in school. In these instances, the remarks made by the students were aligned with the values outlined by researchers, highlighting the crucial role of the social-emotional qualities of the teacher. This alignment between student perspectives and research values was also noted when discussing the significance of emotional salience to learning.

Value of Emotional Salience

Similar to what was discovered about the students' thoughts on social-emotional qualities, it was also found that the students held values about emotional salience which were in line with the literature. In response to a Personal Interview question about the importance of emotional salience, one student pointed out, "if something stands out to you emotionally, you will remember it." This supports Immordino-Yang's (2019) claim that emotions have enormous repercussions on what we remember and recall. Furthermore, one student pointed out the importance of personal stories for their learning while commenting, "it easier to memorize facts if there's a story behind it, an emotional connection." It was made clear that building an environment where students and teachers feel safe sharing personal, emotional stories should be a goal of the school community. Both the students and Bellocchi (2017) argued that science learning intertwines with emotions and social interactions. The students' insights align with the researcher's notion that emotional engagement is an essential component of learning, and it can significantly enhance memory retention and understanding. Not only did the students agree with the researchers on the importance of social-emotional quotients and salience in learning, but they also shared values on the significance of relationship building.

Value of Depth of Relationship

Similar to the previous values, the students and researchers also held a common belief in the value of the depth of relationships. When asked in the Personal Interview about the significance of teacher-student relationships, one student responded that they felt a stronger connection with their teachers after having spent a week bonding with them in Spain. The student said that this deepening of the relationship also improved their learning stating, "I realize I now take in information better, easier." While the student did not go as far as to claim as

Bellochi (2017) does that, “social bonds and knowledge construction are the same phenomenon” (p.771), a similar sentiment was shared. Both the student and researcher noted that there is a connection between relationships and ease of learning. This capstone might not have provided sufficient quantitative data to support the impact of strength-journaling on emotions and social interactions; however, the values behind the goals of this project were supported by both students and researchers. These values include the social-emotional quotient of the teacher, the emotional salience of the learning, and also the depth of teacher-student relationships. It follows that interventions should be administered to care for these topics and help develop them in the classroom and larger school environment.

Reasoning

While the middling results of the study were unsatisfying, enough evidence was collected to merit further research and to justify the development of a school-wide strengths program. Analysis of the student responses showed that they appreciated the intervention and that their values corresponded with the values expressed in the research behind this study. In addition, several teachers commented that they were intrigued by the project and that they saw the benefits of focusing on and building peoples’ strengths. These teachers’ comments applied not only to students, but also towards the development of the staffs’ strengths in the context of professional development.

There was one interesting outlier that emerged from the Personal Interviews. One student did not respond positively to the importance of teacher/student relationships when questioned during the interview. I was really surprised and rather hurt because I would characterize this student as being the one I have the best relationship with. Instead of expressing gratitude for our

relationship, they told me that I had no impact on their interest in science at all: “This is just who I am....You’re just some guy. If I didn’t like you, I would learn just the same. Maybe do my own research, go read a book.” I was so taken aback by the exchange that I went and sought consolation from one of my coworkers. I wondered why that student was being so withholding. My coworker was also surprised and she told me she had seen that student “positively glowing all hour” after they read their strength journal. It was at that moment when I remembered what I wrote, and it all came together. In my strength journal for that student, I pointed out their love-of-learning and I highlighted the power it gives them. I wrote,

Remember that and hold on to it. You have a fire in your belly – that is your blessing and your strength. If you ever find yourself in a difficult situation, use that fire. Make it work for you. Let it guide your life.

And here it was, my words coming back at me. The student had fully internalized the strength I saw in them and that strength had now become a part of their identity. That was who they were, they were going to live up to it.

Implications and Future

While I don’t have the numbers to show it, I have the feeling that my project was a great success. Not only did it impact my current students, but it will also impact the staff in my school in the coming year. Recently, I received news that I will be the Onboarding and Talent Integration Manager for my school starting next year. As a part of that job, I will be in charge of doing the observations of staff members and providing them with constructive feedback. While doing this, I plan to focus on isolating their strengths, expressing appreciation for them, and encouraging them to develop those strengths and use them more often in the future. While the VIA will serve as a guide, I will also focus on practical strengths teachers have such as

organization, communication, and assessment. Through recognizing and valuing those strengths publicly, the staff members will gain a sense of purpose and meaning in their job. The hope is that their positive character strengths and strong teaching skills will be the elements which frame the events of their lives. When they run into a difficult situation, they can use those elements to gain power over the situation in a positive and constructive manner. Moreover, they can use those strengths to support each other when they need help.

The strengths program will be rolled out in three stages. In the first stage, the teachers will learn about strengths, their values, and how to communicate about them. This will happen during the observations and during one-on-one, follow-up conversations. In stage two, the staff will broaden and build. They will observe each other's lessons and point out strengths while reflecting on what they could learn from each other. In stage three, they will step up. Having had personal experience with positive psychology and having internalized its values, the teachers will step up and lead their students in developing their social-emotional wellbeing. The teachers will also now take on the role of introducing new interventions, and together we will inspire a culture of growth, flourishing and resilience within our school community.

Impact on the Author

My time as a student in the MSSE program has not only been marked as a time of growth as a science teacher but also growth as a leader in my school. I will forever be thankful for the structures and inspirations provided by my professors and the incredible program they have designed. I look forward to seeing how this research continues to impact my school and, when assessing its success, I will take what I have learned about data analysis to help build instruments which are more fine-tuned. As I reflect on my experience, I have a feeling of having contributed

towards the ongoing evolution of my school's culture, and I am filled with optimism for the future. It is a transcendent feeling full of hope and gratitude, and it gives me strength.

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APPENDICES

APPENDIX A

INSTITUTIONAL REVIEW BOARD EXEMPTION

Hello Loetz, Nathan,

Your protocol was reviewed by the IRB and has been approved.

PI: Loetz, Nathan

Approval Date: 12/29/2023

Title: Impact of strength journaling on the middle school science class environment

Protocol #: 2023-1202-EXEMPT

Review Type: Exemption

Expiration Date: 12/29/2028

APPENDIX B

VIA CLASSIFICATION



VIA Classification of Character Strengths and Virtues

Virtue of Wisdom



Creativity

Original, adaptive, ingenuity, seeing and doing things in different ways



Curiosity

Interest, novelty-seeking, exploration, openness to experience



Judgment

Critical thinking, thinking through all sides, not jumping to conclusions



Love of Learning

Mastering new skills & topics, systematically adding to knowledge



Perspective

Wisdom, providing wise counsel, taking the big picture view

Virtue of Courage



Bravery

Valor, not shrinking from threat or challenge, facing fears, speaking up for what's right



Perseverance

Persistence, industry, finishing what one starts, overcoming obstacles



Honesty

Authenticity, being true to oneself, sincerity without pretense, integrity



Zest

Vitality, enthusiasm for life, vigor, energy, not doing things half-heartedly

Virtue of Humanity



Love

Both loving and being loved, valuing close relations with others, genuine warmth



Kindness

Generosity, nurturance, care, compassion, altruism, doing for others



Social Intelligence

Aware of the motives and feelings of oneself and others, knows what makes others tick



Teamwork

Citizenship, social responsibility, loyalty, contributing to a group effort



Fairness

Adhering to principles of justice, not allowing feelings to bias decisions about others



Leadership

Organizing group activities to get things done, positively influencing others

Virtue of Justice

Virtue of Temperance



Forgiveness

Mercy, accepting others' shortcomings, giving people a second chance, letting go of hurt



Humility

Modesty, letting one's accomplishments speak for themselves



Prudence

Careful about one's choices, cautious, not taking undue risks



Self-Regulation

Self-control, disciplined, managing impulses, emotions, and vices

Virtue of Transcendence



Appreciation of Beauty & Excellence

Awe and wonder for beauty, admiration for skill and moral greatness



Gratitude

Thankful for the good, expressing thanks, feeling blessed



Hope

Optimism, positive future-mindedness, expecting the best & working to achieve it



Humor

Playfulness, bringing smiles to others, lighthearted – seeing the lighter side



Spirituality

Connecting with the sacred, purpose, meaning, faith, religiousness

APPENDIX C

IMPRESSIONS SURVEY

1. Initial Engagement:

"I feel socially connected when I begin a science lesson."
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

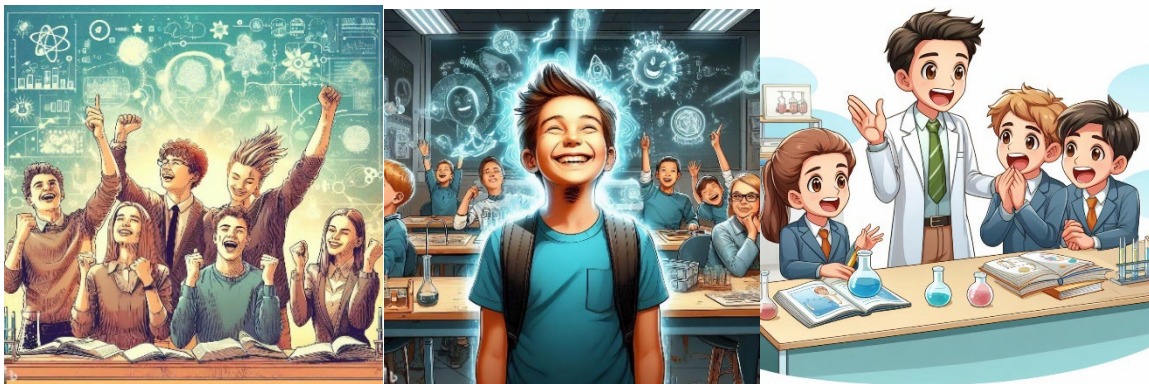
"My social connections at the start of a lesson affect how well I will learn during science."
(Not at all, Slightly, Moderately, Very, Extremely)



"I associate with these images showing social connection at the start of a science class"
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

"I feel emotionally engaged when I begin a science lesson."
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

"My emotions at the start of a lesson affect how well I will learn during science class."
(Not at all, Slightly, Moderately, Very, Extremely)



"I associate with these images showing emotional engagement the start of a science class."
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

2. Experience During Learning:

"My emotions are highly engaged during a science lesson."
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

"I find that having emotional experiences during science lessons helps my learning."
(Not at all, Slightly, Moderately, Very, Extremely)



"I associate with these images showing emotionally connected learning during a science class"
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

"I feel socially connected during a science lesson."
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

"I find that having social connections during science lessons helps my learning."
(Not at all, Slightly, Moderately, Very, Extremely)



"I associate with these images showing social learning during a science class"
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

3. Impact on Retention and Application:

“When I think back on what I have learned in science lessons, I find that my memories have a social component.”
(Not at all, Slightly, Moderately, Very, Extremely)

"The depth of my social connections in science lessons helps how well I remember what I've learned."
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)



"I associate with these images showing how I remember science concepts."
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

“When I think back on what I have learned in science lessons, I find that my memories have strong emotional importance.”
(Not at all, Slightly, Moderately, Very, Extremely)

"In a real-world situation, I am more likely to apply what I've learned in science class if those memories had strong emotional importance."
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)



"I associate with these images showing emotions helping me remember science concepts."
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

4. Teacher's Social-Emotional Capacities:

"My teacher demonstrates strong emotional qualities."
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

Have you noticed improvements in your teacher's emotional qualities recently?
Please rate the changes you've experienced, if any.
(Severely Degraded, Degraded, Remained Consistent, Improved, Greatly Improved)



"I associate my science teacher with these images."
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

"My teacher demonstrates strong social qualities."
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

Have you noticed improvements in your teacher's social qualities recently?
Please rate the changes you've experienced, if any.
(Severely Degraded, Degraded, Remained Consistent, Improved, Greatly Improved)



"I associate my science teacher with these images."
(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

5. Depth of Relationship with Teachers:

Has your relationship with your science teacher changed recently?

Please rate the changes you've experienced, if any.

(Severely Degraded, Degraded, Remained Consistent, Improved, Greatly Improved)

How important is your relationship with your science teacher
for your connection with science learning?

(Not at all, Slightly, Moderately, Very, Extremely)



"I associate my relationship with my science teacher with these images."

(Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

APPENDIX D

OPEN RESPONSE SURVEY

1. Initial Engagement:

- Describe the range of emotions and thoughts you typically experience at the start of a science lesson.
- In what ways, if any, do you feel socially connected at the start of a lesson?

2. Experience During Learning:

- Describe the range of emotions and thoughts you typically experience during a science lesson.
- In what ways, if any, do you feel socially connected during a lesson?

3. Impact on Retention and Application:

- Describe what makes science learning memorable for you.
- Pretend that you are walking through the forest with a group of friends, and suddenly you get the opportunity to apply something you learned in science class. Would you be more likely to apply that science learning in the real world if you associated it with a social experience you had in class? If so, why?

4. Teacher's Social Emotional Capacities:

- Share your observations about your science teacher's social and emotional qualities, such as empathy, communication skills, or relatability.
- How do these qualities influence your overall learning experience in science?
- If you have noticed changes in your science teacher's social and emotional qualities recently, please provide details. How have these changes affected your interactions with your teacher and your engagement with the subject matter?

5. Depth of Relationship with Teachers:

- What words come to mind when you think about your relationship with your science teacher?
- If you've noticed any changes in your relationship with your science teacher, please describe them here.

APPENDIX E

PERSONAL INTERVIEWS

1. Initial Engagement:

- What emotions or thoughts typically run through your mind when you first enter a science classroom or begin a science lesson?
- How do these emotions and thoughts effect how well you will learn?

2. Experience During Learning:

- What points during a science lesson stand out the most emotionally?
- Can you think of a specific science topic that was particularly emotional for you and explain why you felt that way?

3. Impact on Retention and Application:

- In your opinion, how do emotions impact your learning and retention of the material?
- Have you noticed a connection between the depth of your emotional engagement and your ability to remember and apply what you've learned?

4. Teacher's Social-Emotional Capacities:

- How do you perceive your science teacher's social and emotional qualities, such as empathy, communication skills, or relatability? Do these qualities impact your learning experience?
- Have you encountered a specific situation in recent times where you noticed any changes or improvements in your teacher's social and emotional qualities?

5. Depth of Relationship with Teachers:

- In your experience, how important is your relationship with your science teacher in the learning process? Does it impact your connection with science?
- Could you share any recent experiences with your science teacher which might have influenced your relationship with them? Has your relationship improved, remained consistent, or experienced any changes in any way?