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HARNESSING THE VALUE OF FAILURE TO PROMOTE STUDENT GROWTH

A MASTER'S THESIS
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BY
JARED LYLE

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HARNESSING THE VALUE OF FAILURE TO PROMOTE STUDENT GROWTH

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Abstract

One common element that all students face in school is failure. A review of literature will seek to answer the questions: What are the effects of failure on self-efficacy and mindset? What are the most effective structures to help students to handle and use failure in the classroom? This study will review the study of how parenting, gender, income effect how students deal with failure. Also, the study will identify how students with high and low self-esteem view failure differently. Secondly, a review of literature will investigate the differences of how students with growth and fixed mindset approach failure differently, as well as interventions in order to move students from a fixed to a growth mindset. Additionally, the study will review feedback used as well as how students respond to teacher feedback. Lastly, the literature review will identify a system of using failure to promote success in the classroom.

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CHAPTER I: INTRODUCTION

Failure and Self-Efficacy

Failure is one commonality that faces students in school. How a student is able to handle and respond to failure is the variable between each student. Student self-efficacy can affect how students are able to handle failure, and similarly failure can have an effect on student self-efficacy. Failure can affect students differently based on their self-efficacy as well as their resilience. It has been found that matters that contribute to self-efficacy include: sex, place of residence, as well as psychological resilience and positivity (Bingol et al., 2019). Given that every student is unique, it is beneficial to know the affect backgrounds have on student efficacy. Research has also found that parental influence has had an effect on student self-efficacy as well as academic achievement (Bandura et al., 1996; Bingol et al., 2019, Caprara et al., 2008). Statistically, in 2017, 5.4% of students dropped out of school, which equates to 2.1 million students. The reason for this staggering number of high-school dropouts could result from a lack of ability to appropriately traverse failure in school and thus leading to lower self-efficacy. Students' self-efficacy is paramount to them successfully handling failure, and it is paramount to know how to individually support students in order to successfully use failure without it becoming detrimental to self-efficacy (Banks & Woolfson, 2008; Dodgson & Wood, 1998; Spieker & Hinsz, 2004; Zhang et al. 2018). Similarly, when students experience failure, their self-esteem is affected influencing student access to their strengths and weaknesses, and thus cause students to experience a decrease in self-efficacy (Dodgson

& Wood, 1998). Also, as students face repeated failure, it can affect the difficulty of student goals (Spieker & Hinsz, 2004).

Failure and Mindset

Along with self-efficacy, mindset can change how students view and handle failure (Andrews & Debus, 1978; De Castella, Byrne, & Covington, 2013; Diener & Dweck, 1978; Forsythe & Johnson, 2017; Gibbs & Tunstall, 1998; Scapinello, 1989). The type of mindset a student possesses will greatly influence how they will handle failure. Students with a fixed mindset believe that their intelligence, abilities and talents are fixed and cannot be improved or changed, whereas a student with a growth mindset believe that their abilities and intelligence can be developed with effort, learning, and persistence. Mindsets are essential for students handling and using failure, and given teacher influence, it is essential for educators to know how to build growth mindsets in their students to replace fixed mindsets. Students with a fixed mindset demonstrated defensive behaviors in order to protect their self-esteem and display the highest rates of self-handicapping (De Castella, Byrne, & Covington, 2013; Forsythe & Johnson, 2017; Lou & Noels, 2017). Also, research states that mindsets are malleable, meaning that students should be able to utilize mindset intervention to improve academically (Hoyert, Ballard, & O'Dell, 2019; Irfan Arif & Mirza, 2017; Rhew et al., 2018).

Additionally, the mindsets of caregivers and teachers have a significant influence on student mindset and a student's view of failure (Gibbs & Turnstall, 1998; Haimovitz & Dweck, 2016; Smith, Brumskill, Johnson, & Zimmer, 2018). Unless students are trained how to adopt a growth mindset, they will be stuck into believing that failure is

uncontrollable and that success is due solely to ability. Students that have a growth mindset will view failure negatively and will avoid challenges in order to decrease the opportunity of failure. Inversely, students that possess a growth mindset will welcome challenge and failure knowing that this failure will lead to future success. It is the responsibility of the educator to have a growth mindset perspective as well as be able to teach growth mindset in order to push students to use failure to grow in their academic pursuits. The prevalence of student mindset is apparent when teaching, and it is necessary not to just recognize student mindset, but it is necessary to intervene in order to shift student mindset from fixed to growth mindset. Supporting students with appropriate mindset intervention can be difficult when a growth mindset is not supported at home. Unless students are able to move from a fixed to a growth mindset, they will not be able to appropriately view failure as a tool to promote success, but rather failure is a reminder of ineptitude.

Feedback

A tool that educators use to help students navigate failure is feedback. Teacher feedback (person, praise, no feedback) has been shown to have an effect on student-teacher relationship, and students who received person feedback had more negative feelings about the student-teacher relationship as well as showing more of a negative response to failure (Skipper & Douglass, 2012; Skipper & Douglass, 2015). The type of feedback that students receive from teachers can have a great effect on motivation and efficacy (Brooks et al., 2017; Garcia Gutierrez & Duran Narvaez, 2017; Sellbjer, 2018). Ahmed Shafi et al. (2018) found that despite a student's immediate negative emotional

reaction to a disappointed grade, feedback actually helped students to cope with their negative emotions. It has also been noted that gender of whom is giving feedback has an effect on how feedback is accepted by the student depending on their gender sex (Bush & Dweck, 1976; Dweck et al., 1978). Given the influence that feedback has on the student mindset and efficacy, teachers need to be aware of how they are giving feedback as well as what type of feedback is given. Skipper and Douglas (2012) researched the difference in student response to process, person, and no feedback after both success and failure, and they found no significant differences between process, person and no feedback after the successes, however, after one failure, students showed differences between the selected responses. The interaction between student and teacher also need to be carefully monitored due to the negative interactions being detrimental to efficacy and mindset (Brooks et al., 2019; Garcia Gutierrez & Duran Narvaez, 2017). Feedback intervention is essential in order to educate teachers of how to appropriately give effective feedback

Productive Failure

Productive Failure (PF) is a learning process that provides conditions for students to persevere to generate and explore different representations and solutions for solving both complex and novel problems (Kapur & Kinzer, 2009; Kapur, 2010; Kapur, 2011; Kapur 2012; Song, 2018). This process will lead students to initial failure, but will lead students to consolidate and assemble their thoughts and solution methods into commonly approved methods of problem solving. Through the research of Kapur (2009, 2010, 2011, 2012) it has been shown that the traditional lecture-practice structure tests

significantly lower than those involved in the PF classroom. These results can be shocking given that a majority of teaching is based off of the lecture-practice model. The lecture-practice model lends itself well for students to answer well organized questions. The teacher will go through examples and then the students will answer questions that have a similar format to the questions that were solved previously by the teacher. The thought of how to solve a problem is taken out of the equation and students are taught to trust a model that has been laid out for them to follow. Where students may answer the practice questions correctly, students understand a model or equation to use to solve a problem rather than understand a concept. It is evident in the lack of understanding when students of the lecture-practice model encounter an ill-structured problem and the convention doesn't fit the need of the problem. Students will tend to approach this failure and quit because they haven't been taught how to be resilient through their failure to produce success. Contrarily, students involved with PF will approach ill-structured questions differently and use more creativity in exploring options knowing that their failures will help to lead them to success and true knowledge and understanding an educational concept.

Research Focus

Every student will fail at school, but not every student is prepared to fail. One of research questions I seek to answer through a review of literature is how does failure affect student self-efficacy and self-esteem? Within answering that question, it will be studied how that gender, income, and parental attitudes affected the level of student self-efficacy. Repeated failure can severely damage student efficacy and push them

away from academic process. Another question that I seek to answer is how does parental influence affect student efficacy and academic achievement?

Additionally, I want to study how failure affects student mindset? Along with how failure affects student mindset, I will also seek to find how do student prior mindsets influence their view and how to effectively handle failure? Student's mindsets are malleable and can be influenced by both parents and educators. Being that student's mindsets are so influential, how can we train students to adopt a growth mindset instead of a fixed mindset? Also, what are the effectiveness of mindset interventions?

As students face failure in the school setting, teachers are responsible to assist students with both handling and using failure. The tool that teachers can use to aid student growth through failure is feedback. How can educators utilize feedback in order to stimulate student growth through failure? Moreover, what feedback interventions can be implemented to improve teacher feedback?

As stated previously, feedback is a tool that can be utilized, additionally, the classroom environment should utilize failure to promote student success. Through my research, I hope to answer what is productive failure, and how can it be beneficial to students in the classroom?

CHAPTER II: LITERATURE REVIEW

Literature Search Procedures

To locate the literature for this thesis, searches of Education Journals, ERIC, EBSCO MegaFILE, and Education Journals were conducted for publications from 1976-2019. The list was narrowed by only reviewing studies from peer-reviewed journals that focused on using failure to promote learning in the articles that addressed the guiding questions. The key words that were used in these searches include: failure and self-efficacy, failure and self-esteem, feedback, effects of failure on growth mindsets, and productive failure. The structure of this chapter is to review the literature on failure as how it affects self-efficacy, self-esteem, and mindsets. Additionally, this chapter will also review structures for optimizing failure in the classroom: feedback and productive failure.

Self-Efficacy and Self-Esteem

Albert Bandura defines self-efficacy as an individual's belief in his or her capacity to execute behaviors necessary to produce specific performance attainments. Researchers Bingöl, Batik, Hosoglu, and Kodaz (2019) conducted a study in Turkey to examine the relationship of self-efficacy of different demographic variables and how they were affected by psychological resilience and positivity (Bingöl et al., 2019). Students at four different universities in Turkey voluntarily answered a questionnaire which included the General Self-Efficacy Scale (GSES), the Brief Psychological Resilience Scale (BRS), the Positivity Scale (PS) and a personal information form (Bingöl et al., 2019). Of the 844 students that participated in the study, 480 were female, while 364

were male. Additionally, of the 844 students that participated also reported: 35.4% lived in a big city, 73.1% had a moderate income level, and 54.1% emphasized growing up with a protective family style (Bingöl et al., 2019). Bingöl et al. (2019) reported that gender, income, and parental attitudes affected the level of student self-efficacy. Bingöl et al. (2019) found from the questionnaire that male levels of self-efficacy as measured by the GSES were higher than that of females. Participants that tested higher in self-efficacy were from metropolitan areas and had a high-income. The researchers found a connection to self-efficacy and parental attitudes, in which students with perceived authoritarian parenting reported lower self-efficacy scores than the participants who perceived their parents as negligent, protective or democratic. This finding corroborates the findings of Caprara et al. (2008), who found that students in an authoritarian system view themselves as less successful in self-directed learning. Lastly, Bingöl et al. (2019) found through analysis that self-efficacy correlated with psychological resilience and positivity, as well as physiological resilience and positivity being a predictor of self-efficacy. Limitations of their study include the fact that it is centralized to college students in Turkey as well as the results being self-reported.

As students face failure in school, similar to the findings of Bingöl et al. (2019), Bandura et al. (1996) found that self-efficacy is shaped by parental influence. Bandura (1996) studied the impact of self-efficacy beliefs on academic achievement. In the study, 279 children (155 males and 124 females) from the ages of 11 to 14, were measured by 37 items to measure self-efficacy. Along with the 37 items data collected include: data on the children's social and emotional behavior were obtained from different sources

using diverse methods of assessment, problem behaviors were measured by 85 items from the Child Behavior Checklist, parents took an eight item inventory to ensure parenting efficacy, and both students and parents were given an inventory to measure academic aspirations (1996). Researchers found that parents have a significant influence on their child's intellectual development and academic aspirations (1996). Specifically, Bandura (1996) found that parental beliefs in efficacy to support their child's intellectual development and academic aspirations select and create environments that are beneficial to their child's development. Not only did Bandura (1996) find that parental belief in efficacy influenced their children, but that parents having positive educational aspirations and act on the thought that they can help their child achieve them, raised the student's academic sights. Additionally, parental perceived efficacy guided their student's learning as well as parental perceived academic efficacy determined academic aspirations for their children (1996). This led researchers to find that students who believe they can control their own learning and mastery of coursework achieve success in their academic pursuits (1996). Although Bandura (1996) had reliable results, the study did have limitations of a limited age group and only the student's mothers participated in the study.

As Bingöl et al. (2019) and Bandura et al. (1996) found in their research, the role of parental influence on students is statistically significant. Similarly, Gunderson et al. (2018) found that the praise parents give their children can affect their education. In their research, Gunderson et al. (2018) observed 53 children and their caregivers, of whom 24 were white, nine were African American, six were Latino, and four were of

mixed racial background. Of the 53 children, 29 were boys and 24 were girls (2018). The caretakers were diverse in terms of their education level as well as annual family income (2018). To gather information, researchers observed parents in their natural environment for 90 minutes when their child was 14, 26 and 38 months old, and studied how the parents talked to their children in every-day interactions (2018). After observing interactions, parents were separated into three different praise groups: process praise (18%), person praise (16%), and other praise (66%) (2018). What the researchers found was that there was a pattern in the results that caregivers' who emphasized process praise predicted their child's incremental motivational framework five years later, which predicted the child's achievement two years later, especially in math and reading comprehension (2018). Also, the findings suggested that process praise leads children to form incremental motivational frameworks, which improves academic achievement and links that framework to improved fourth grade achievement (2018). For all of the links researchers found between process praise and academic achievement, researchers found that there was no relation between process praise and students' motivational framework and achievement for reading decoding, which could be due to the complexity of reading decoding (2018). For all of the positive results between process praise leading to academic success, the researchers did have limitations, such as: small sample size which leads to lack of power to detect true effects, the praise style of caregivers' could have changed or they could use a combination of praise styles, or small sample size could lead to low positive predictive value (2018).

Bandura's research focused mainly on parental influence, Caprara et al. (2008) focused their research on the effect of perceived self-efficacy on self-regulatory efficacy. In this study of 412 students, 196 were males while 216 were females. The students were in staggered, multiple cohort design ranging from 1994 to 2004 (Caprara et al., 2008). Both of the cohorts started when the students were 12 years old and progressed through high school (2008). Students who participated in this quantitative study were given 11 items to measure self-efficacy to plan and organize their academic activities, rated the strength of their efficacy to execute the designed activities using a five-point scale, at the end of junior high, students were assessed in multiple subject matters using a five level grade system, and lastly, students were assessed in high school through required testing (2008). Caprara et al. (2008) found that self-regulatory efficacy of students progressively decrease as students move through school, although, females exhibited higher levels of self-regulatory efficacy and less of a decline as they went through school than males. In the analysis of their results, the researchers found: students' perceived efficacy to regulate their learning in junior high contributed to achievement and completion in high school, students are influenced by socioeconomic life conditions, but self-regulatory efficacy contributes independently academically, and self-regulatory efficacy can affect the course of life paths through choice processes (Caprara et al., 2008).

Spieker and Hinsz (2004) studied how repeated success and failure effect and influence self-efficacy and personal goals (Spieker & Hinsz, 2004). In order to study the influence of repeated success and failure on self-efficacy and personal goals, Spieker

and Hinsz (2004) had three hypotheses that they wanted to explore: Self-efficacy and personal goals will be positively correlated with task performance, past successes will lead to higher personal goals, whereas past failures will lead to lower personal goals, and past successes will lead to higher ratings of self-efficacy, whereas past failures will lead to a lower rating of self-efficacy (Spieker & Hinsz, 2004). The participants in this quantitative study were asked to complete an idea generation task where they would set a performance goal of how many uses they could create for an object in ten minutes, then the students would then identify if they had met their goal or not, and this process was repeated twice (Spieker & Hinsz, 2004). Spieker and Hinsz (2004) were then able to separate the students by their performance: two successes with no failures ($n = 17$), one success and one failure ($n = 20$), and two failures with no successes ($n = 10$). Through the experiment, Spieker and Hinsz (2004) found that self-efficacy and personal goals were positively correlated with performance and correlated highly with each other. Also, the results revealed that repeated success and failure had a significant effects on personal goals (2004). The results of the study, that success and failure not having a significant effect on self-efficacy, are contrary to previous research, and reasons for this could be from the lack of trials, small sample size, or lack of personal investment.

Another concern of failure is how students will respond (Diener & Dweck, 1978; Dodgson & Wood, 1998; Scapinello, 1989; and Zhang et al., 2018). Dodgson and Wood (1998) conducted multiple experiments to identify how participants with high self-esteem (HSE) and low self-esteem (LSE) respond to failure. They selected participants that were in an introductory psychology class at the University of Waterloo who

completed two psychological measures: Self-Rating Scale (SRS) to test self-esteem, and Self-Attributes Questionnaire to identify strengths and weaknesses (Dodgson & Wood, 1998). Of the students that completed the psychological measures, only those who scored in the top and bottom third on the SRS were selected to participate in the experiment, which came out to be 72 participants: 36 that identified as HSE while the other 36 were LSE. Through the support of two different experiments, Dodgson and Wood (1998) found that in general, individuals are able to access strengths more readily than weaknesses. Individuals who have HSE are able to more readily activate strengths and weakness when experiencing failure than others with HSE whom experience no feedback. Participants who are LSEs showed a non-significant trend of identifying weakness after failure, rather, LSEs over-generalized failure, but not so much as to overshadow strengths. Students who over-generalize failure, attribute failure to a lack of ability, as well as failure being an uncontrollable factor (Diener & Dweck, 1978; Scapinello, 1989). When students over-generalize failure, researchers Zhang et al. (2018) found in their research that the fear of failure was positively associated with academic procrastination, but if there was an increase to self-esteem, it may reduce academic procrastination.

Banks and Woolfson (2008) conducted a study to examine how student attributions affect their academic achievement. The study consisted of 53 participants (25 male, 28 female) who were between the ages of 11 and 14 years old. The students were from three schools, two of which were low-income, while the third was a middle-low income (2008). The students were split into three groups; average achieving

(AA)(n=27), learning difficulties (LD)(n=15), and low achieving (LA)(n=11). Students were given two sets of puzzles, which unbeknownst to them, were unsolvable, to which they gave a reason for their failure (2008).

Banks and Woolfson (2008) found that participants who felt themselves to be not as good as most people at doing their school work also tended to see themselves as having less control over the outcome of their performance. Students perceived themselves to have less control over their unsuccessful performance than students who thought of themselves as being higher achievers (2008). The findings suggest that how students perceive themselves may be more important than how teachers view students' learning status (2008).

Failure and Mindset

As students approach learning, researchers have found that students can have either a fixed mindset (basic abilities, intelligence, and talents are fixed) or a growth mindset (abilities and intelligence can be developed with effort, learning, and persistence), and based on students' mindset can change how they cope with failure (Andrews & Debus, 1978; Bush & Dweck, 1976; Forsythe & Johnson, 2017; Karumbaiah et al, 2017). Researchers Forsythe and Johnson (2017) gave questionnaires to 151 undergraduate students (113 females and 38 males), who voluntarily participated, to measure mindset, psychological assessment feedback, and defense-style. What the researchers determined from the questionnaire was that 86 of the participants were of a fixed mindset and 65 were considered to have growth mindset (Forsythe & Johnson, 2017). It was demonstrated from the questionnaire that students with growth mindset

scored higher on challenge interventions and allowed a person to pull them out of their comfort zone in order to obtain academic growth, as well as had a greater motivation to act on feedback (2017). Similarly, Karumbaiah et al. (2017) found that when students in an urban school in Southern California were given growth mindset responses, they succeeded more often at answering problems correctly, but also made more mistakes. Andrews and Debus (1978) found that when students attribute failure to insufficient effort, it was positively correlated to persistence. Students who received effort-oriented schemata were observed to have a significant increase in persistence, which was still evident four months later as calculated by a follow-up posttest (Andrews & Debus, 1978). When observing the cognitive differences of students with low and high motivation, Scapinello (1989) found differences between students with high and low-motivation. Students with low-motivation indicated that success produced a significantly higher attributions to effort than failure under the conditions of high consensus and attributed failure to low ability, which they believe is a fixed trait (Scapinello, 1989). Scapinello (1989) found that students classified as high-motivation: were less accepting of failure than those students classified as low-motivation, and refused to believe that failure was attributed to low ability, but rather to lack of effort. Gibs and Turnstall (1998) in their research echoed this finding and in their analysis determined that students demonstrated the importance of effort and how it is linked to success.

Forsythe and Johnson (2017) found that students could likewise exhibit a fixed mindset. Students with fixed mindsets exhibited limited motivation and had difficulty

restraining or changing their thoughts and feelings, which are imperative in order to used feedback for behavioral change. Also, students who had a fixed mindset demonstrated defensive behaviors in order to protect their self-esteem rather than use feedback to aid with remediation as well as viewing feedback as either all-good or all-bad (Forsythe & Johnson, 2017). Researchers Diener and Dweck (1978) refer to students who have fixed mindsets as helpless. In their research, Diener and Dweck (1978) were comparing students who are identified as helpless and mastery-oriented before and after failure. Their research was comprised of two studies: Study one consisted of 70 fifth graders (35 males and 35 females) from a semi-rural community, while study two consisted of 60 fifth graders (30 males and 30 females) all of whom didn't participate in study one (1978). The researchers split the students up into helpless and master-oriented based on their tendency to neglect or emphasize the role of effort in their failures.

In study one, over 50% of the student in the helpless group determined that they were unable to do a problem due to not being smart enough, but none of the master-oriented students gave this response (Diener & Dweck, 1978). Students in the helpless group used ineffectual hypothesis significantly more than students in the mastery-oriented group, and there was a significant negative correlation between the effort attribution scores and use of ineffectual hypotheses (1978). Furthermore, based on the results, those in the helpless group steadily declined in effective strategies to solve problems. In the first test, 93.1% of the students in the helpless group used an effective problem solving strategy, but as stated previously, each test the percentage of students

that used effective strategies decreased in subsequent test after receiving failure feedback (72.1%, 51.7% and 31%) (1978). Conversely, students in the master-oriented group showed more sophistication in their problem solving as they received failure feedback; students in the master-oriented groups consistently had useful problem solving strategies through all four test (92.1%, 73.7%, 68.4% and 84.2%). One commonality that was found between the two groups is that after the first failure, both groups had a decrease in useful problem solving strategies. Though both groups had decreases in useful problem solving after the first failure, the master-oriented groups showed more resilience than that of the helpless group (Diener & Dweck, 1978).

The difference in the research by Diener and Dweck (1978) from study one and study two was that students in study two verbalized their thoughts while solving the problems that were given. Based on the results, those in the helpless group steadily declined in effective strategies. In the first test, 100% of the students in the helpless group used an effective problem solving strategy, and similar to the results in study one, each test the percentage of students that used effective strategies decreased in subsequent tests after receiving failure feedback (73.3%, 63.3% and 36.7%) (Diener & Dweck, 1978). Students in the master-oriented group showed more sophistication in their problem solving as they received failure feedback, using useful problem solving strategies 100% of the time through all four tests (1978). Mastery oriented students engaged in solution-directed behavior such as self-instructions and self-monitoring, whereas students from the helpless group made the following statements: ineffectual task strategy, attributions to loss of ability, statements of negative affect, and solution-

irrelevant statements (1978). Diener and Dweck (1978) found that helpless students contemplate their reason for failure, give credit of the failure to an uncontrollable factor, which led to little time thinking about how to overcome failure, while mastery-oriented students are directed towards finding a solution and are less concerned about past failures in order to attain future success (1978). While the researchers were successful at comparing the mindsets of students that were considered helpless and mastery-oriented, it should be noted the small sample size as well as a lack of diversity in the study.

In order to identify the relationship between fear of failure, success orientation, and self-protective behavior, researchers De Castella, Byrne, and Covington (2013) conducted two studies, one in Japan and a second study in Australia. Study one took place in Japan, were 1,423 students, who captured a diverse spread of low, intermediate, and high ranking schools (De Castella et al., 2013). The students in the study ranged from 15 to 18 years old, 42% of which were male and 58% female, and all students participated voluntarily (2013). Study two in Australia consisted of 680 students ranging from 15 to 19 years old. Of the 680 students, 38% were male and 62% were female, and 35% of the students were from public schools while the remaining 65% went to private school. The study was quantitative in nature and students were given a questionnaire that was rated on a 7-point Likert scale (De Castella et al., 2013). Questionnaires were administered in students' English class and were told to answer to the best of their abilities and their answers would be kept anonymous. One difference between the studies was that in study two, there were three additional measures to

assess student disengagement, truancy, and general academic achievement (De Castella et al., 2013).

The results in Japan in study one indicate that optimists (low fear of failure, high success orientation) and over strivers (high fear of failure, high success orientation) report similarly low levels of self-handicapping and helplessness (De Castella et al., 2013). Self-handicapping behavior and attributions of helplessness were most common among students scoring high on the dimension of self-protection (high fear of failure and low success orientation) (De Castella et al., 2013). In study two, researchers found that fear of failure and success orientation significantly predicted self-handicapping, defensive pessimism, and students' tendencies to engage in helpless patterns of thinking, and found a significant and positive relationship between fear of failure and self-handicapping (De Castella et al., 2013). Self-protecting students displayed the highest rates of self-handicapping and were the most likely to become disengaged in school and skip class (De Castella et al., 2013). Success orientation and fear of failure accounted for a significant variance in truancy, disengagement, and self-reported achievement, and students were the most defensive and pessimistic when they were concerned about failing, while students that showed the most adaptive behavior were low in fear of failure and were highly success oriented (De Castella et al., 2013). Although the study was multi-cultural, study one and two were consistent across cultures.

Researchers have found the effects mindsets have on children, but the mindset of parents are as influential on children as their self-mindset. Researchers Haimovits and Dweck (2016) wanted to see how parents' views of failure predict children's fixed and

growth intelligence mindset (Haimovitz & Dweck, 2016). In order for Haimovitz and Dweck (2016) to study the effects of parental view of failure on mindset, it led to their primary hypothesis: As compared to parents who view failure as enhancing, parents who view failure as debilitating would result in their child believing that intelligence is fixed. Haimovitz and Dweck (2016) split their study into five separate studies to analyze their hypothesis. For each of the studies, Haimovitz and Dweck (2016) used surveys (scaled from 1, strongly disagree to 6, strongly agree) and questionnaires to analyze the participants. What Haimovitz and Dweck (2016) found in their results was that there was a significant relationship between parent's failure mindset and the child's intelligence mindset ($\beta = 0.24$, $p = .038$), as parents had a "failure is debilitating mindset", the more fixed the child's mindset.

The mindset of the teacher has also been shown to have an effect on the mindset of the students (Gibbs & Tunstall, 1998; Smith et al., 2018). Smith et al. (2018) studied the impact of teacher language on mindset. In their study, 106 participants completing a psychology course (77.5% female, 57.7% white, 26.8% African American) completed a six item survey used to measure mindset, and scores were on a five-point Likert scale with higher scores referring to agreement to fixed-mindset statements (T1). After the completion of the lessons with either the control, fixed-mindset, or growth-mindset teacher, students completed the mindset questionnaire for a second time (T2) (Smith et al., 2018).

Smith et al. (2018) found from their study that the control group showed very little change from T1 to T2, but both the fixed and growth mindset groups scores

decreased (lower score indicates a growth mindset), but as expected, the growth mindset group's score decreased the most, shifting 2.72 times the amount of the fixed group. Researchers found that the instructors brief opening comments to the class, which were either fixed or growth mindset, impacted the students' mindset in respect to IQ (2018). Similarly, in the research by Gibbs and Turnstall (1998), when they studied the attribution of success or failure by students, they also concluded that the children did see the teacher as having an influence on success and failure. Although Smith et al. (2018) found that the opening comments of the instructor impacted the students' mindset in respect to IQ, they found that the effect of the instructor's comments on mindset had small effect on beliefs of school performance ability and had a limited impact on students' quiz performance.

Research done by Lou and Noels (2017) analyzed mindset and the relation with goal orientations and learning language. In order to complete their research they had two different studies. In study one there were 1,633 students (63% female, 37% male) who were enrolled in an introductory psychology class in a Canadian university. The participants were from diverse ethnolinguistic backgrounds: 1,097 (67.2%) spoke English as their first language, 305 (18.7%) spoke English and another language as their first languages, and 229 (14%) spoke a language other than English as their first language (Lou & Noels, 2017). Study two consisted of 189 students (84.1% female, 15.9% male) who were identified in a mass-testing session for students in first year psychology courses and invited to complete an online questionnaire in a group-testing session (2017). None of the participants in study two participated in the first study.

Study one tested the validity of the Language Mindset Inventory (LMI), and the assessment showed sound internal consistency and reliability as well as evidence of validity, and study two verified the validity of the LMI (Lou & Noels, 2017). Separate from mindsets, perceived competence had indirect effects of failure response through learning goals and performance-avoidance goals, but the relationship between language mindsets and perceived language competence were related to goal orientations (Lou & Noels, 2017). Lou and Noels (2017) also found through their research that stronger perceived language competence indirectly predicted a stronger fear of failure, while only performance-avoidance goals predicted helpless and anxious responses. Lastly, the research found that goal orientations mediated the relation between mindsets and these responses (2017).

Mindset Intervention

Researchers Rhew et al. (2018) wanted to investigate if a growth mindset intervention would improve adolescent special education students' self-efficacy and motivation. As Rhew et al. (2018) began their research, the question that they wanted answered was: "Is there a significant difference in reading self-efficacy and motivation between middle-school special education students who participate in the growth mindset program and those who do not" (Rhew et al., p. 6)? The criteria to be considered part of the study included: Special education students with a learning disability or dyslexia, receiving special education services, and has reading goals. Of the students that met the requirements for the study, only 70 students met the criteria and agreed to participate (23 sixth graders, 25 seventh graders, and 22 eighth graders), but

only 68 students completed the experiment. Rhew et al. (2018) gave students the Reader Self-Perception Scale 2nd Edition (RSPS-2) to gauge self-efficacy, and the Motivation for Reading Questionnaire (MRQ) to gauge motivation of reading, and both were given as a pre and post-test. The experimental group participated in Brainology, a growth mindset intervention, while the control group did not. Students participated in this study for a period of eight weeks. Rhew et al. (2018) found that the RSPS-2 pre-test results, there was no statistical significance between the control and the experimental group. The researchers found similar results in the post-test data as well. It seemed like Brainology (growth mindset intervention) didn't affect student self-efficacy. As the researchers reviewed the data from the MRQ, the data showed that both the experimental and control group results were not statistically significant before intervention. Unlike the post-test scores for the RSPS-2, the MRQ showed significant differences between the experimental group ($M = 159.13$, $SD = 12.27$) and the control group ($M = 141.64$, $SD = 8.27$). Rhew et al. (2018) contribute the poor showing of self-efficacy growth on the RSPS-2 based on previous research that students with learning disabilities have difficulty gauging self-efficacy.

Hoyert, Ballard, and O'Dell's (2019) research focused on providing interventions to support students that were failing in college. The interventions that were provided included growth mindset, goal-orientation, and stereo-type threat with the hope that it would increase student retention and GPA, which were provided in a sophomore seminar course (Hoyert, Ballard & O'Dell, 2019). These interventions taught students how to respond to academic failure, set and pursue realistic goals, as well as how to

embrace challenge (2019). Of the 68 participants, 65% were underrepresented minorities, 75% were female, 72% were full time students, and the group had a 901 mean SAT (2019). Before being involved with the intervention, the average GPA of the participants was 1.45.

Before being involved with the intervention, the average GPA of the participants was 1.45. After completion of the intervention, the students' GPAs were measured at the semester of the class, the semester after the class, and one year after the class, and the students' GPA was 2.39, 2.20, and 2.38, respectively (Hoyert, Ballard & O'Dell, 2019). Not only did the GPA scores increase, but so did the number of credits completed. Before the intervention, the participants' completion rate was 60%, and as measured at the semester of the class, the semester after the class, and one year after the class, the completion rate went up to 73%, 74%, and 80% (2019). When analyzing credit completion, before the intervention, the average number of credits completed was 6.4, and in the following three check points, student completion rate went up to 11.3, 10.8, and 9.8. Lastly, 61 (89%) of the students who registered for the class had a GPA that was below 2.0, and after the intervention class, 22 (32%) students had between a 2.0 and 3.0, while 19 (28%) students earned a GPA between 3.0 and 4.0 (2019). For all of the positive results, the Hoyert, Ballard and O'Dell (2019) recognize limitations in the study: there was a small sample size, there were no comparisons between the various interventions used.

While Hoyert, Ballard, and O'Dell (2019) provided students with an array of growth mindset, goal-orientation, and stereo-type threat interventions, Irfan Arif and

Mirza (2017) focused on the effectiveness of resilience training in non-resilient, at-risk students. There were 255 male students involved with the study, all of whom were in ninth and tenth grade (14 – 16 years old). Of the 255 students, 41 of the students had academic issues, 32 were in poor health, 27 had low socio-economic states, 15 experienced negative life events, 115 were at-risk students, and 64 were considered non-resilient at-risk students (Irfan Arif & Mirza, 2017). The researchers split the students into two groups, 32 of the students were in the control group and 32 students were in the experimental group. Students in the experimental group were given resilience training for three months and students in the control group received their regular instruction (2017). The students selected for the study were given a risk identification survey and resilience assessment scale (RAS) (2017).

Irfan Arif and Mirza (2017) found that students that received intervention training tested better on their overall resilience than those without the resilience training as well as the resilience teacher was able to develop a positive relationship with students as well as maintain a positive and motivational attitude. The findings exhibit that the treatment was effective in helping students by providing explanations, encouraging students to elaborate their responses, appreciating and applauding student successes and providing support wherever needed during their task and learning processes (2017). Students in the experimental group reported more positive learning environment and obtained a higher resiliency score than their counterparts and that the intervention was significantly effective in enhancing academic resilience (2017).

Feedback

Feedback is an intervention that teachers use in order to assist students with the success and failure in school. Ahmed Shafi et al. (2018) used both a quantitative and qualitative study to analyze student response to teacher feedback. In this study, Ahmed Shafi et al. (2018) administered a survey to a cohort of 100 undergraduate Education Studies students and received a total of 91 responses. Over half of the responses indicated that they read their feedback carefully, and of the 91 students, 80 reported that feedback that was the most beneficial feedback was in terms of feed-forward, which allowed them to know how to improve on the next assignment (2018). Also, given the research, it appeared that feedback was a prompt for students to action as well as a resource for students on future assignments. Additionally, Ahmed Shafi et al. (2018) found that despite a student's immediate negative emotional reaction to a disappointed grade, feedback actually helped students to cope with their negative emotions. It was suggested that explicit teaching on how to use feedback would be valuable to students.

One of the most powerful interventions that have a lasting effect on students is feedback (Dodgson & Wood, 1998; Haimovitz & Dweck, 2016; Skipper & Douglass, 2012). As expressed in the previous section, Dodgson and Wood (1998) found from their research that individuals who have high self-esteem are able to more readily activate strengths and weakness when experiencing failure than others with high self-esteem whom experience no feedback. Similarly, researchers Skipper and Douglass (2012) wanted to study the effects of the different types of feedback that are given to students

after success and failure. Skipper and Douglas (2012) conducted two experiments to study how process praise compared to objective outcome feedback when individuals deal with failure. In the first experiment, 145 British school children (66 girls and 79 boys) with the mean age of nine years old were split into three experimental groups: person praise, process praise, and no praise. Students were given a questionnaire and were asked to imagine themselves as the child represented by five different everyday school situations (Skipper & Douglas, 2012). The first three scenarios depicted success and an objective performance feedback, this was then followed by their selected experimental condition. Students were then given two scenarios that depicted failure, and were offered no verbal feedback after the failure (2012). It was found that no significant differences between process, person, and no feedback after student success, but children in the person praise group showed more of a negative response to failure than those in the process praise and no praise group (2012). Also, it was found that there was no difference of those in the process praise and no praise group in any of the measures. Skipper and Douglas (2012) observed that the data suggests that process praise and objective performance may be a buffer for one failure, but after a second failure, more negative responses occur regardless of type of feedback.

A second experiment was performed with 114 Social Science undergraduates (74 females and 39 males), whom had a mean age of 21 years old (2012). The students took part of the study on a voluntary basis, and were split into three experimental groups: person praise, process praise, and no praise. Similar to experiment one, students were given a questionnaire and were asked to imagine themselves as the child represented

by five different everyday school situations, consistent with the wording in experiment one, but modified to be appropriate for adult participants (2012). The first three scenarios depicted success and an objective performance feedback, this was then followed by their selected experimental condition, followed by two scenarios that depicted failure and then offered no verbal feedback after the failure (2012).

As a result of the experiment, Skipper and Douglas (2012) found no significant differences between process, person and no feedback after the successes, which reflected the results of experiment one. After one failure however, students showed a similar pattern to the school children with differences in perceived performance and affect across conditions (2012). It was also found that University students' level of persistence was not affected by type of feedback received. Additionally, similar to the results of the school children, the questionnaires filled out by the University students revealed: person praise group showed more of a negative response to failure than those in the process praise and no praise group, there were no differences of those in the process praise and no praise group in any of the measures, and after a second failure, more negative responses occur regardless of type of feedback (2012). Although the results were consistent between the two experiments, the researchers identify that limitations to their study include: small sample size, and students responded to imagined responses instead of actual responses to classroom data (2012).

Similarly, Skipper and Douglas (2015) studied the effects of person, process, and no feedback on children's perceptions of their relationship with a teacher following success and failure. This study consisted of two experiments; experiment one consisted

of 145 British school children (66 girls, 79 boys), from age nine to 11, experiment two consisted of 98 British children (45 girls, 79 boys, one missing rating), between the ages of seven and 11 (Skipper & Douglas, 2015). The children in both experiments were separated into three different experimental groups where they worked through a questionnaire during class time (2015). Students imagined themselves as the student in the five written scenarios where they performed a task and were provided with feedback (2015). The final two scenarios depicted success and then students were given no further feedback.

In experiment one, Skipper and Douglass (2015) found that the impact of the type of feedback (person/process/control) after success had no effect on dependent measure as well as no effect on the student's liking of the teacher or how they felt the teacher liked them. Regardless of feedback type, after failure, all students viewed the teacher-student relationship more negatively (2015). In experiment two, students who received person criticism perceived a significantly lower teacher-student relationship than of the other two groups. Skipper and Douglas (2015) found that following the first success, the type of feedback received had a significant impact on the perception of the student-teacher relationship, and student that had person feedback had more negative feelings about the student-teacher relationship, even after the first success. Limitations to this research were that the scenarios were simulated as well as having a small sample size.

Just as Skipper and Douglas studied how different types of feedback affect how individuals deal with failure, researchers Karumbaiah et al. (2017) researched different

response methods (empathy, growth mindset, success/failure) increased student motivation to persist on a task. Karumbaiah et al. (2017) selected 64 sixth-grade students in an urban school in Southern California to partake in their research. For this quantitative study, students used a computer program, Math Spring, an intelligent tutor that personalizes mathematics problems, provides help using multimedia, and effectively teaches students to improve in standardized test scores (2017). The learning companion messages were randomly assigned and given in audio and written format, and students were randomly put into one of the three conditions: Empathy (24 students), growth mindset (20 students), and success/failure (20 students) (Karumbaiah et al., 2017). Students who received empathetic responses had a higher interest in mathematic problem solving as well as believing that mathematics is valuable to learn and seemed to be more patient and careful in their math problem solving (2017). Students who saw more growth mindset responses succeeded more often at answering problems correctly, but also made more mistakes. Lastly, students who received success/failure messages showed more confusion with the materials after the post-test, reduced learning orientation, hurried work, and had a reduced likelihood of requesting hints (2017). It was identified that the limitations of this study included having a small sample size, needing of more diversity in participants, as well as students receiving a mix of method responses in all of the reported categories (2017).

After experiencing failure and success, students can experience a variety of emotions. Jarrell, Harley, Lajoie and Naismith (2017) examined the relationship between performance feedback and emotions. The subjects used for the study were comprised

of 30 medical and dentistry students from North America (11 men and 19 women), with an average age of 23, and who completed basic science curriculum as well as courses on endocrinology, metabolism, and nutrition (Jarrell et al., 2017). Students were asked to solve three endocrinology cases of varying levels of difficulty on a Computer-based learning environment (CBLE), and after each case, students were given an Academic Emotions Questionnaire (AEQ) and asked to respond after receiving performance feedback from the case (Jarrell et al., 2017).

Jarrell et al. (2017) found that when working with difficult cases, shame was the strongest emotion experienced, while joy was felt the most easily after easy cases. After responding to the AEQ, students could be grouped into three different clusters: negative, positive, and low emotion (2017). Students in the low emotion cluster chose more correct evidence items than those in the negative cluster, but less correct evidence items than those in the positive group cluster. It was found that those in the positive group cluster outperformed those in the other two cluster categories. The results of the moderate difficulty case did not fit the researcher's pattern of results due to the low emotion cluster outperforming those in the positive and negative cluster. The results from the study highlight the importance of emotional intensity in response to feedback, due to how together emotional valence and intensity relate to performance outcomes (2017). Limitations of the study by Jarrell et al. (2017) include: limited sample size, prior knowledge was not assessed, as well as the difficulty of measuring emotions.

Feedback differences in sexes

It has been found that feedback can affect and differ according to sex (Bush & Dweck, 1976; Dweck et al., 1978). Bush and Dweck (1976) conducted two experiments to study this difference. In experiment one, 108 fifth-grade students (52 female and 56 male) participated in the study as well as their teacher, whom were all females. In this experiment, students performed a task, and received feedback from adults and peers of different genders. What Bush and Dweck (1976) found was that girls were less likely to show improvement over trials under failure when the evaluator was adult or female, but girls showed immediate and sustained improvement when the evaluator were peers or a male. Boys were less likely to show improvement over trials under failure when the evaluator was a peer or male, but boys showed immediate and sustained improvement when the evaluator were adults or a female (Bush & Dweck, 1976). It was also found that girls found that the adult female evoked the greatest attribution of failure for lack of ability (30.8%), while the male peer evoked the greatest attribution of failure to blaming the agent (15.4%) (1976). Boys found that the male peer evoked the greatest attribution of failure for lack of ability (21.4%), while the female adult evoked the greatest attribution of failure to blaming the agent (21.4%) (1976).

Bush and Dweck (1976) conducted a second experiment, using 108 fourth and fifth grade students (55 males and 53 females). Girls showed a tendency to attribute failure to lack of ability rather than lack of effort with adult and female agents as compared to peer and male agents (1976). Conversely, boys showed a tendency to attribute failure to lack of ability rather than lack of effort with peer and male agents as compared to adult and female agents (1976). Limitations to the work by Bush and

Dweck include: small sample size, lack of diversity, and all of the students had female teachers.

Similarly, Dweck et al. (1978) studied how boys and girls differ when given evaluative feedback. The students in the first study consisted of 52 fourth-grade and 27 fifth-grade students who were predominantly white, low-middle class students who attended public school (Dweck et al., 1978). In the fourth-grade class there was a more advanced class (13 males and 15 females) and a less advanced class (13 males and 11 females), and the fourth-grade class was taught by two teachers, one taught reading, while the other taught science, while the fifth-grade class was taught by one teacher the whole day (1978). Researchers observed the evaluative feedback given by the teacher and categorized the type of feedback given. When researchers observed the percentage of total positive feedback given for intellectual quality of their work, boys (93.8%) received statistically significant higher feedback than girls (78.9%) (1978). When researcher observed the percentage of total negative feedback given for intellectual quality of their work, girls (69.6%) received statistically significant higher negative feedback than boys (32.5%) (1978). It was also found that when receiving positive work-related feedback given by the teacher, 93.8% of the praise the boys received was for their intellectual competence, whereas the girls were praised for their competence 80.9% of the time, and roughly 19% of the praise the girls received was not for their intellectual competence, but rather for things such as neatness (1978). For negative work-related praise, the results were more apparent. For boys, 54.4% of the work-related criticism referred to intellectual inadequacy; conversely, 88.9% of the criticism

girls received on work-related content addressed intellectual performance (1978). Also, both boys and girls were given the same amount of failure feedback, but most of the feedback boys received was accompanied by attribution to lack of motivation. Lastly, study one found that 45% of the negative feedback boys received on their work was unrelated to its intellectual quality (1978).

In study two, 60 fifth-grade students (30 male and 30 female) were randomly assigned to three experimental conditions (Dweck et al., 1978). It was found in study two that children receiving failure feedback, referring to intellectual adequacy of their performance, viewed successive failures as to suggest a lack of ability. Dweck et al. (1978) suggest the limitations of their research include that it is agent specific as well as students being manipulative at grade school age (1978).

Parent Feedback

Gunderson et al. (2018) examined the relation of parent praise and motivational frameworks to academic growth in three academic domains: mathematic problem solving, reading comprehension, and reading decoding. The study focused on 53 children (29 boys and 24 girls) with the mean age of 10 years old and their caregivers. Of the 53 children, 34 of the students were white, nine were African American, six were Latino, and four were of mixed racial background (Gunderson et al., 2018). The caregivers were diverse in their terms of level of education and were also diverse in terms of annual family income (2018). For this quantitative study, parents were observed in their natural environment for 90 minutes when their child was 14, 26, and 38 months old. Researchers studied how parents talked to their children in every-day

interactions and separated into three different praise groups: process praise (18%), person praise (16%), and other praise (66%) (2018). Gunderson et al. (2018) used the Woodcock-Johnson III to assess academic achievement in math achievement, reading comprehension, and reading decoding.

Gunderson et al. (2018) found a pattern in the results that caregivers' who emphasized process praise predicted their child's incremental motivational framework five years later, which predicted the child's achievement two years later, especially in the academic domains of mathematics and reading comprehension. The findings also suggest that process praise leads children to form incremental motivational frameworks, which over time, improves their academic achievement and researchers found a link that trait beliefs alone formed a link between caregivers' process praise and their children's fourth grade achievement (2018). Gunderson et al. (2018) did not find a relation between caregivers' process praise and their children's motivational framework and achievement. Lastly, as the researchers anticipated, there was no relation between process praise and students' motivational framework and achievement in the domain of reading decoding, presumably due to the complexity of reading decoding (2018).

Gunderson et al. (2018) note limitations include: small sample size leads to lack of power to detect true effects, the praise style of caregivers could have changed or they could use a combination of praise styles, and small sample size can lead to low positive predictive values.

Teacher Feedback

One of the most powerful tools a teacher uses during the day to redirect student success and failure is feedback, and much research has been done analyzing how teachers give feedback to students (Brooks, Carroll, Gillies & Hattie, 2019; Garcia Gutierrez & Narvaez, 2017; Sellbjer, 2018;). Brooks et al. (2019) studied what type of feedback is most commonly used in the classroom and which type of feedback is most useful to promote improvement. In the study, Brooks et al. (2019) recoded the teacher and the type of feedback was split into two stages: feedback type and feedback level. The feedback was then classified in three ways: Feed Up (where they are going), Feed Back (how they are going), and Feed Forward (steps towards improvement) (2019). There were 28 students (13 female, 15 male), between the age of 11 and 13, in the class the class that was observed with a teacher whom had 30 years of teaching experience. The second stage of the study was then to measure feedback level and the level at which the feedback was aimed (2019).

What Brooks et al. (2019) found that the type of feedback most commonly used was feedback, followed by feeding up, then lastly feeding forward. When observing relative frequency by feedback level, 78% of feedback was task level feedback, and the observation of task level feedback it was found that feeding up was the most common use of feedback, which was also mainly directed to the whole class as well as pertaining to task expectations (2019). Also, feeding back was the most common at the task level, which much feeding up was directed to: whole class, small groups, and individuals (2019). Similar to feeding up and feeding back, feeding forward was most utilized during task level work. For all three types of feedback, self-regulatory was the least likely form

of feedback used, and feedback at the process or self-regulatory level help students to deepen their understanding of subject matter (2019). For all of the connections on feedback made, having a small sample size as well as just observing one class are limitations of this study.

In a study performed by Garcia Gutierrez and Duran Narvaez (2017), they were seeking to explore the correlation between the high school learners' prior language learning experiences and their recurrent failure of the English courses that led to low self-efficacy. Garcia Gutierrez and Duran Narvaez (2017) studied 11 students in the ninth and 11th grade, who age ranged from 13 to 15 years old. All of the students selected experienced constant failure and reluctance towards learning a foreign language. In this qualitative study, students wrote an autobiography and were guided through some of the questions (2017).

As the researchers reviewed the autobiographies of the students, they observed that students felt when the teacher's instruction was teacher-centered as well as having poor work appraisal and correction techniques, which caused the students to feel apprehensive and demotivated to learn, meaning that the teacher influenced how students performed in the classroom (2017). The students' autobiographies suggested that the interactions between the teacher and students, namely being demotivated as well as publicly humiliated, caused the learners' self-efficacy to be dramatically decreased (2017). Lastly, when students experienced negative individual and relational factors, it caused the students to experience: anxiety, inhibition, low self-esteem and lack of motivation, lack of empathy, as well as fear and frustration (2017).

In a study similar to Garcia Gutierrez and Duran Narvaez, Sellbjer (2018) examined how teachers respond with their feedback for underperforming students on tests. Sellbjer (2018) observed 91 students that had failed an examination over the period of eight months. Of the 91 students, a total of 190 exams were failed for the whole group, 70% of which were written exams, 27% were take home exams, and 3% being oral exams (2018). Most of the feedback for the study came from take-home exams, and 10% of the students (referred to as the group of nine) received 29.5% of the feedback comments. The group of nine were then compared to the rest of the group.

Sellbjer (2018) found that the group of nine made errors on things that include: references, biography, relevant literature, and more comments on the qualification of their answer. Students in the group of nine also received more comments for clarity than those in the other group (20% vs 16%), as well as more negative comments (12% vs 5%) and less motivational comments (9% vs 15%) (2018). Finally, researchers made a list of 43 negative comments observed and reduced the list down to the ten most negative, and of the ten most negative comments, those in the group of nine received seven out of ten of the most negative comments (2018). Sellbjer (2018) recognized that the limitations of the study include that there was a small size as well as there being no other research to compare the result of the findings.

Feedback Intervention

Researchers Thayer et al. (2018) examined if a method of feedback given an array of factors and outcomes and then examining its efficacy as an intervention with at-risk students. The researchers assessed students and identified 81 students who showed

early warning signs of dropping out of school. The top 15% (12 students) of those students were excused from the study whom had the highest number of trancies and disciplinary incidents due to the intensive intervention of the study (Thayer et al., 2018). Using a researcher developed questionnaire, the number of students was then reduced from 69 to 35, and of the 35 students selected from the questionnaire, 28 agreed to participate in the study, and of the 28, six students were randomly selected to participate in the intervention study (2018). The six participants were all males, non-white (four African American and two Latino), all of the students received free and reduced lunch, and two of the students received special education services (SLD) (2018). The intervention strategy the teacher used is the Wise feedback strategy. The Wise feedback consists of the teachers implementing four steps: positively greet the students to diffuse any potential fears or negativity, communicate the reason for the feedback and then aligns the reason with the desired outcome, formulates a statement that articulates the expectations for behavior and performance as well as believe in the students ability to meet or exceed that goal, and asks one or two open-ended, encouraging questions that prompt ways the student can use the feedback to improve their performance and how the teacher can best support the student (2018).

The results of the intervention showed moderate reductions in early warning signs for at-risk individuals as well as a decrease in average warning indications for every student who participated in the study (Thayer et al., 2018). The largest drop in average warning indicators occurred for Ernesto and Damion. Ernesto's average was a nine, and after wise feedback intervention, his average dropped to four. Damion's average

dropped from an initial 11.8 to a 3.6 (2018). Also, prior to intervention, students reported on the belonging measure a 12.2 on a scale of 30, which indicates that the students felt disconnected from their school, and in regards to reporting the trust measure, initially students reported a score of 15.2 out of 36 (2018). After utilizing the wise feedback intervention, students reported a belonging measure of 18.4 and a trust measure of 25.4 (2018). Thayer et al. (2018) discussed limitations to their study, such as small sample size, difficult to determine what components of the intervention cause the positive outcomes, and the researchers didn't gather long-term data.

Productive Failure

Productive Failure (PF) is a learning process that provides conditions for students to persevere to generate and explore different representations and solutions for solving both complex and novel problems (Kapur & Kinzer, 2009; Kapur, 2010; Kapur, 2011; Kapur 2012; Song, 2018). This process will lead students to initial failure, but will lead students to consolidate and assemble their thoughts and solution methods into commonly approved methods of problem solving. Kapur and Kinzer (2009) studied the effects of PF on students that participated in computer-supported collaborative learning (CSCL). The study included 177 11th grade science students (120 male, 57 female) from two co-educational, English speaking high school in India were randomly assigned to answer either well-structured or ill-structured problems as a group while receiving no external support (Kapur & Kinzer, 2009). After completing the group problem solving, students then individually solved well-structured problems followed by ill-structured problems (2009).

Data from this study showed that in the group work, the quality of the answer of the well-structured (WS) group ($M=2.84$, $SD=1.26$), on average did statistically significantly better than the ill-structured (IS) group ($M=1.29$, $SD=1.08$) (2009). Due to not being given a structure, the IS group spent more time on interactional activity on problem analysis, problem critique, and criteria for developing a solution. The students were then given a post-test which included two sections: well-structured and ill-structured questions. It was found on the well-structured posttest, ill-structured post-test, and the mean WS post-test performance, that those in the IS group significantly outperformed their counterparts in the WS group (2009). Kapur and Kinzer (2009) add the limitations of their study include having a small sample size as well as the scope of inference holds only under the conditions and settings of the study.

Kapur (2010) continued his work on the benefits of PF and in this study, Kapur designed a study to investigate the hidden efficacy in delaying the structure of learning of students by having them engage in unscaffolded problem solving of complex problems before receiving direct instruction. The subjects of the study were 75 seventh grade students in Singapore. Of the 75 students, 43 were male and 33 were female between the ages of 12 and 13 years old and came from middle class socio-economic backgrounds (Kapur, 2010). The students were in two math classes (37 and 38 students) who were taught by the same teacher. The study was both quantitative and qualitative. For the quantitative study, the researcher's analyses of group solutions, individual solutions to the what-if extension problems, the corresponding confidence ratings, and all of the students took two post-tests (2010). The qualitative study

consisted of the analyzing the problem representations produced by groups as well as discussions (2010).

In the post-test one, which reviewed the covered content, researchers found a significant difference between the Productive Failure (PF) class and the Lecture and Practice (LP) class. The PF class earned 10% more points on post-test one (2010). On the well-structured problems, the PF class earned 6% more points than those in the LP class, and in the higher-order analysis, the PF class earned an average 23% difference in points than those in the LP class, which is statistically significant (2010). Post-test two, which was an extension of content not covered, had two versions of the test, version A, which had a structure to answer item one, whereas version B had no structure to answer item one (2010). Both the PF and LP were given the same set-up for item two. What Kapur (2010) found was that students from PF-A had significantly greater success rate at answering item one (94% success rate) than all of the other groups (PF-B, 68%; LP-A, 68%; LP-B, 53%) (2010). Students in PF-A had a significantly greater success rate at answering item two, 50% success rate, than all of the other groups (PF-B, 16%; LP-A, 21%; LP-B, 21%) (2010). Lastly, LP groups showed a better understanding of creating structures than the PF-B group who were not provided with a structure (2010).

While Kapur (2010) investigated the hidden efficacy in having students engage in unscaffolded problem solving, Kapur (2011) conducted a study to determine which structure of learning and problem solving activities would most benefit student in performance success. The three structures of learning Kapur (2011) decided to analyze include: Productive Failure (PF), Facilitated Complex Problem Solving (FCPS), and Lecture

Practice (LP). The PF and FCPS groups are designed to be the exact same with one exception: Students in the PF group didn't receive any teacher intervention in the group or individual problem solving process, while the students in the FCPS group received teacher intervention throughout the group and individual problem solving process. The LP group followed the traditional teaching process of teacher presenting material followed by practice problems (2011). In the study 109 students (59 male, 50 female) participated, all of whom were in 7th grade (12 – 13 years old). All of the students were from three math classes, one class was designated as the PF class (36 students; 19 male, 17 female), another class was designated as the FCPS class (34 students; 19 male, 15 female), and a third class assigned to the LP group (39 students; 21 males, 18 female). All of the classes were taught by the same teacher, whom had a bachelor's degree in mathematics, a post-graduate certificate in mathematics education, and five years of teaching experience. The students who participated in the study had no prior instruction on the concept of average speed.

The experiment was both qualitative and quantitative and students were analyzed on several bases. First, Kapur (2011) observed group problem representations and methods, and these group work artifacts were used to derive the maximal set of problem representations and solution methods generated by the groups. Secondly, group and individual work samples in the PF and FCPS groups were examined to determine the number of groups that were able to find the solution to the complex problems. Students in the PF and FCPS groups were also assessed on their confidence after individual extension problems through the using a five-point Likert scale from 0

(0% confidence) to 4 (100% confidence) (Kapur, 2011). Additionally, in the final two to three minutes of each lesson, students in all of the three groups reported their level of engagement using a five-item Likert scale survey (2011). To measure the student performance in the LP group, data from homework assignments, which were comprised of well-structured problems were graded by the teacher. Lastly, students from all three groups were given a 40 minute, six-item posttest comprised of three well-structured problems, one higher-order application item, and two items on representational flexibility (2011).

Given the analysis, there was no significant difference between the groups in the pre-test. Kapur (2011) found that the PF groups were able to generate more diverse amounts of representations and methods for solving problems. When the students took the three well-structured items, the PF group scored the highest, followed by the FCPS group, and then finally the LP group (2011). On the higher-order application item, the PF group scored the highest, followed by the FCPS groups, then the LP group, and the effect was statistically significant (2011). These results of the graphical representation item followed the results of the higher-order application item. Overall, the results were that those in the PF group outperformed those in the other groups with statistically significant results, and those in the FCPS group marginally outperformed those in the LP group, but the results were not statistically significant (2011). Kapur (2011) identifies the limitations of his study were the small sample size, limited socio-economic differences and content domain (2011).

Kapur (2012) continued his study of PF by comparing the efficacy of a PF design as compared to a Direct Instruction (DI) design. In the study, 133 9th grade students from an all-boys public school who were all Chinese in ethnicity (Kapur, 2012). Two classes that participated in the study were taught by one teacher, and two classes were taught by another teacher. The topic being covered by the study was variance, which is a topic taught in 10th grade, and none of the students had prior experience with the topic, and all students had a working knowledge of mean, median, and mode (2012). The PF class worked the first two days on a data analysis with their triads, and no instructional support were given. On the third day, the teacher then compared and contrasted student-generated solutions with each other, and then modeled and worked through the canonical solution (2012). In the fourth and final day, students solved three data analysis problems for practice, and the teacher discussed the solutions with the class (2012). Lastly, the students in the PF group were given no homework. In contrast, on the first day the DI group was taught by the teacher the concept of variance followed by students practicing similar problems (2012). The second day consisted of the student working individually on three data analysis problems to solve that were discussed by the teacher (2012). On the third day, students worked in triads to solve the same problems that were given to the PF group, and finally on the last day, the students worked individually to solve three more data analysis problems (2012). Students in the DI group were also given a total of six homework questions.

When Kapur (2012) administered a pre-test, there was no significant difference between the two groups. It was found that students in the DI group were able to solve

the data analysis problem with 100% accuracy as compared to 0% by the PF group in the generation phase, due to the fact that the PF student couldn't come up with the canonical solution (2012). The performance of the DI group on the homework problems was high ($M=93.2\%$, $SD= 5.3\%$) (2012). The post-test measured the students in three areas: procedural fluency, conceptual understanding, and transfer. When comparing procedural fluency, there was no significant difference in the data between the PF group ($M=7.02$, $SD=1.05$) and the DI group ($M=7.07$, $SD=1.69$) (2012). When comparing conceptual understanding, the PF group ($M=8.76$, $SD=2.40$) significantly outperformed the DI group ($M=4.37$, $SD=2.43$). Lastly, when comparing transfer, the PF group ($M=5.88$, $SD=2.32$) significantly outperformed the DI group ($M=3.23$, $SD=2.31$). Overall, the findings suggest that PF students significantly outperformed their DI counterparts on conceptual understanding and transfer without compromising procedural fluency (2012).

Kapur (2009, 2010, 2011, 2012) studied productive failure as compared to traditionally taught classes, researcher Yanjie Song (2018) was seeking to improve collaborative problem solving competency in project-based learning with productive failure (PF) in a seamless learning environment (Song, 2018). In order to see the effects of productive failure in a project-based learning classroom, the question that Song (2018) wanted to answer is: "What is the effect of project-based learning with PF instructional design in a seamless learning environment on students' collaborative problem solving competency" (Song, 2018, p. 983)? For this study, Song (2018) chose two 6th grade Science classes examining "Plant Adaptations". Class 1 had 27 students, 14

females and 13 males, and Class 2 had 26 students, 14 females and 12 males. The instructors were one male, who used project-based learning without PF instructional design, and one female, who used project-based learning with PF instructional design. The data that Song (2018) collected included: pictures and videos, interviews, post-reflections, and a pre- and post-domain knowledge test. Mixed data analysis were utilized for this study, such as: on-task analysis (student centered artifacts), content analysis (group project booklet, student focus group post-interviews, and student post reflections), and quantitative description analysis (pre- and post-domain tests). Song (2018) found that the Class 1, who utilized PF with project-based learning, well outperformed class two, who utilized project-based learning without PF, in multiple areas. The results of the collaborative problem solving, which was out of 100 points, for Class 1 were: 76, 68, 87, 83. The results for Class 2 on the collaborative problem solving were: 51, 54, 62, and 69. According to the results of the pre- and post-test analysis, Class 1 had a mean difference of .82; while Class 2 had a mean difference of .00, which indicates that there was no change in learning from the pre to the post test for the class that didn't utilize PF.

CHAPTER III: DISCUSSION AND SUMMARY

Summary of Literature

One of the conditions that every student faces in school is failure. Failure can affect students differently based on their self-efficacy as well as their resilience. Variables that contribute to self-efficacy include: sex, place of residence, as well as psychological resilience and positivity (Bingol et al., 2019). Research has also found that parental influence has had an effect on student self-efficacy as well as academic achievement (Bandura et al., 1996; Bingol et al., 2019, Caprara et al., 2008). Bingol et al. (2019) observed that participants who perceived their parents as authoritarian reported lower self-efficacy levels than those who perceived their parents as negligent, protective, or democratic and similarly, Caprara et al. (2008) found that students with authoritarian parents have lower self-efficacy. Bandura et al. (1996) noted that parental belief in creates a positive and supportive environment for student learning.

Bandura et al. (1996) also observed that children who believe they can control their own learning achieve success in their academic pursuits. Students' self-efficacy is paramount to students successfully handling failure (Banks & Woolfson, 2008; Dodgson & Wood, 1998; Spieker & Hinsz, 2004; Zhang et al. 2018). Students with high self-esteem were found to more easily access their strengths than weaknesses as well as suppress their weaknesses, while students with low self-esteem tend to overgeneralize failure (Dodgson & Wood, 1998). Fear of failure also can be positively associated with academic procrastination (Zhang et al., 2018). Banks and Woolfson (2008) found that

students who felt that they were not as good as other students perceived that they had less control over their unsuccessful performance than other students who viewed themselves as high achievers.

Along with self-efficacy, mindset can change how students view and handle failure (Andrews & Debus, 1978; De Castella et al., 2013; Diener & Dweck, 1978; Forsythe & Johnson, 2017; Gibbs & Tunstall, 1998; Scapinello, 1989). Students with a fixed mindset demonstrated defensive behaviors in order to protect their self-esteem and display the highest rates of self-handicapping (De Castella et al., 2013; Forsythe & Johnson, 2017; Lou & Noels, 2017). Fixed mindset attribute failure to not being smart enough and account for a significant variance in truancy, disengagement, and self-reported achievement (Andrews & Debus, 1978; De Castella et al., 2013; Diener & Dweck, 1978; Scapinello, 1989) Conversely, students with growth mindsets scored higher on challenge interventions and have greater motivation to act on feedback (Forsythe & Johnson, 2017). It was also found that students with growth mindset attributed failure to lack of effort and are able to show more sophistication in their problem solving skills as well have greater academic resilience (Andrews & Debus, 1978; De Castella, Byrne, & Covington, 2013; Diener & Dweck, 1978).

Seeing the impact that failure and mindsets have on students, studies have been completed to observe the effect that parents and teachers on student mindset (Gibbs & Turnstall, 1998; Haimovitz & Dweck, 2016; Smith et al., 2018). Haimovitz and Dweck (2016) observed that there was a significant relationship between parent's failure mindset and the child's intelligence mindset. Teachers have as much on student mindset

as parents. Gibbs and Tunstall (1998) concluded that students saw the teacher as having an influence on success and failure while Smith et al. (2018) found that the effects of the instructors' comments (fixed/growth) impacted the students' mindset in respect to IQ.

As stated previously, student self-mindset as well as parent and teacher influence can have a significant effect on academic performance. Given that mindsets are malleable, students should be able to utilize mindset intervention to improve academically (Hoyert, Ballard, & O'Dell, 2019; Irfan Arif & Mirza, 2017; Rhew et al., 2018). Rhew et al. (2018) had students participate in Brainology, a growth mindset intervention while compared to a control group, and students who participated in Brainology showed a significant difference that the control group in the Motivation for Reading Questionnaire (MRQ). Similarly, Hoyert et al.(2019) provided students with growth mindset and goal-orientation training, where students learned about how to respond to failure, embrace challenge, set goals, and persist until they reach their goals. Students responded to the training by increasing GPA and number of credits completed. Finally, Irfan Arif and Mirza (2017) gave resilience training for three months when compared to a control group and found that students that received intervention training tested better on their overall resilience training.

As educators, one tool that is used to help students with failure is feedback. Ahmed Shafi et al. (2018) indicate that students read feedback carefully and that students prefer feedback in terms of feed-forward, which allowed them to improve on future assignments. Teacher feedback (person, praise, no feedback) has been shown to have an effect on student-teacher relationship, and students who received person

feedback had more negative feelings about the student-teacher relationship as well as showing more of a negative response to failure (Skipper & Douglass, 2012, 2015).

Students who receive empathetic responses from teachers show higher interest in class as well as the value of what is being taught, while students who receive growth mindset responses succeeded more often at answering questions (Karumbaiah et al., 2017).

Lastly, Jarrell et al. (2017) observed that students who received positive feedback outperformed those in the negative and low emotion feedback groups. Students of different genders have shown to respond differently to the type of feedback given and whom it is given by (Bush & Dweck, 1976; Dweck et al., 1978).

The type of feedback that students receive from teachers can have a great effect on motivation and efficacy (Brooks et al., 2017; Garcia Gutierrez & Duran Narvaez, 2017; Sellbjer, 2018). Brooks et al. (2019) studied the types of feedback given to students. What Brooks et al. (2019) found was that the type of feedback most commonly used was feedback followed by feeding up (where they are going), then lastly feeding forward (steps towards improvement). These interactions between teachers and students need to be carefully monitored by staff, negative interactions such as being demotivated as well as publicly humiliated, cause learners' self-efficacy to dramatically decrease (Garcia Gutierrez & Duran Narvaez, 2017). Equally important to teacher feedback, parent feedback is, if not more, more impactful to student learning (Gunderson et al., 2018). Gunderson et al. (2018) found that process praise led children to form incremental motivational frameworks, which over time, improved their academic achievement.

With the impact that feedback has for a student in mind, Thayer et al. (2018) studied how a feedback intervention would impact student efficacy. Thayer et al. (2018) utilized Wise feedback which; positively greets the student in attempt to diffuse any potential fears or negativity; communicates the reason for the feedback and aligns the reason with a desired outcome, formulates a performance and a genuine belief in the student's ability to meet and exceed expectations, and asks one or two open-ended, encouraging questions. Results from the intervention include: moderate reductions in early warning signs for at-risk individuals as well as a decrease in average warning indicators for every student (Thayer et al., 2018).

Productive Failure (PF) is a learning process that provides conditions for students to persevere to generate and explore different representations and solutions for solving both complex and novel problems (Kapur & Kinzer, 2009; Kapur, 2010; Kapur, 2011; Kapur 2012; Song, 2018). This process will lead students to initial failure, but will lead students to consolidate and assemble their thoughts and solution methods into commonly approved methods of problem solving. This method will lead to student creating original problem solving thoughts in order to understand and organize both well and ill structured problems.

Limitations of the Research

To locate the literature for this thesis, searches of Education Journals, ERIC, EBSCO MegaFILE, and Education Journals were conducted for publications from 1976-2019. The list was narrowed by only reviewing studies from peer-reviewed journals that focused on using failure to promote learning in the articles that addressed the guiding questions. The key words that were used in these searches include: failure and self-efficacy, failure and self-esteem, feedback, effects of failure on growth mindsets, and productive failure. The research was limited to articles that were peer reviewed articles as well as having full text available. While the research was vast for the effects of failure, the research was limited on the interventions used to improve self-efficacy as well as mindset after failure. While feedback and productive failure are interventions that have been successful in helping students academically, there was little research found that showed interventions to improve student self-efficacy and mindset after failure.

Another difficulty of researching how to best utilize student failure are the different variables that are present in each individual. A strategy that is effective for one student could be less effective for another student. This variability is what makes handling failure difficult for teachers. Another limitation to the research is that a large amount of

research was reactive in nature. It would be beneficial for teachers and students to have research directed towards how to proactively utilize failure that will occur in class.

Implications for Future Research

While interventions such as feedback as well as productive failure have been successful in helping students succeed academically through failure, little research was found on specific interventions that would help student self-efficacy as well as mindset after failure. Future research should be directed to mindset interventions to help students improve self-efficacy after failure. This would be especially beneficial to students identified as at-risk students who show self-destructive academic behaviors. As stated in the previous section, it would be beneficial for teachers and students to have research directed towards how to proactively utilize failure that will occur in class. Given the variability of the background of each student, it would be useful to have a strategy in place that is effective for students utilizing failure that can be universally used no matter of gender, race, or socio-economic status. Also, given the data on growth mindset, more research on implementing growth mindset training, would be benefit all of the scholastic disciplines. If students were able to recognize that failure is a process and that success is dependent on effort, then more students would strive for more

academic success knowing that their success isn't predetermined. Additionally, feedback is a tool that every teacher utilizes to assist students in the assessment of their failure. More research should be done on feedback interventions in order to assist students to utilize their failure.

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Implications for Professional Application

Failure is paramount for learning. Failure can become destructive when a student has difficulty dealing with that failure. It is important as educators to understand how failure can have an effect on a student's self-efficacy. By knowing and understanding our students' view of themselves as well as tendencies of students with

lower self-efficacy, educators will be able to direct the appropriate mindset messages as well as feedback to help that student. It has been noted in the research that socio-economic status, place of residence, and sex effect the self-efficacy and resilience of students. Knowing which students have a tendency for low self-efficacy as well as fixed mindsets will assist teachers to identify and intervene and assist those students who are the most vulnerable to their failure.

Additionally, it should be noted the influence that parents have on their children, and especially the fact that authoritarian parents. Teachers should take the time and effort to build rapport with parents in order to identify parental mindset, which can indicate the self-efficacy of the student. In order to best help the student's self-efficacy and mindset, it can be beneficial to partner with parents in order to teach them skills and strategies to build resilience and self-efficacy in their student. The skills that lead to students developing a growth mindset can be taught to parents so that students can be supported both at home and at school.

Next to parental influence it has been found that teachers have substantial influence on student efficacy and mindset. Students are attentive and cognizant to the type of feedback that they are given. We as teachers need to have the same type of cognizance about the feedback that is given. Students don't just need feedback to learn from their failure, but students need to experience feeding up (information that lets the learner know where they are going), as well as feeding forward (steps towards improvement). It is important that we not only have students reflect on the failures that they have made but teach students how to move forward and learn from their failure.

These interactions between teachers and students need to be carefully monitored, negative interactions such as being demotivated as well as publicly humiliated, cause learners self-efficacy to dramatically decrease (Garcia Gutierrez & Duran Narvaez, 2017). Teachers need to be intentional with the type of feedback that is given as well as how it is given due to the positive and negative response in mindset and efficacy that it can have with students.

Lastly, it is important for educators to be reflective in their teaching and knowing when it can be appropriate to infuse productive failure into the classroom. Students benefit from being able to discover and fail in the classroom. Failure allows students grasp the common accepted method in problem solving. Teachers need to create a learning environment where failure is accepted and celebrated because it is through directing that failure appropriately that learning is maximized. While PF cannot be implemented into every class due to lack of prior knowledge, it is a method that could greatly enhance the use of failure to build student efficacy.

Conclusion

Every student experiences failure. Failure can affect student efficacy as well as mindset both positively and negatively. Teachers need to understand their student and their background in order to understand the current efficacy and mindset of how they

handle failure in order to optimize and use failure to enhance student learning, mindset and efficacy.

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