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Students' Perceptions of Growth and Fixed Mindsets: An Investigation in a Corequisite STEM Mathematics Course

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Abstract

Students have often been exposed to growth and fixed mindsets before entering the college classroom. Although the growth mindset ideology has been thoroughly discussed and shown to help students shift their understanding of their learning, many studies assume students know and understand what growth and fixed mindsets are. Few studies, for instance, have considered how college students perceive the growth mindset ideology and/or whether students view a growth mindset as a benefit in the mathematics classroom. Findings from this study suggest that students do not think of growth and fixed mindsets as binaries and will often provide suggestions to how either mindset can be beneficial in their learning.

Keywords: growth and fixed mindsets, undergraduate corequisite mathematics, students' perceptions

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Students pursuing majors in Science, Technology, Engineering, and Mathematics (STEM) fields face unique challenges and opportunities in their academic journey. Mathematics serves as the foundation for numerous disciplines and professions, and yet it is often the gatekeeper to whether students are retained and persist in STEM (Li & Schoenfeld, 2019). Students who choose not to pursue mathematics or avoid mathematics altogether may limit their future opportunities in STEM fields (Li & Schoenfeld, 2019; Maass et al., 2019), as mathematics is often considered as a "prerequisite" for STEM learning (Li & Schoenfeld, 2019). To address the needs of students who struggle in STEM gateway courses, many colleges have adopted the corequisite model in which students are enrolled in their mathematics course as well as a support course designed to provide extra time and support (Atkins & Beggs, 2017).

Corequisite remediation, as an alternative approach, places students into college-level mathematics courses with additional academic support. A corequisite model helps to streamline "remedial material so students focus on topics needed for their other coursework and/or remedial work is condensed and/or remedial material is combined with college-level work" (Logue et al., 2019, p. 295). How instructors choose to use this additional support time varies by instructor and institution. Some instructors may choose to use the additional time to practice skills, while others may use the time to focus on students' self-efficacy beliefs (Kim, 2016), as lower self-efficacy (or lack thereof) in mathematics abilities has been shown to deter groups of students from pursuing STEM (Borum & Walker, 2012).

One way to address how students think about themselves and their own learning is implementing ideas of growth and fixed mindsets, first proposed by Dr. Carol Dweck (2006). In her research, Dweck theorized that a person's success is most impacted by the individual's conceptions of his or her own intellectual capacity, a belief she describes as a mindset and a way in which people have come to understand themselves as well as the world around them. People with a growth mindset believe that a person's intellect is malleable and can change over time, while those with a fixed mindset believe that intelligence is innate or is a biological condition (Dweck, 2006).

Given that many students often struggle with mathematics and may have lower self-efficacy in their mathematics abilities (Borum & Walker, 2012), we incorporated Boaler's (2013) ideas of growth mindset into our Introduction to Mathematical Modeling corequisite courses. While students may require extra time to grapple with mathematics content, they also need time and guidance to learn how to think about their own learning. Thus, the authors of this study had students participate in multiple activities throughout a semester, such as exam debriefs, learning journals, and study skills, that addressed the idea of mindsets and study skills in the classroom. The purpose of this study was to understand how students think conceptually about mindset ideology and how they applied those ideas to their learning. In a three-part project, students were asked to explore ideas of growth and fixed mindset ideology, indicate the types of mindsets they currently have, and reflect how their current mindsets affect their learning. The research questions are:

1. How do students in mathematics corequisite courses define fixed and growth mindsets?
2. In what ways do students in mathematics corequisite courses perceive their own mindsets?

3. How do students in mathematics corequisite courses think about how their current mindset affect their motivation, effort, and success in a mathematics class?

Literature Review

A person's mindset can either limit a person's opportunities or can help make the most of the opportunities given. Mathematics, for example, is a subject in which many have come to believe is difficult and only a select few can be good at mathematics while also being a core subject that supports all other disciplines (Fitzallen, 2015; Li & Schoenfeld, 2019). Despite the importance of mathematics within STEM and the need to encourage and support students to pursue mathematics, many people in the United States continue to believe that mathematics and science success is linked to a person's innate abilities, which growth mindsets push back on (Yeager et al., 2019). Growth mindset interventions offer a method for bringing awareness to students' misconceptions about themselves and empower students to navigate challenges with resilience and determination. Interventions that address students' specific needs based on their potential for improvement tend to have a more substantial impact in how students approach their own learning (Burnette et al., 2022). On the other hand, a fixed mindset can create additional barriers for students who have not been successful in previous coursework.

Mathematics corequisite courses can serve as gateways to higher-level mathematics and science courses, laying the groundwork for future academic and professional endeavors. However, the pervasive belief associating success in STEM disciplines with fixed abilities can exacerbate feelings of inadequacy and hinder academic progress. By fostering a belief in the change of intellectual abilities, growth mindset interventions offer an opportunity for students in corequisite mathematics classes to thrive in STEM fields and beyond by giving them the space and time to reflect on their own learning and how they engage in their academic work.

Simply incorporating growth and fixed mindset ideology in the classroom, however, does not guarantee that students will achieve success. Growth and fixed mindsets have been traditionally viewed as binaries, whereas recent discussion tends to describe them more as a spectrum. Dweck (2015), for instance, reflects on the way that her work has been perceived by both the public and research community. Although many educators have applied ideas of mindset in their classrooms (and have seen great results in students' motivation and achievement), Dweck questions whether people truly understand what a growth mindset is, as many people have started to equate having a growth mindset to effort. Dweck (2015) refutes this claim, stating that although "effort is key to student achievement" (para. 5), effort should be considered an end goal to *learning* and *improving*. Connections should be made between the mistakes students have and the ways in which they can "fix" them. And if students are not learning, the default should not be to "blame" students and claim they have a fixed mindset. Yeager and Dweck (2020) argue that mindsets should be conceptualized as being on a continuum from fixed to growth and that people may be on different parts of the continuum at different times for different aspects of their lives. This mindset continuum perspective emphasizes the dynamic nature of mindsets, acknowledging that individuals can fluctuate between and amongst fixed and growth mindsets depending on circumstances, experiences, and personal beliefs.

Although one of the goals of helping students develop a growth mindset is to help them become self-aware of their own learning and progress, many times students are excluded in

conversations about how they think about these concepts and how it helps them in their learning. Little research has been done on how students define growth and fixed mindsets and how it relates to their learning. While there have been studies that examined how students perceive some of these ideas of growth and fixed mindsets, they were joined with other various approaches when applying growth mindset, such as concepts around grit and students' sense of belonging (see Hoyert et al. (2019) and Pueschel & Tucker (2018) for some examples).

Furthermore, many studies did not consider how students think and feel about mindsets. Womer (2023), however, conducted a study that examined high school juniors' perceptions of growth mindsets and how these perceptions potentially impacted their academics and life in general. One of the core ideas of Dweck's (2015) work is that people need to be aware of their current mindset to actively practice steps in developing a growth mindset. So, to understand how students perceive their own mindsets and their participation in developing a growth mindset, studies need to consider students' awareness and thinking of growth mindset (Womer, 2023). Focusing on students' perceptions can provide insight into how students think about and apply growth mindset in their mathematical learning, as well as how they take these ideas into other areas of their lives beyond the classroom walls. We intend to add to the research on how students specifically think about growth and fixed mindsets in the context of a corequisite mathematics classroom.

Methodology

The focus of this article is on the second part of a semester-long project where we asked students to investigate and learn about mindsets and to think critically about their own mindsets and those of others. Note that that while this article focuses on one part of a semester-long project, this part of the project is independent of the other two parts. The first part of the project asked students to create a webpage to write their "math story," highlighting numbers that are important to them (see DeGeorge & Pinzon (2023) for a more detailed description and findings) and provided "a first step in inviting students to share their experiences, emotions, and thoughts" (DeGeorge & Pinzon, 2023, p. 4) before diving more deeply into mindset ideology. The second part of the project, and the focus of this article, asked students to research growth and fixed mindsets, define them, and reflect on their own mindsets (see Appendix A for the assignment given to students). The third part of the project then asked students to think more critically about their strengths, their biggest areas of improvement, and how certain characteristics exemplify a particular mindset (i.e., the mindset they declared having in the second part of the project).

Participants from this study are students in an Introduction to Mathematical Modeling course (a corequisite course comprising of three credit hours of mathematics credit and three credit hours of support) who attend a four-year public institution with an enrollment of about 12,000 students. The college is a Hispanic Serving Institution (HSI) and is described as a minority-majority institution, ranked as the most ethnically diverse regional college in the southern region.

Students interested in pursuing a STEM degree but who have also exhibited a past in struggling with mathematics are required to take corequisite Introduction to Mathematical Modeling, a course for students who do not yet qualify for corequisite College Algebra (a prerequisite for many STEM courses). Students are placed into the course based on several criteria, such as high school GPA or a placement exam. The Introduction to Mathematical

Modeling corequisite course comprises of a maximum of 20 students, and each professor has the freedom to use the additional three credit hours of learning support time in ways that will best benefit students. The researchers of this study decided to use the additional support time for mathematics content remediation as well as incorporating mindset ideology and study skills.

Data for this project were collected over three semesters (Fall 2019, Spring 2020, and Fall 2020) from six courses by two faculty members with a total of 73 student projects. In these three-part self-reflection projects, students created a digital story using Adobe Express (an online interactive tool (formerly known as Adobe Spark) where students created their own videos and webpages) to describe what they learned about themselves: their mindsets, how they handle struggles and feedback, and what they think it takes to be successful (as students, mathematicians, and people). Again, for the purposes of this article, we will be focusing on part two, which asked students to define a growth and fixed mindset, give strengths and weaknesses of each mindset in a classroom, and reflect on their own mindsets.

To begin to understand how students are thinking about mindsets in general and about their own mindsets, data analysis first focused on the questions posed in the project (see Appendix A) students completed. For instance, all data responses to how students defined growth mindset was collected and transcribed for analysis. Similarly, data sets centered on each component of part two of the project were collected and transcribed (i.e., the difference between the mindsets, the advantages/disadvantages of having each mindset in a classroom, and the types of mindsets they perceive as having at that moment in time).

After collecting and transcribing data sets for each component of part two of the project, the data was then coded using Saldaña's (2013) coding cycle method, which encourages researchers to code data within two cycles. The First Cycle focuses on the initial coding. Within this cycle, we employed descriptive and in vivo coding. Descriptive coding allowed us to label data "to provide an inventory of their topics" (Saldaña, 2013, p. 83) and tried to stick close to the data, especially those that appeared to be significant (Charmaz, 2014) while remaining open to other possibilities. This process allowed us to "chunk" the data (i.e., by the question the students were answering) and then created codes based on the content. For example, when creating initial codes for how students defined growth mindsets, some initial codes included "motivation to learn" and "learn from mistakes" as these were qualities students described of a person having a growth mindset. In vivo coding was also applied as we were also interested in how students describe mindsets and thus drew upon students' own language for codes (Saldaña, 2013). Some in vivo codes included phrases such as "embrace challenge" and "persist through obstacles."

Once all initial codes were created within the First Cycle, they were then grouped together to create categories within each data set. For example, all the initial codes in how students defined growth mindset were then grouped together to create categories. This grouping of initial codes occurred during the "After First Cycle Coding" phase in which Saldaña (2013) encourages researchers to visualize or "touch the data" (p. 205). During this phase of analysis, each of the initial codes were copied on to PowerPoint so that the researchers of this study could manipulate and move initial codes around while grouping these codes to create categories.

Categories within each data set were created and provided a general sense of how students thought about each part of the project (i.e., defining growth and fixed mindsets, understanding their own mindsets, etc.). From these categories, we then moved into Saldaña's (2013) Second Cycle Coding. During this phase of analysis, we used focused coding, which

allowed us to code data "based on thematic or conceptual similarity" (p. 209). Frequent or significant codes were used to develop themes to address the research questions, which made the most analytical sense (Charmaz, 2014). Note that some "cycles" were revisited more than once. Although outlined here in a linear structure, Saldaña's (2013) coding process can also be cyclical.

Results

How Students Defined Mindsets

The ways in which students described growth and fixed mindsets were very similar, even across classes. Many students, for example, identified a person with a growth mindset as someone who has the motivation to do better, believe a person's abilities can develop or improve over time, and can learn from mistakes. Other defining characteristics of growth mindset also included an increase in self-esteem over time and embracing one's imperfections. Students stated that those with a growth mindset welcomes and accepts challenges, rather than running away from them. Overall, the ways in which students described a growth mindset were positive.

When describing a person with a fixed mindset, students often provided antonyms to those describing a growth mindset. Many students described a person with a fixed mindset as someone with "fixed traits," "closed-minded," and "do not accept challenges." The initial ways in which students described these two mindsets made it appear that they believed these two mindsets to be opposites or binaries. For example, those with a growth mindset were often represented as those who could be successful, while those with a fixed mindset are not because they would never grow or learn from their mistakes.

Advantages and Disadvantages of Mindsets in a Mathematics Classroom

When describing the advantages and disadvantages of having a growth or fixed mindset in a mathematics classroom, however, the lines that appeared to be between the two mindset definitions began to blur. Some defining characteristics of each mindset were still there (i.e., students again mentioned that having a growth mindset is beneficial in that it allows students to learn from failures and mistakes and increase their overall chances of success), but students also described ways in which having one mindset could be more beneficial than another and often gave examples that seemed to contradict some of their earlier definitions. For example, while many students first stated that having a growth mindset in the classroom is the most advantageous of the two, students were critical about whether a growth mindset was *always* a positive mindset to have. They were able to provide some examples and suggestions to when having a growth mindset in the classroom could be seen as a disadvantage (see Table 1).

Table 1

Ways in Which Students Described the Advantages and Disadvantages of Having a Growth Mindset in the Classroom

Advantages of a Growth Mindset	Disadvantages of a Growth Mindset
Positive Outcomes Learn New Skills Learn from Your Failures/Mistakes Increase Motivation Indicators of Success Benefits of the Self	Overwhelming Feelings and Can Affect Your Mental Health Effort Does Not Guarantee Success Not Making Enough Progress Can Push You Towards a Fixed Mindset

Some students were concerned about whether having a growth mindset in the classroom could be detrimental to their mental health. If a person, for example, focuses on growth mindset as purely effort and does not improve (in grades or understanding of the content), then it can be disheartening to see that so much time and energy has been spent without the benefit of seeing an increase in grades. Cesar,[1] for example, stated that having a growth mindset is like "obsessing over effort rather than learning other strategies and think everything can be forced which could cause a toll on your mental health and your relationships" (Spring 2020). When describing the advantages and disadvantages, students began to think more critically about how effort is not enough to guarantee success. Although effort was not specifically mentioned in students' initial definition of a growth mindset, it became clear in the ways students began talking about the advantages and disadvantages, many students may have associated effort as being a necessary (and potentially the primary) component that would lead to success. When describing how one can be successful with a growth mindset, however, many students explained how learning required not just effort, but also the flexibility to try different learning strategies to find one (or two) that could help propel their understanding of the content (and thus success in the course). The danger lies in relying solely on effort to see progress, and if progress does not come in an expected amount of time, that focus on effort alone can lead a person to reject the growth mindset ideology altogether. So, while students saw having a growth mindset to be advantageous overall, they also seemed to be careful in committing 100% to the growth mindset ideology.

The relationship between effort and success was also highlighted in the ways students talked about the advantages and disadvantages of a fixed mindset in a mathematics classroom. Just like with growth mindset, students were critical about having fixed mindsets and did not always agree that having a fixed mindset is a "bad thing." While most comments suggested that having a fixed mindset could be more detrimental to their success (i.e., students often mentioned that having a fixed mindset would lead to limited progress or results), they were also able to provide some justification as to when having a fixed mindset in the classroom could be advantageous. Table 2 highlights some of the ways in which students described the advantages and disadvantages of having a fixed mindset in a mathematics classroom.

[1] Pseudonyms used for every student data/quote.

Table 2

Ways in Which Students Described the Advantages and Disadvantages of Having a Fixed Mindset in the Classroom

Advantages of a Fixed Mindset	Disadvantages of a Fixed Mindset
Understanding of Current Self	Low Self-Esteem
Tough Skin/Confidence in Self	Unwilling to Try
Success Stems from Talent/Skills	No Opportunities/Progress
Prevents Mistakes & Staying Focused	Fear of Failure

Although most students stated that having a fixed mindset would overall be disadvantageous in the classroom, there were some advantages to having a fixed mindset. For example, those with a fixed mindset may already be aware of their strengths and talent. Due to this awareness of self, these people do not need to worry about making mistakes or not being successful because they are not "wasting their time" with focusing on skills they were not already good at. Angela, for example, stated that when a person with a fixed mindset focuses on only strengths, then they will "not be disappointed in one's work, being satisfied with a mediocre performance or grade" (Fall 2020). Already knowing that something is a weakness helps to not set high expectations for oneself, which can lead to disappointment. Others stated that those with a fixed mindset may be "more disciplined" because they would focus on what they can do rather than on what they cannot. For example, "a fixed mindset helps you realize what is important at the moment and what responsibilities you need to take care of first" (Ashley, Fall 2020). The idea of perfection and the unwillingness to make mistakes could be beneficial because more time would be spent on improving the things they perceive they are already good at or have more potential to be good at.

Students' Perceptions of Their Own Mindsets

The final component of part two of the project asked students to summarize their videos and then state which mindset they currently have and why. Of the 73 student videos, not all students identified as having a growth mindset. While the majority (57.5%) did perceive themselves as having a growth mindset, 28.8% of the students claimed to have both mindsets; not wanting to stake a claim with one or the other (see Table 3).

Table 3

How Students Categorized Their Own Mindsets

Type of Mindset	Number of Students	Percent
Growth Mindset	42	57.5
Fixed Mindset	4	5.5
Both Mindsets	21	28.8
Unknown/Unclear	6	8.2
Total	73	100

Of those who stated they have both fixed and growth mindsets, many of them described having different mindsets in different contexts. Gabby, for example, indicated that

> I sometimes feel like I have a fixed mindset. I feel like when I am frustrated, I tend to give up or say that I am good at it or not, but sometimes I have a growth mindset, which I like being challenged to see the things I could try that are new to be able to grow my mindsets.
>
> (Fall 2019)

Rather than focusing on just the mathematics classroom, students often spoke about their mindsets in different contexts. While some students claimed to have a growth mindset in the classroom, others were able to recognize that they did not always have a growth mindset in their learning or other parts of their lives. Samantha, for example, stated that she has "a growth now but used to be fixed" (Fall 2020). Taking the time to reflect on their experiences, students were able to think more critically about their own journey and how they have grown to be the people they are now. Reflecting on their educational journey has allowed some students to consider that they could have a mixture of both growth and fixed mindsets and that these experiences have impacted the way in which they view their own learning and understanding of mathematics. For example, Audrey stated,

> I currently have a mixture of both but more on the growth mindset side because I used to be terrible at math and homework in general. Today I find myself doing all my homework and I'm starting to see the benefits of the homework and now math isn't as terrible as I once thought. I am also learning to become more responsible.
>
> (Spring 2020)

Some students stated that it was not until this project that they were able to see their own progress, but that they are willing to continue this journey of either working toward a growth mindset or maintaining one in the hopes it will help them be successful in school. Others (see Table 4) provided ways in which learning about mindsets has helped them begin to shift the way they think about themselves or how they approach a situation.

Table 4

Examples of How Two Students Perceive How Learning About Mindsets Have Affected Their Views of Themselves

Student	Semester	How Learning About Mindsets Have Affected View of Self
Angel	Fall 2021	My biggest improvement in life is just actually listening to other people's opinion and being able to receive constructive criticism. A lot of people struggle with that and be very defensive.
Elliot	Fall 2021	My mindset allows me to never give in to despair when it comes to what I don't know. I simply approach the situation at a DIFFERENT ANGLE.

Note. Not all students chose to reflect on their learning when categorizing their mindsets. These are just examples of how two different students chose to show how learning about mindsets have begun to change the way in which they see themselves.

Discussion

The result of this study highlights that students have a variety of ways they think about growth and fixed mindsets, some of which align with the literature around mindsets. Students, for example, do not necessarily believe that growth and fixed mindsets are binaries or that they must occupy one over another. When students initially described the two mindsets in this project, it did first appear as though students believed the mindsets to be opposites of one another. Yet, further analysis showed that when given the opportunity, students were able to think more critically about how these mindsets are defined and how it impacts their own lives.

One recurring theme is that an individual does not necessarily always have one type of mindset; rather, a person can have both mindsets at the same time, and it can vary depending on the context. Students often provided examples of when they felt they have a fixed mindset and when they felt they had a growth mindset. For example, one student views English as a weakness (because she is not a native English speaker) and stated that she noticed her mind was more "fixed" in her English classes. It became apparent to her that she had this type of mindset in that class because she found herself disconnecting with the class and gave up too easily. In mathematics, however, she felt she presented a growth mindset most times because she was not afraid to challenge herself, often looking forward to working on complex problems. Being able to reflect on her actions in both classes prompted her to think more critically about whether a person can always have a particular mindset. Similarly, other students provided examples of when they too had different mindsets (or more of one mindset over another) depending on the context. These reflections led most students to claim that while they believe they have a growth mindset most of the time, they also understood that it was not a constant state, often requiring effort and work. Isabella, for example, stated that she has had a fixed mindset in the past, but now believes she has

> a growth mindset in a classroom and in general [a growth mindset] is best. I won't be able to learn anything if I thought I was already too good. No one is perfect and no one knows everything. There is always room in our brains to learn. Constantly learning will always bring me to higher success. And I try to keep my growth mindset in practice by keeping in mind that my mistakes and failure will bring me higher success and achievement. From that experience, I have learned that making those mistakes and not understanding something right away is actually a learning method so you can later better yourself in any concept.
>
> (Spring 2020)

Others did not want to claim to have one mindset, but rather stated they had both at varying levels. In these responses, students tended to allocate a proportion of their mindset to being fixed or growth. For example, Sarah mentioned that she is "mostly growth most of the time but also some fixed" (Fall 2020). Like Sarah, other students claimed to have both mindsets at different varying levels.

When students began describing the advantages and disadvantages of each mindset in the classroom, students began to specifically question their initial definitions of what a growth mindset is. Although effort was not clearly defined or a part of their initial definitions, students often discussed and questioned the impact of effort on overall success. While many of them agreed that effort was also a necessary component to having a growth mindset, they began to recognize that effort alone could not help them get the result they wanted.

Like Womer's (2023) participants (high school juniors who were asked about how they perceive growth mindsets), many of our students felt they understood the differences between growth and fixed mindsets and could explain these differences to others but also rejected the idea that certain qualities are innate or unchanging. Similar to Womer's study, students felt they could define growth and fixed mindsets and provide examples of how these mindsets could be applied in school. In addition, students often spoke about the correlation between effort and doing well in school. Unlike Womer's participants, however, many of our students could see how effort and work were required in both academic and extracurricular activities (Womer's participants indicated that they had to work harder in their extracurricular activities, which could indicate that they see a closer connection between effort and reward in those areas rather than in school). In most cases, however, students discussed how having a growth mindset could help them view setbacks as opportunities for learning rather than moments for them to stop (Womer, 2023).

Conclusion

Similar to how our students think about mindsets, Dweck (2015) echoes this theme of mindset not being a binary, acknowledging that a person can be comprised of a mixture of fixed and growth mindsets, and emphasizing that in order to "move closer to a growth mindset in our thoughts and practices, we need to stay in touch with our fixed-mindset thoughts and deeds" (Dweck, 2015, para 13). Thus, it is imperative to understand that people are mixtures of both mindsets, and that effort should not be a primary criterion in how we achieve a growth mindset. As many students mentioned in this study, having a growth mindset may be considered the best, but it is a journey they must continually work at and does not depend on effort alone.

The ways in which students perceive mindsets can greatly impact how students approach and learn mathematics. Just like with Womer's (2023) participants, we are aware that many students who come to college have already seen or heard of growth and fixed mindsets, and yet it is unclear whether students were given the time or opportunity to process what these concepts mean to them. Our research highlights that students think about growth and fixed mindsets in many ways. Understanding how students think about these concepts and the applications of them in their schooling and lives can provide educators insight to how to encourage and give time to students to reflect on their experiences, feelings, knowledge, and beliefs.

Providing opportunities such as these can help combat the pervasive belief associating success in STEM disciplines with fixed abilities, which has often exacerbated feelings of inadequacy and hindered academic progress. By fostering a belief in the change of intellectual abilities, growth mindset interventions offer an opportunity for students in corequisite mathematics classes to thrive in STEM fields and beyond by giving them the space and time to reflect on their own learning and how they engage in their academic work. Intentionally teaching concepts like growth mindset in school has the potential to not only help students in their academic achievement, but also invite students to become more active in their own learning (and not just passive recipients). Incorporating a project like what we have done in our classrooms (see Appendix A) could provide students in our courses opportunities to reflect upon themselves. We encourage others to open spaces for conversations such as these with their students to learn more about students' perceptions and beliefs about their own mindsets.

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Appendix A

Reflection Assignment
(PART 2) – All About Mindset

This assignment is the second part of a semester long reflection assignment. It will focus on defining the types of mindsets and using Adobe Spark (https://spark.adobe.com) to create a "video". This part of the assignment can be done **individually or in pairs**.

Here are some examples of Adobe Spark videos for you to preview:
https://www.youtube.com/watch?v=YC2AGc1os-M
https://www.youtube.com/watch?v=AicrQOsLlLs

For this assignment, create an Adobe Spark video using text, graphics, and sound about mindsets. This assignment is worth 20 points of the 100-point semester long project grade.

Part 2: (20 points) An Adobe Spark VIDEO addressing the following:

- Define fixed mindset.
- Define growth mindset.
- Discuss the difference between the two mindsets.
- Explain the advantages/disadvantages of having each mindset **in a classroom.**
- Conclusion: Summarize your video by stating which type of mindset you currently have and why. ****If you are working in pairs, this must be addressed for each person****

Component	Points	Requirements
Title Slide	0.5	Must contain image(s)/text
Slides for Video	1	*At least* 5 – must relate to the content of your page
Script for Video	1	*At least one for each slide*
Content of Definitions	4	Must contain correct, engaging, cohesive, well-thought-out ideas that are presented in a logical sequence. Ideas must connect from one slide to the next and voice in video must be clear.
Content of Differences	2	
Content of Advantages and Disadvantages	4	
Conclusion	4	
Creativity	3	
Credits	0.5	Credit sources for pictures and text

The video script for the video will be submitted in the Mindset (Part II) Assignment folder on D2L by **XXX.** A link to your Adobe Spark video along with a word document of your video script will be submitted in the Mindset (Part II) Assignment folder on D2L by **XXX.**

To help you get started, here are a couple tutorial videos:
https://www.youtube.com/watch?v=H6gWqMaHYwY
https://www.youtube.com/watch?v=3dDvYzmOtP8