Actions Speak Louder than Words: Social Persuasion through Teaching Practice

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What a student believes about their abilities to do mathematics has a significant impact on the ways in which they then do mathematics. If they believe they can solve a problem they behave very differently than if they believe they cannot. As such, the development of self-efficacy needs to be paramount in the conversation of what it means to teach mathematics. In this paper, I look at the subtle ways in which students' self-efficacy is developed within the specific teaching paradigm of Building Thinking Classrooms. Results indicate that what a teacher does is just as important as what a teacher says when it comes to developing student self-efficacy in mathematics.

Keywords: Self-efficacy, affect, social persuasion, thinking classrooms.

Introduction

Henry Ford is famously credited with stating that "whether you think you can, or think you can't … you're right". Ford believed that beliefs in your abilities to achieve something are central determinants on whether or not you do, indeed, succeed. Believe you can—and you likely will. Believe you can't—and you probably won't. This maxim likely emerged from Ford's belief that success is the product of hard work. And in order to persevere in the face of the work that is needed to succeed you have to first believe that your hard work will be met with success.

Bandura (1997) refers to this belief in your abilities to succeed as self-efficacy and argues that these beliefs affect how a person thinks, feels, and behaves within a given situation. "It affects the choices they make, the effort they put forth, the perseverance they display in challenges, and the degree of anxiety or confidence they bring to the task at hand" (Rouleau, Ruiz, Reyes, & Liljedahl, 2019). And because these self-efficacy beliefs affect the way you act, they "can powerfully influence the level of accomplishment that people ultimately realize" (Pajares, 2006, p. 341).

Self-efficacy has long been seen as having a significant influence on student performance in mathematics (Hackett & Betz, 1989; Hannula, 2012; Skaalvik et al., 2015). As such, helping students to develop positive self-efficacy beliefs about their mathematical abilities should be an important part of what it means to teach mathematics. In this paper I look at how this is achieved through a teaching paradigm called Building Thinking Classrooms (Liljedahl, 2020).

Development of Self-Efficacy

Whether a person believes they can, or believes they can't, Bandura (1986, 1994, 1997) argues that these beliefs emerge from an individual's encounters with one of four sources—mastery experiences, vicarious experiences, social persuasions, and emotional/physiological reactions. The first of these, mastery experience, is the most influential of the four and is the result of one's previous experiences with success and failure. If you have had a lot of experiences of success you are more likely to believe that you can be successful in future endeavors. Likewise, if you have had repeated experiences of failure, you are less likely to believe that future efforts will be met with success. In essence, self-efficacy is strengthened by success and weakened by failure and that once a trend is established, single contradictory experiences are less likely to affect a person's overall self-efficacy belief. That is, if a person is accustomed to succeeding and has, as a result, developed positive self-efficacy beliefs, a single encounter with failure is unlikely to affect their overall positive belief in their own abilities (Skaalvik, Federici, & Klassen, 2015). Conversely, a person with negative self-efficacy is unlikely to change their view of their abilities after only one encounter with success unless that encounter was an AHA! experience (Liljedahl, 2008) or occurred on a task others found especially challenging (Bandura, 1997).

The second source of self-efficacy is through vicarious experiences—seeing a peer experience success or failure through their actions. This source of self-efficacy is greatly heightened when they perceive a strong similarity between themselves and the peer they are observing. For example, a student watching a friend be successful at solving a mathematics problem will create a stronger belief in their own abilities than watching a teacher solve the same problem. The teacher is perceived as being too capable and too knowledgeable for their successes to be seen a reasonable approximation of what will occur when the student tries it on their own. A friend's success, on the other hand, is a better proxy—similarity trumps expertise.

The third source of self-efficacy, social persuasion, draws on persuasive communication and evaluative feedback to build up beliefs about one's abilities. Unlike vicarious experiences, social persuasion is enhanced when coming from a source perceived to be knowledgeable. That is, the words of a teacher expressing confidence in a student or reminding a student what they are capable of is more effective at building up their self-efficacy than the same words from a peer. For social persuasion, expertise trumps similarity.

The final source of self-efficacy is emotional/psychological reaction and comes from how a person perceives their own emotional reaction to a situation. For example, if a student works very hard to try to solve a problem, persisting in the face of much frustration and several failed attempts, they may perceive this experience in a number of different ways. They may focus on the time it took and how much of that time was spent being frustrated and how many failed attempts there were and conclude that they are not good at solving problems. Alternatively, they may focus on the fact that they endured, persevered through the hardship of frustration and failed attempts, and conclude that they are strong and capable. The same experience can result in different reactions which, in turn, can result in different self-efficacy forming. "It is not the sheer intensity of the emotional and physical reactions that is important but rather how they are perceived and interpreted" (Bandura, 1994, p. 3).

Building Thinking Classroom

Building Thinking Classrooms (Liljedahl, 2020) is a teaching framework that was developed in response to the realization that much of what happens during a mathematics lesson is not thinking. In particular, the baseline data that emerged from this research showed that in a typical lesson about 20% of students spend approximately 20% of the time thinking—8-12 minutes per hour—while the other 80% of students spend no time thinking (Liljedahl, 2020). Research has shown that the normative practices present in many classrooms are promoting, in both explicit and implicit ways, non-thinking behaviors such as mimicking among students (Liljedahl & Allan, 2013). These normative structures permeate classrooms around the world and are so entrenched that they transcend the idea of classroom norms (Yackel & Cobb, 1996) and can only be described as institutional norms (Liu & Liljedahl, 2012)—norms that have extended beyond the classroom and have become ensconced in the very institution of school and fabric of what it means to teach.

Much of how classrooms look and much of what happens in them today is guided by these institutional norms—norms which have not changed since the inception of an industrial-age model of public education. Yes, desks look different now, and we have gone from blackboards to greenboards to whiteboards to smartboards, but students are still sitting, and teachers are still standing. Although there have been many innovations in assessment, technology, and pedagogy, much of the foundational structure of school remain the same. If we want to promote and sustain thinking in the classroom, these norms are going to have to change (Liljedahl, 2020).

Over the course of 15 years, and through the conducting of thousands of micro-experiments with over 400 practicing teachers, a series of 14 practices emerged that break away from the aforementioned institutional normative ways of teaching and have been proven to get more students thinking and thinking for longer (Liljedahl, 2020). Each of these 14 practices is a response to one of the following 14 questions:

1. What are the types of tasks used?
2. How are collaborative groups formed?
3. Where do students work?
4. How is the furniture arranged?
5. How are questions answered?
6. When, where, and how are tasks given?
7. What does homework look like?
8. How is student autonomy fostered?
9. How are hints and extensions used?
10. How is a lesson consolidated?
11. How do students take notes?
12. What is chosen to evaluate?
13. How is formative assessment used?
14. How is grading done?

Although each of these 14 practices, on their own and in concert, have been empirically shown to increase student thinking in the classroom (Liljedahl, 2020) the visually defining qualities of a thinking classroom is that students work together to solve thinking tasks in random groups of three while standing at vertical whiteboards (see figure 1).

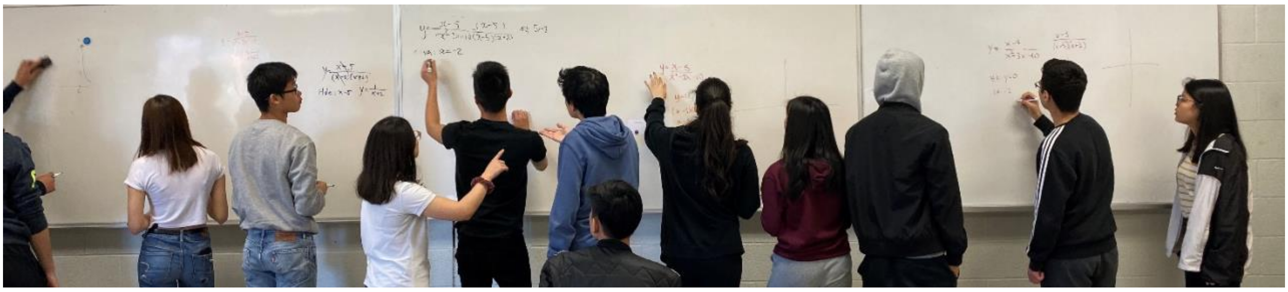


Figure 1: A thinking classroom

When put together, these 14 practices build a classroom ethos, routine, and culture of students thinking individually and collectively to do and learn mathematics. And it radically improves on the baseline data stated above. Rather than 20% of students thinking, we are now seeing upwards of 90%. And rather than thinking for 8-12 minutes students are thinking for 50 – 85 minutes.

Aside from getting students to think, building a thinking classroom has also been seen to fundamentally change other aspects of the student experience, one of which is their self-efficacy beliefs. The repeated and ubiquitous opportunities to persevere and be successful through the use of thinking tasks creates mastery experiences. In addition, the constant work in groups provides ample opportunities for vicarious experiences to occur. And the close proximity within which they work allows for the spread of positive emotional reactions.

What I am more interested in, however, and what is the phenomenon of interest for this paper, is the ways in which social persuasion manifests within a thinking classroom. Whereas social persuasion is most often seen as explicit verbal encouragement, in this paper I am going to look at the more subtle forms of social persuasion that are communicated through the thinking classroom practices.

Methodology

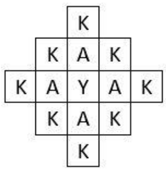
Data from this study are harvested from the aforementioned larger research project into building thinking classrooms that involved hundreds of teachers and thousands of students and took place across a wide range of grades (K-12) and settings (low socio-economic—high socio-economic, private—public, French—English). Regardless of grade and setting, however, the research followed a general research methodology that I refer to as rapid prototyping wherein the unit of analysis was a two-week micro-intervention. That is, for two weeks, a given teacher would enact a unique practice within their classroom and we would study the effect that this change in practice had on student thinking behavior—were more students thinking and were they thinking for longer than they had prior to the intervention? Based on the results of this micro-experiment, adjustments would be made to the intervention to try to increase the amount of thinking that was happening in the room and the teacher would enact this adjusted practice for the next two weeks. And so on. Once the data showed convergence towards an effective practice that practice was distributed to many different practitioners and longer studies were conducted (6 weeks – 10 months), and more adjustments to the practice were made. Despite the fact that we were focused on student thinking behaviors, a number of other aspects of the student experience were also captured—in particular, their reactions to the interventions. It is from these reactions, across a wide variety of micro-experiments that the data for this study were harvested. That is, the data does not come from any one study. As such, participants vary in ages from 5 to 18 and were in classrooms in varying socio-economic settings and geographic locations.

Results

In what follows, I use excerpts from these data to showcase the subtle and surprising ways in which three of the thinking classroom practices communicate social persuasion.

Thinking Tasks

If we want our students to think, we need to give them something to think about—something that will not only require thinking but will also encourage thinking. In mathematics, this comes in the form of a problem-solving task, and having the right task is important. The research (Liljedahl, 2020) revealed that when first starting to build a thinking classroom it is important that these tasks are highly engaging non-curricular problem-solving tasks. The tasks, the research showed, need to have a low-floor (accessible to everyone in the room), a high ceiling (evolving complexity), and be novel (because thinking is what we do when we don't know what to do). For example, see figure 2.



For this image, can you see a path from one letter to an adjacent letter that spells the word KAYAK? Can you see another one? Another one? How many unique paths are there that spell KAYAK?

Figure 2: A thinking task

When these types of tasks were used, we saw a significant increase in student thinking in the classroom. We also saw an increase in student self-efficacy as their efforts were met with success (master experiences). More subtle, however, was what began to emerge in the data after students' third or fourth experience with such thinking tasks. Consider this excerpt from week five of a three-month longitudinal study into the effects a teacher using the first three thinking classroom practices in a grade 8 (ages 13-14) classroom (thinking tasks, random groups, vertical non-permanent surfaces).

Researcher	Before you start, any thoughts about this task?
Kyla	Hmm! This one looks hard.
Researcher	Hard?
Kyla	Yeah! I mean, I don't even have a clue how we would start.
Researcher	So … what does that mean?
Kyla	It means we better start.
Researcher	Oh?!?
Kyla	Yeah. I mean, we almost never know where to start, but we always get there in the end. I'm sure it will be fine.
Researcher	How do you know?
Kyla	Our teacher wouldn't give it to us if she didn't think we could do it.

The repeated positive experiences with these types of tasks were not only building mastery experiences. These experiences were also building a confidence in their teachers' confidence in them. That is, the teacher was communicating to the students, through the use of carefully selected thinking tasks, that they were capable of solving the tasks at hand.

Visibly Random Groups

Once we have the thinking task students need someone to think with. We know from research that student collaboration is an important aspect of classroom practice because when it functions as intended, it has a powerful impact on learning (Hattie, 2009). How groups have traditionally been formed, however, makes it very difficult to achieve the powerful learning we know is possible. Whether students are grouped strategically (Dweck & Leggett, 1988; Jansen, 2006) or students are allowed to form their own groups (Urdan & Maehr, 1995), 80% of students enter these groups with the mindset that, within this group, their job is not to think (Liljedahl, 2020). However, when frequent and visibly random groupings were formed, within six weeks 100% of students entered their group with the mindset that they were not only going to think, but that they were going to contribute. In addition, frequent and visible random groupings was shown to break down social barriers within the room, increase knowledge mobility, and increase enthusiasm for mathematics (Liljedahl, 2014).

Visibly random groups gave lots of opportunity for both mastery and vicarious experiences to occur. But it also proved to provide social persuasion. Consider this excerpt from week two of a two-week micro-experiment into using random groups in a grade 7 (ages 12-13) classroom.

Researcher	So, the teacher has had you working in groups for a few weeks now. Any thoughts?
Sara	I love it.
Researcher	Why?
Sara	I love being in random groups. It’s like a new adventure every day.
Researcher	Do you think this is why she does it?
Sara	Sure. But I also think she does it randomly because it doesn’t matter what group we’re in. We’re all the same. We can all do it.

By forming the groups randomly, the students were interpreting this to mean that the teacher believed that they were all the same—that they were all capable. Incidentally, the students did not say the same things in classrooms where the teacher grouped students strategically. In those settings, the teacher's deliberate and careful selection of groups communicated the exact opposite—that some student were capable and some were not.

How we answer questions

In an institutionally normative classroom teachers answer between 200 and 400 questions in a day (Liljedahl, 2020), all of which fall into one of three categories:

1. Proximity questions: These are questions asked only because the teacher is close. Interestingly, in 90% of the cases, students make little or no use of the information they gain from the teacher’s response. They are only asking the question to show that they are on task—that they are being a good student.
2. Stop-thinking questions: These are questions student ask to get the teacher to help them avoid or to stop thinking. These are most often of the form “is this right”, “are we doing this right”, “are we going in the right direction”, or “is this what you wanted”. Thinking is difficult and if they can convince the teacher to help them, things would be easier.
3. Keep-thinking questions: These are questions that students ask so they can get back to work and are most often clarifying or extending questions. Often the students are in a hurry because they want to get back to the thinking.

To build a thinking classroom, only keep-thinking questions should be answered (Liljedahl, 2020). But this still leaves the question of how to answer proximity and stop-thinking questions. In the research, we found that the simplest way of dealing with these types of questions is to smile and nod as they are asking the question and then, when they are done, simply turn and walk away. At first, students hate this. But an interesting thing begins to happen after a few weeks. Consider this excerpt from week three of a three-month longitudinal study into not answering students' proximity and stop-thinking questions in a grade 9 classroom (ages 14-15).

Researcher	What was that? You asked her a question and she just smiled and walked away.
Morgan	Yeah. She does that a lot.
Researcher	She does!?! What does that mean?
Morgan	It means she thinks we can figure out for ourselves.
Researcher	What do you think?
Morgan	Yeah. We probably can. She's usually right about these kinds of things.

By smiling and walking away, it turns out that the teacher is communicating to the students that she believes that they are capable of figuring this out on their own.

Conclusions

The 14 building thinking classroom practices emerged out of empirical work wherein the goal was to increase the number of students who are thinking in class and for how long they are thinking during a lesson. Aside from achieving this, the research also produced a number of other results pertaining to how students experience mathematics, one of which pertains to their self-efficacy beliefs. Although this was not the intention of the research, data from across a wide variety of interventions and settings showed that aspects of the thinking classrooms improved students' self-efficacy beliefs. And although these changes are happening in part through the ubiquitous opportunities to have mastery and vicarious experiences, and to interpret those experiences with their peers, changes in self-efficacy is also happening through the non-verbal ways in which these practices communicate social persuasion—that the teacher has faith in the students' abilities. What these practices seem to communicate is not that "you can do it" but, rather, that "I believe you can do it". This is a subtle difference, but it intimates that before a student believes in their own abilities, someone else needs to believe in them. And the students need to see these beliefs. Before students can have confidence in their own abilities, they need to have confidence in their teacher's confidence in them.

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