

SLACK IN EDUCATION: A VOICE PLATFORM FOR QUIET STUDENTS
A PERSONAL REFLECTION USING DRAWINGS

By

Emma M. Corby, B.A.

A Thesis Submitted in Partial Fulfillment of the Requirements

for the Degree of

Master of Arts

in

English

University of Alaska Fairbanks

May 2023

APPROVED:

Sarah Stanley, Committee Chair
Eileen Harney, Committee Member
Eric Heyne, Committee Member
Chris Coffman, Chair
English Department
Ellen Lopez, Dean
College of Liberal Arts
Richard Collins, Director
Graduate School

Abstract

In this thesis, I will be exploring how Slack can be used as a platform for quiet students in the classroom. I do this by referring to barriers I faced as a quiet student myself. These barriers include the competitive atmosphere of learning, unheard communications for help, unread and unanswered emails, and limited connections with my teachers.

The scholarship on Slack's presence in education hasn't yet researched the topic of Slack as a platform for quiet students to find their voice. In this thesis, I explore my own experiences as a quiet student and as a teacher using Slack; I don't have qualitative or quantitative research, however, my work is a start. I explore the ways that Slack can be researched and used as a tool in the classroom to give every student a voice, a place to express themselves, and a place to connect with their classes and their learning more deeply.

While exploring the ways that Slack's platform can be used in a class, I use hand-drawn comics throughout my thesis; one of Slack's most powerful tools is its access to so many multimodalities. With my comics, my goal is to provide a deeper understanding on the affects and benefits of using multimodalities in a learning setting.

Table of Contents

| | Page |
|--|------|
| Abstract | iii |
| Table of Contents | iv |
| Table of Figures | v |
| Chapter 1 Introduction | 1 |
| Chapter 2 Barriers for the Quiet Students in a Traditional Classroom | 7 |
| 2.1 Introducing Silence as a Lack of Voice | 7 |
| 2.2 The Competitive Learning Atmosphere for Attention | 8 |
| 2.3 Unheard Communications for Help | 13 |
| 2.4 Unread and Unanswered | 16 |
| 2.5 Delayed and Limited in the Margins | 20 |
| Chapter 3 Using Slack as a Tool to Clear Out Barriers | 24 |
| 3.1 Slack’s Growing Presence in Education | 24 |
| 3.2 A Noncompetitive and Collaborative Learning Atmosphere for Attention | 27 |
| 3.3 Heard Communications for Help | 33 |
| 3.4 Read and Answered | 37 |
| 3.5 Direct and Limitless in Multimodalities Instead of Margins | 40 |
| Chapter 4 Conclusion | 46 |
| References | 47 |

Table of Figures

| | Page |
|---|------|
| Figure 1.1 Loud Voices | 1 |
| Figure 1.2 Four Years..... | 2 |
| Figure 1.3 Monday through Friday..... | 3 |
| Figure 1.4 Pumpkins and Grapes..... | 4 |
| Figure 1.5 Music in Multimodalities | 6 |
| Figure 2.1 Overheard | 8 |
| Figure 2.2 Anticipation | 11 |
| Figure 2.3 Raising Hands..... | 11 |
| Figure 2.4 Coffee Crash..... | 12 |
| Figure 2.5 Lonely Road Trip..... | 13 |
| Figure 2.6 Loud Class..... | 14 |
| Figure 2.7 Quiet in Class | 16 |
| Figure 2.8 Racing to Class | 16 |
| Figure 2.9 Just Send an Email..... | 18 |
| Figure 2.10 No New Emails..... | 19 |
| Figure 2.11 Creative Writing Classroom | 20 |
| Figure 2.12 In the Margins..... | 21 |
| Figure 2.13 Connecting with Poetry | 23 |
| Figure 3.1 Slacking Anywhere..... | 24 |
| Figure 3.2 Thoughts about Slack | 25 |
| Figure 3.3 Peer Support on Slack | 26 |
| Figure 3.4 Students Collaborating on Slack | 29 |
| Figure 3.5 A Heard Answer..... | 30 |
| Figure 3.6 Peeled Potato | 31 |
| Figure 3.7 Isolating Change of Scenery..... | 32 |
| Figure 3.8 Asking for Help | 34 |
| Figure 3.9 Student Slacking Me for Help..... | 35 |
| Figure 3.10 Potato Journaling..... | 36 |
| Figure 3.11 One Minute of Slacking with Sarah | 37 |
| Figure 3.12 Teaching Presence on Slack | 38 |
| Figure 3.13 Slacking from a Treadmill..... | 39 |
| Figure 3.14 Using Voice Memos on Slack..... | 41 |
| Figure 3.15 Checking in on Slack..... | 42 |
| Figure 3.16 Reacting with Emojis | 43 |
| Figure 3.17 Forrest Gump in Multimodalities..... | 44 |

Chapter 1 Introduction

My experience through school was quiet.

I was constantly the quiet girl, preferably in the corner, who hardly, if at all, got called on. Usually, it was because I didn't raise my hand; and when I did raise my hand, there were other hands in the air that were seen first. I became used to learning in the background. I didn't have a voice in the classrooms I learned in, making it feel like I didn't have a voice in my education. I couldn't find my voice in a classroom – there wasn't space for it.



Figure 1.1 Loud Voices

In tenth grade, my chemistry class had a seating arrangement. Because it was alphabetically based, and my last name is Corby, I was front and center. Right next to Ben Desino: the loud guy that breathed up all the air in every hallway he walked through. He took up a lot of space in that chemistry classroom; he constantly replied to our teacher like they were the only two people in the room, asking questions without raising his hand and replying to her drawings on the board with “oohs” and “aahs.” He was the loudest student in the grade. I was

one of the quietest. Sitting next to him, I felt more in the background than I had ever felt, even from a back corner of a classroom.

About two weeks into the school year, I came to class a few minutes late. I slipped in, quietly, and rushed to my seat. I didn't think anybody noticed me enter the room. Ben did – he watched me walk to my seat, sit down, and take out my notebook. Noticing that he was still looking at me, I worked up the courage to look back, softly smile, and look down at the black slate table we sat at. I will never forget what he said to me as soon as I looked away.

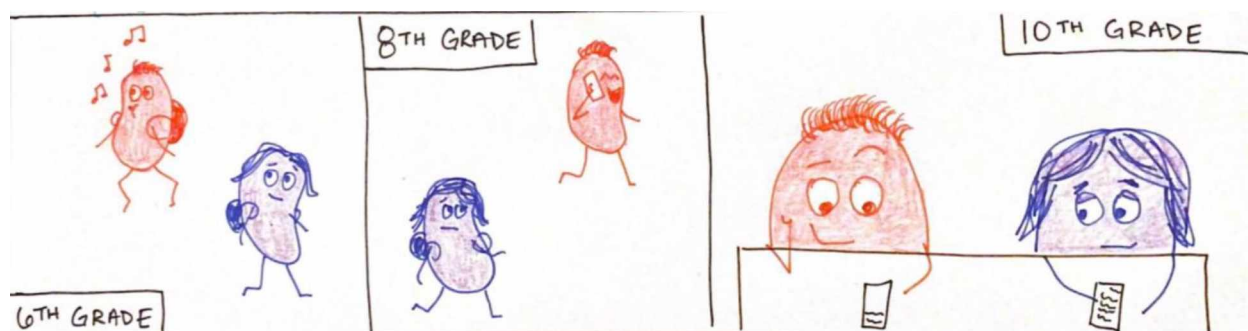


Figure 1.2 Four Years

“Are you new here?”

I had been going to the same school as Ben since sixth grade. We had been sitting next to each other for two weeks. I hadn't raised my hand once in that chemistry classroom because Ben was constantly raising his.

I wanted to cry. I wanted to cry because I'd known who Ben was for four years. I wanted to cry because we'd had four or five classes together and he was the person that talked to everybody and seemed to know everything. I wanted to cry because chemistry was hard for me,

and I couldn't even ask a question when I was confused. I had no voice and felt like I couldn't learn because of it.

I got a C in that chemistry class. I had to schedule time, once a week after school, with my teacher just so I could ask her questions about equations that confused me. I had to miss the first few minutes of after school sports just so I could feel like I had a voice in that classroom... For twenty minutes, once a week.



Figure 1.3 Monday through Friday

In my thesis, I explore additional stories of my time in school as a “quiet student” in order to uncover the reasons behind my beliefs in asynchronous learning for other quiet students. I rely heavily on Sarah Rose Cavanagh’s book, *The Spark of Learning: Energizing the College Classroom with the Science of Emotion* and my teacher training at the University of Alaska Fairbanks, where I was exposed to working to build an online classroom that offers a voice to every student.

Sarah Rose Cavanagh, in her book, explores the relationship between emotion and learning. Cavanagh is a psychologist and a professor at Simmons University, teaching classes on

mental health and affective science and researching how emotions, learning, and motivation tie together. In her book, she provides evidence based on studies of neuroscience, psychology, and education to demonstrate how emotions fuel learning. Cavanagh’s approach in using this power is especially helpful in an online classroom, where emotions can help build connections and a community, helping students feel valued and heard.

In UAF’s teacher training, everybody kept a “potato journal” – this journal was just like any other journal, named after potatoes because of their versatility. Our journals could be as versatile as we wanted; they were our space. Some weeks, we’d write about a lost art, and other weeks, we’d write about stereotypes. That potato journal gave me a voice in that teacher training classroom; I knew that if I didn’t have time to say something out loud to the room, I could write in my potato journal later that evening.

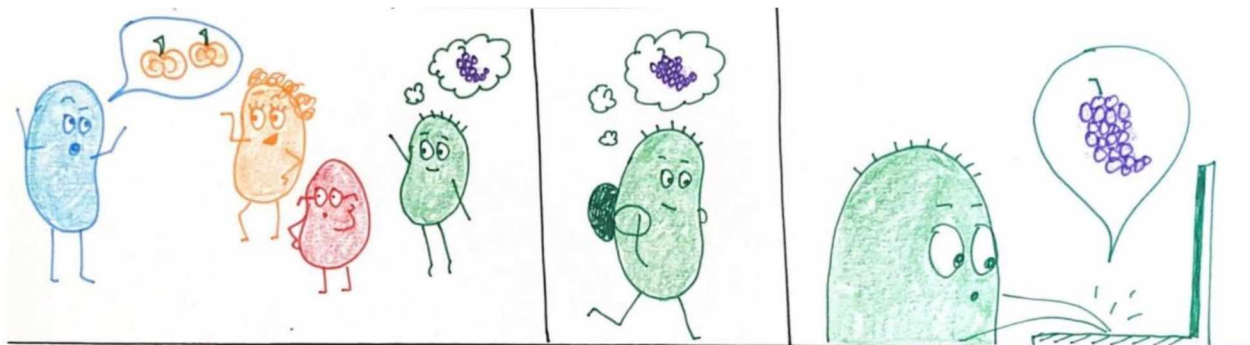


Figure 1.4 Pumpkins and Grapes

Come the end of the semester in that teacher training, we had a final project: choose something from our potato journals and make it into a project that told our “literacy narrative.” The freedom of the project excited me. It was one of the first times I felt like I had complete control of my voice in a classroom, and I used it to draw potato comics. I felt that through

childlike, potato-shaped cartoons, I could show the struggles of a quiet student in a colorful and straightforward way. I could draw facial expressions, write blunt sentences, and use any color I wanted. I discovered a new voice of mine in that teacher training, and with that new voice, I learned. I learned the importance of a voice in learning, and I learned how much emotion can be behind that voice.

As a teacher, I want to give my students the voice that I had trouble finding for myself in the classroom. I want to help offer a space for their voice and also for their emotion. I want my students to feel like they can reach out to me and not be overpowered by louder, more outgoing students. I want to create a space for quiet students to express themselves so that I can listen to and value their voices and expressions. By doing this, my hope is that my students will not only feel acknowledged, but also more engaged with their learning.

And so, by introducing and using Slack and all its multimodalities in my classroom, I can help students better engage with their learning through their voices. Created by Slack Technologies, Slack is an app that was specifically designed for collaboration and communication in a workplace. Education is a student's workplace. The app, Slack, is like social media in that it can provide students with a teacher's presence in an easier and more accessible way than other apps or email can. The app is created to be direct and clear in its usability, unlike other platforms that are designed to be primarily used in a desktop design. I will be focusing on this app because, in my own teaching, it has been a powerful tool for both me and my students.

My hope is that by providing a space for quiet students to have a voice, these students will grow more confident in using them. A voice like the one that can be expressed through multimodalities would have helped my own learning in that chemistry classroom. Whether it's

expressed through words or pictures, as I've done in this thesis with potato comics, a voice in learning can help the learner and the listener engage with each other and their education.

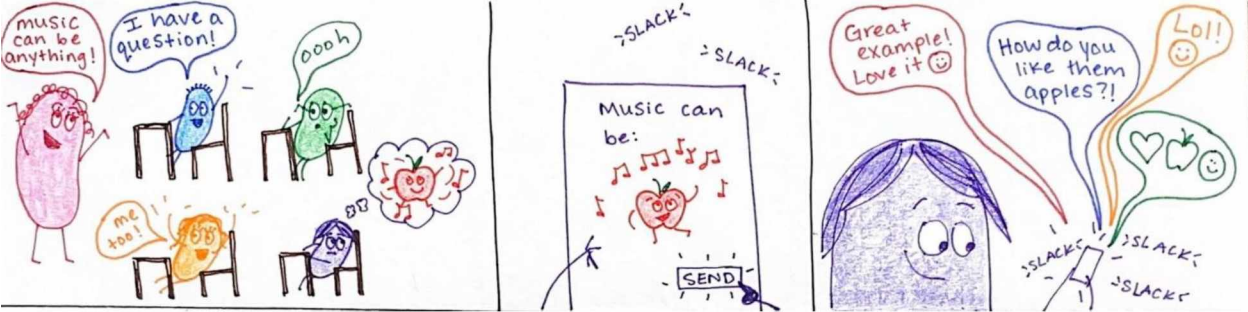


Figure 1.5 Music in Multimodalities

Chapter 2 Barriers for the Quiet Students in a Traditional Classroom

2.1 Introducing Silence as a Lack of Voice

Silence in the classroom can be an overlooked topic, but Natalie Taylor dives deep into silence's presence in the classroom in her dissertation scholarship. In "Centering Silence," Taylor positions silence in the center of the classroom, where it can take up space, just like any other voice. Taylor describes silence in a classroom as "loaded, awkward, or unwelcome," and as such a large presence that it can be "experienced as a bodily encounter" (Taylor 2, vi). Taylor's work builds on Mary Reda's interviews of quiet students and their reasons for being quiet.

In her writing, Taylor explores the meanings behind students' silences, writing that: "humans can deliver silence in purposeful, powerful, and even empowering ways," describing silence as intentional on a student's behalf (Taylor 100). Taylor divulges the agentic role of silence in a classroom, dissecting all its different meanings, intentions, and possibilities. Taylor explores silence as a different kind of voice in a classroom,

I will not be doing that. Although I will be talking about the agentic role of silence, I will be focusing on the performing emotions behind those silences that act as barriers. Barriers in a traditional classroom for a quiet student can be found in competition for attention, unheard communications for help, unread and unanswered emails, and delayed or limited communications.

In my writing, I position silence along the edges and in the corners of a classroom; as a quiet student, I never felt like I was in the center. I felt alone, disconnected, and was over-aware of my body. All of these feelings, I felt in the corners; nobody else seemed to notice. It seemed that all the loud voices were swirling together and against each other in the competitive

atmosphere of learning while my silence was below them, unable to swirl. I wasn't competing; I was just listening.

I will be exploring silence as looked over and as a lack of voice. When I was a student, I was silent while nobody else was. There wasn't space for silence to have a physical, loaded presence in the traditional classrooms I learned in because the other presences were so loud. My quietness wasn't intentional. My quietness was not purposeful, powerful, or empowering; it made me feel small. It wasn't a conscious decision I made because I didn't feel like I had a choice – it was a place I was stuck in.

2.2 The Competitive Learning Atmosphere for Attention

As a quiet student in the classrooms that I've learned in, I've become used to feeling smaller than others in the class. I've become accustomed to getting less attention from my teachers because of my quietness.

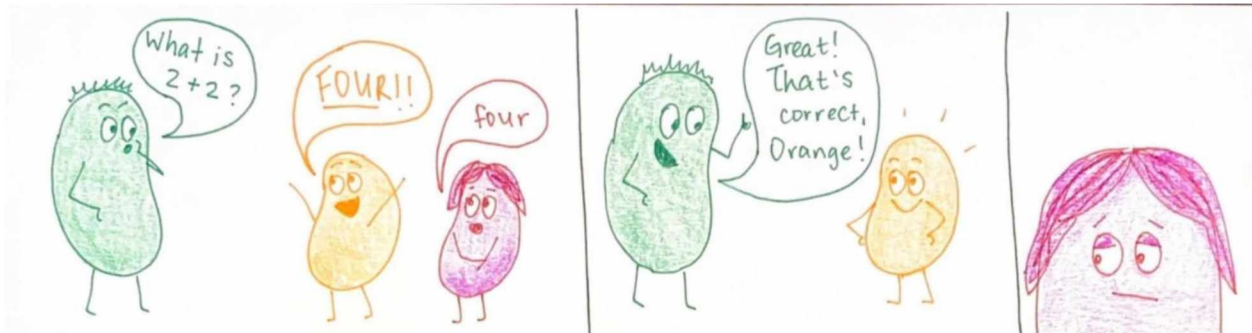


Figure 2.1 Overheard

In October 2021, I explored a past wrong in my potato journal entry, writing:

I was a pretty average student, nothing special. I was never the worst in my classes, but I also was not the best. I fit in and blended in, never drew attention to myself, and never really spoke unless I was asked to. So, because of my quietness and sometimes blending in so well I felt invisible, you can imagine how I felt suddenly noticeable when Mrs. Gebbell (I think that's how you spell it) approached my desk in the back left corner in the last few minutes of class.

I figured she would ask me to pass back everybody else's papers, because that's what she did. Not always me, but always somebody other than herself. But she had nothing in her hand.

"Emma, did you see the comments I left on your paper online?" I remember immediately thinking my paper was the worst she'd ever read. I said no. "Well," she continued, "your paper was awesome! I had no idea you had such a wonderful voice. Please, you have to go read my comments... I left some really good ones. I think you really surprised yourself here - really, really, well done. I made note of all my favorite spots."

I had worked over that said paper for the past week; in high school, a six page paper seemed like writing a novel. I tried hard, but didn't think it was anything special. Mrs. Gebbell put an idea in my head that I was really great, so I left that class looking forward to going home, signing onto my family's one computer, and checking the comments.

When I did check, later that night after dinner, I found one comment on the entire paper. It was a generic one at the end - a sentence and a half, telling me I got an 83% and that I was a pleasure to have in class. I remember staring at the screen, blinking, knitted eyebrows, trying to make sense of the conversation I had with my teacher. All that build-up just for a dumb grade and a copy-and-pasted comment.

The next day in class, I got there right before the bell, as always (so I didn't have to worry about socializing for the two minutes before the bell rang). I sat down in my back left corner, took out my notebook, propped my head up on my elbow, and waited. Mrs. Gebbell asked us all to take out whatever book we were reading at the time while she pulled up an example paper (somebody's in the class) to show us all "what to strive for next time." I pulled out the book, dropped it on my desktop, and glanced up towards the screen.

Emma *Cypher*. The other Emma in the class. It was the week before Thanksgiving break, and I had class every day. I no longer gave Mrs. Gebbell the benefit of the doubt.

I know that this was an honest mistake on Mrs. Gebbell's part, and that she had about 60 students that year, and that we were both "Emma Cs," but I felt more invisible than ever that day. She never apologized, or even addressed what she had done. She didn't seem to notice. For the rest of that school year, I tried to get better than the oddly specific 83%... Once, I got an 86.5% on a three page paper. She had a formula for grading, I guess.

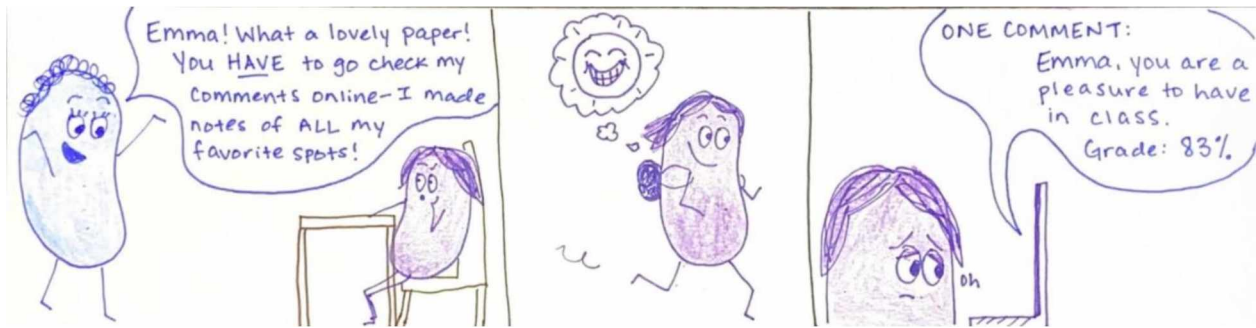


Figure 2.2 Anticipation

I still remember that day. I still remember feeling smaller than Emma Cypher and everybody else in the class for the rest of the semester. Maybe I would have felt better if Mrs. Gebbell had addressed her mistake, but she never did. I remember how I felt that day because it was the first time a teacher had ever complimented my writing, and the first time I didn't get to keep the compliment. I remember my cheeks reddening and looking down so nobody would notice my disappointment; I don't remember anything from that day's lesson.

I had sat through countless classes, watching my peers volunteer to read their writing. I'd listened through years of my classmates reading their writing out loud and my teachers responding with compliments. I was too quiet to volunteer.

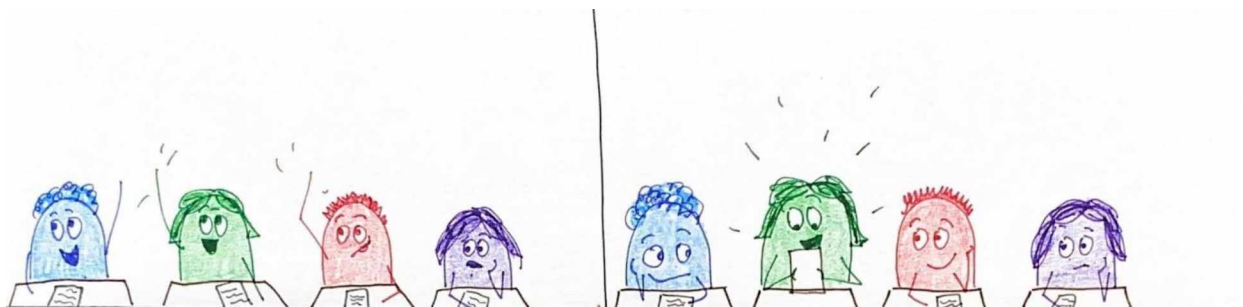


Figure 2.3 Raising Hands

Up until that day, I hadn't gotten that much attention from a teacher since the first grade, when I turned a corner too fast on my way to the library. Ms. Norton spilled her scalding hot coffee all over me. That day, I didn't have to compete for attention in the classroom, and, as Cavanagh states, "competition for that attention is fierce" (Cavanagh 33). I was the sole and most fierce competitor that day because I was the only one with first-degree burns. I was the only one in the competition, so there was nobody to overshadow me.

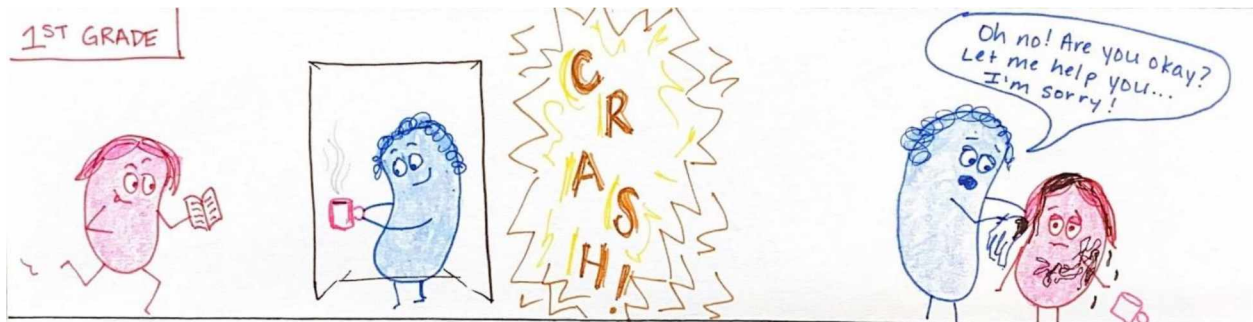


Figure 2.4 Coffee Crash

In first grade, I received attention because I had been obviously hurt, and in tenth grade, my attention resulted in getting hurt – in a less obvious way. Seeing my peers receive attention unharmed and regularly from my teachers, I felt less attended to, and began to feel more unequal and distant. I became more accustomed to being quiet, staying outside the competition for attention, which acted as a barrier in my communication. If I had to ask for help, I couldn't. I felt like there was always going to be somebody else to help before me or instead of me.

In a traditional classroom, this happens often. The fierce competition, as Cavanagh describes it, for a teacher's attention in a traditional classroom makes it nearly impossible to ensure every student in every classroom feels equally valued.

2.3 Unheard Communications for Help

In the fall of my junior year in college, I lived through one of the toughest weeks of my life, and my professors had no idea.

My professors had no idea that I got a Facebook message from a friend of a friend at 7:30PM on a Wednesday night. They didn't know I left for home at 7:38PM. They didn't know I lived over six hours away. They didn't know that my friend of a friend and I had one person in common; her name was Katherine.

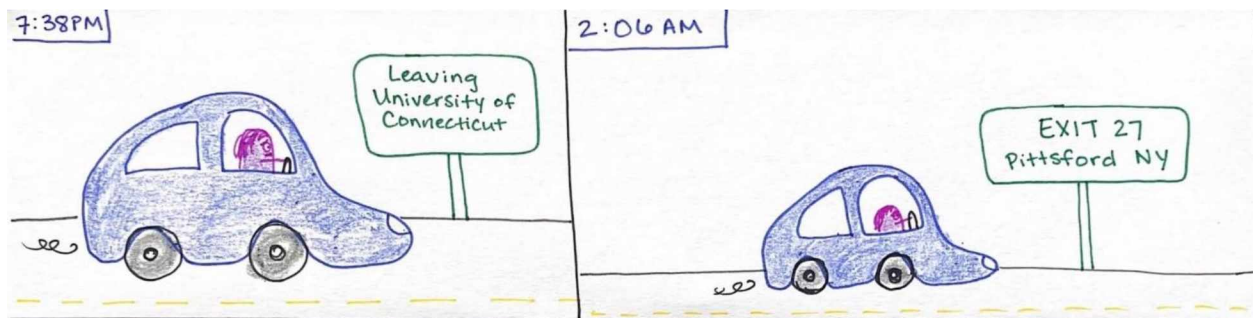


Figure 2.5 Lonely Road Trip

On Monday morning, my professors didn't know I felt especially quiet because I was quiet every day. They didn't question that my hand wasn't in the air because it hardly ever was. My professors didn't think twice about my sitting in the back corner because I sat there every class.

My professors did not know how I was feeling because I didn't write any emails. During my grief, writing out "Dear Professor Smith" felt like too much; I couldn't even imagine the rest of the email. I wished I could telepathically tell them how I felt or what my weekend entailed,

just to help them understand my actions. As a quiet student, though, my actions weren't any different. I sat in the background, learned in the background, and that semester, I grieved in the background. Everything felt silent as the noises of the classroom blended together.

My classes all consisted of at least twenty or twenty-five students; statistically, I should have taken up four or five percent of talking time, but there were plenty of students that took at least ten percent for themselves. I was an out-of-state student at a state school – I was the only one in my classes with no friends. I was silent towards other students, and silent towards my teachers. I felt sad because if a louder student had acted how I was, everybody would have noticed. My actions went unnoticed because I was a quiet student.



Figure 2.6 Loud Class

In the classroom setting, there was no space for my emotion. I had nobody and nowhere to talk about anything emotional in my educational atmosphere; if I emailed my professor, it was to ask for a copy of the assignment sheet because one hadn't been passed back to me in class. That semester, all I wanted in my classes was to be understood. I wanted to privately tell my

professors I needed extensions and extra time, but I didn't want the publicity of waiting in the line of students at their desks after every class. I was a college athlete and didn't have time for my professors' office hours, and even if I did, saying what I was going through, out loud, scared me. I thought it was easier to keep existing just the way I was: spoken over.

When it is time for a student to write an email, it can feel like a big, formal task. An email has to include a greeting, maybe an apology for writing on a Friday night or early on a Sunday morning, and a form of signing off. The formality of an email can take away space that could be used for natural emotion. And for a quiet student, speaking to a professor one-on-one can be even scarier and more daunting than writing an email. Because of my quietness, I didn't have any relationships in my classes, and because of that, there didn't seem to be space for me in the classroom. It didn't feel like there was space for me in a professor's inbox, either.

In a time of difficult emotion, in a traditional classroom, it is more likely for a quiet student to keep that emotion to themselves, rather than letting a professor know. Like I did. There was nowhere for me to channel that emotion, and since, as Cavanagh states, "emotions have such power over learning and performance," I was unable to disconnect myself from those emotions (Cavanagh 33). I couldn't focus on learning when I felt as blue and emotional as I did. There was no space for my emotion, and I felt there was no space for me to ask for help.

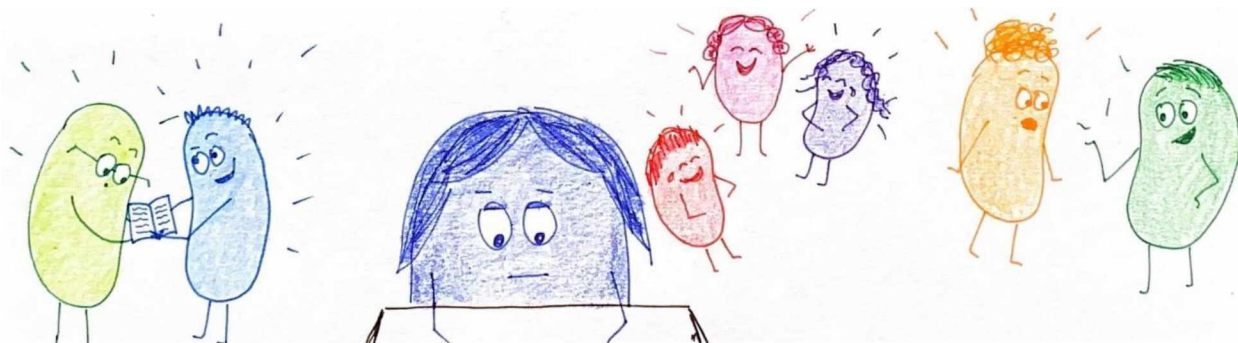


Figure 2.7 Quiet in Class

2.4 Unread and Unanswered

As a first year in college, I was clueless. I hardly ever knew where I was, and I struggled to remember which of my classes was which.

The one class I was positive about, though, was my first-year English class... unfortunately for me, the only reason why I remembered it so well was because class started fifteen minutes after my college swim practice ended – and it was a mile away in the lonely building next to the barns. Lucky for me, the back corner desk was always open for me to slide into, a couple minutes late with my wet hair and reddened cheeks, just about every day.



Figure 2.8 Racing to Class

The third week of classes, one of my practices ran a few minutes over, so I showed up to class about ten minutes late. I slid in quietly, whispering an apology to the teacher, knowing she likely didn't hear me. She was erasing something off the board as I walked in, which I hardly noticed. I didn't think to ask anybody if it was important, because in my mind, if it was, she'd leave it up.

My first year English teacher taught two night classes, mine being the first of the two. She was always one of the first to leave the room because, like me rushing from practice to class, she was rushing from class to class. This particular evening, as she rushed out the door like usual, she said,

“Don't forget your first drafts on Thursday!” and the door closed behind her as the rest of the class continued packing their bags and putting their coats on for the long walk back to the rest of campus.

I wasn't worried about it; it was Tuesday, and I had almost a full 48 hours to figure out what the assignment was, which was easy, and then write it, which was almost as easy. Especially if it was just a first draft. I figured I'd send my teacher an email, greeting her, apologizing for my lateness to class, explaining my lateness, then ask for details on the assignment before wishing her a nice evening. So that's what I did. I went to sleep that night worry-free.



Figure 2.9 Just Send an Email

The next night, however, I was not feeling very worry-free. As I was getting ready for bed, I kept refreshing my email; my English teacher still had not answered. I didn't know what to write about. I didn't know what the assignment was, and I didn't have any of the other students' contact information from the class to ask. I accepted my defeat as I went to bed that night, showing up to class empty-handed the next day. At least I was on time.

I was late to class on Tuesday and missed an important announcement, and I needed to know about the assignment before it was due on Thursday. Ideally, my teacher would have answered my email later that Tuesday evening, but she didn't; she didn't answer on Wednesday either. As a quiet student, I had reached out in an alternative space, via email, and I didn't get a response. Once again, in that class, I had no voice. I was unheard and unseen. I wished for a way to reach her more quickly, directly, and informally.



Figure 2.10 No New Emails

In this first year English class, as a quiet student, I took a jump and confronted my teacher through my email. I reached out. I asked for help. But I never received a response. Because that traditional classroom took place in-person, conversations usually happened face-to-face. I couldn't find a voice in the physical classroom, so I tried my voice via email. I wasn't expecting a response right away, but I was expecting one before the next class. I was looking for a form of immediacy or even just responsiveness. I found neither.

As teachers, Cavanagh states that, "immediacy pertains to behaviors that are both spoken and unspoken and convey to students that you are interested in them, the material, and the process of learning" (Cavanagh 100). I chose to share this story because, in that traditional classroom, my teacher may have shown immediacy within the walls of the classroom, but as a quiet student, I struggled to engage. When I searched for a voice in a more informal, asynchronous way with my email, it went unrecognized. As a result, I felt that not only was my teacher disinterested in me, but also in my learning. It made me feel alone.

2.5 Delayed and Limited in the Margins

In eleventh grade, I took my first creative writing class. Everything about the room was designed to be a collaborative space. There were twenty-one other students in that class with me, and the desks were arranged in a U-shape around the room. There was no back row. So, I sat at the end of the line of desks; that way, I only had to sit next to one other person, rather than sitting between two people.

When we got our first papers back in that creative writing class, I still hadn't said a word out loud in the classroom. I still sat next to whoever got to class late and took the empty desk next to me, self-conscious of every small movement I made, thinking everybody would notice if I had an itch on my nose or if I had to clear my throat, or, my worst nightmare, if I had to sneeze. On this day, I was wearing a navy blue hoodie that kept shifting backwards, pulling at my neck. I was uncomfortable and felt like my breathing was restricted, and in my quiet world, my breathing sounded too loud, so I kept pulling at my hoodie. Every few minutes, it would shift back, bearing its weight on the front of my neck again. I kept tugging.

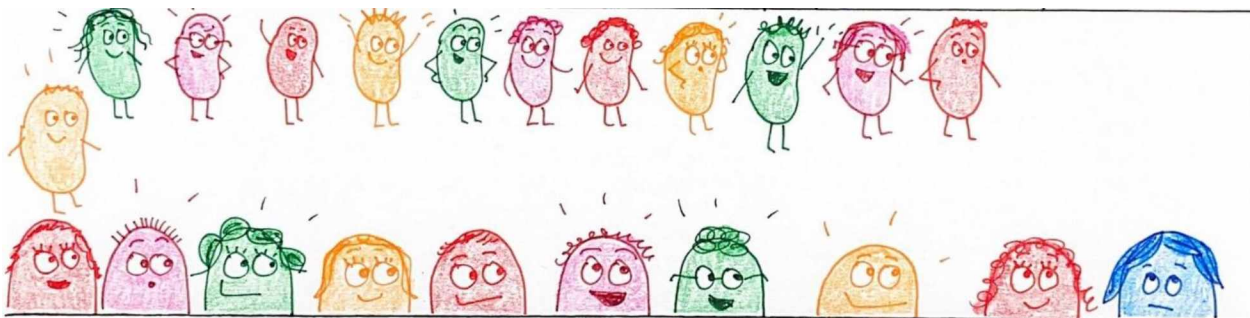


Figure 2.11 Creative Writing Classroom

When Mr. Steele started handing out papers, I wondered, as I was tugging my hoodie, if he'd know my name. Emma Cypher, the other "Emma C," was not in the class, but I hadn't spoken a word yet. How would he know me?

A paper landed on my desk, startling me.

Mr. Steele made me feel seen in the classroom without calling on me in front of all the other students – he wrote in the margins of my papers. He seemed to understand my quietness. He would draw two parallel lines perpendicular to the lines of my writing when he liked a certain part, and three lines when he really liked something. And he always wrote a note about why he drew those lines. He gave me advice and pointed out if something felt "trite," but those perpendicular and parallel lines are what stick with me. Now, I use lines like that when I annotate texts.

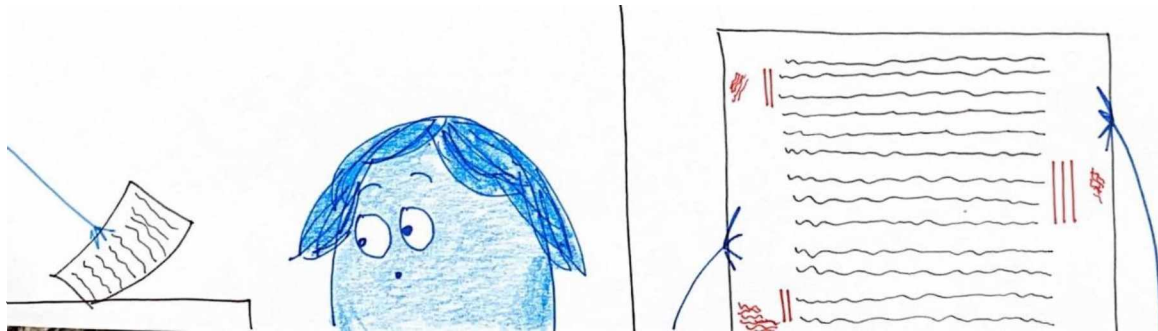


Figure 2.12 In the Margins

I appreciated the way that Mr. Steele reached me through written word, but there was always a delay. If we handed papers in on Friday, I'd have to wait until Tuesday or Wednesday to get them back... and that was a quick turnaround. Before I got any papers back, I still felt in the dark and unseen. I would listen during class, tugging at a hoodie or trying to stifle a sneeze, but I couldn't bring myself to talk or engage. I was more comfortable as an outsider, and in a way, Mr. Steele's approach made me feel like I belonged there.

Had that creative writing class used Slack, I may have felt directly seen. When classes use Slack, it offers teachers and students a way to connect outside of writing a paper for class, which can be a platform for teachers to show students that they see their value. Cavanagh states: "it is our responsibility as practitioners of pedagogy to demonstrate to our students that we see their value," and by writing in the margins of all my papers, Mr. Steele showed me that (Cavanagh 133). He demonstrated to me that he valued me as a student and communicated with me on my assignments. However, the communication taking place in the margins of my paper greatly outweighed the communications happening elsewhere in the class. Slack would have provided an alternative space for that communication.

Mr. Steele, or other past teachers of mine, could have used Slack as a discussion forum or as a one-on-one space; both would have provided another space to communicate in a way that I wouldn't have to make any noise. I could have typed my opinions on poetry in a class discussion right alongside my peers, without worrying about a heavy navy blue hoodie or an itch on my nose. Or, I could even directly reply to another student's post asking who our favorite poet was or what our favorite nonfiction piece was. Using Slack as a tool provides quiet students with

another space to communicate, offering them a voice, and a lot of my past teachers could have offered this app as a way to offer a voice to their quiet students.



Figure 2.13 Connecting with Poetry

Chapter 3 Using Slack as a Tool to Clear Out Barriers

3.1 Slack's Growing Presence in Education

Slack is a powerful tool in education becoming more and more present in asynchronous classrooms. Thanks to the COVID-19 pandemic, Slack's place in education has been growing rapidly in the past few years – Slack is an instant messaging program that was designed and created by Slack Technologies in 2013. Slack was designed as a team building app for work, but it is also helpful for communication generally. Communication is what ties people together, and this app can connect anybody from anywhere. Downloadable on laptops, tablets, and smartphones, its accessibility allows for participants to carry Slack with them wherever they go. In less than ten years, this app is a growing presence in online learning.

No tool is the end all be all of learning – as a company, Slack isn't completely ideal. If users don't pay for a subscription, the free version only saves messages for 90 days until they are moved to archives that need payment to be accessed. However, my focus on Slack in this thesis is to highlight how teachers' choices have impacts on the kind of experience students have in the classroom, and how those choices can use this platform as a tool to reach deeper levels of learning.

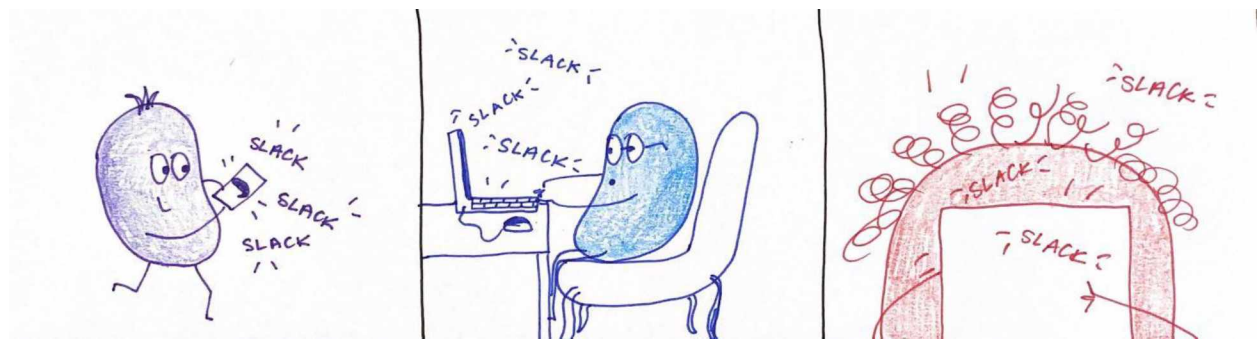


Figure 3.1 Slacking Anywhere

Early studies of Slack's use in higher education were concerned about user experience (Tuhkala and Karkkainen 3; Menzies and Zarb 8). Ari Tuhkala and Tommi Karkkainen designed a questionnaire, with their results showing that most of the graduate students using Slack thought it was a relatively easy to use communication tool, but that it came with practical and technical issues. Users were having issues with authentication and getting organized on the app in 2018, and although they voted that it was fine and straightforward to use with their peers, not all the students were likely to use Slack in their future.

Rachel Menzies and Mark Zarb's case study research focused on the difference of students using communication apps for their personal lives versus in their professional or educational lives. A few hundred students were instructed to use Slack as their primary communication tool between teachers and peers across two institutions; at this point in time, in 2020, the number of students who further recommended Slack and the number of students who didn't recommend it were fairly even.

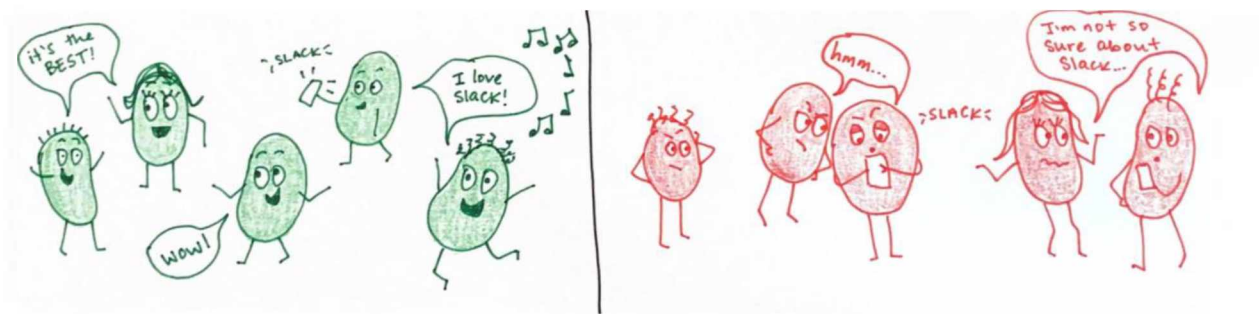


Figure 3.2 Thoughts about Slack

Since 2020, those numbers have drastically changed. Now, many universities have a section on their websites, often in their IT sections, with directions on how to use Slack. These

schools include Stanford’s “Slack as a teaching tool,” Dartmouth’s “Slack for Teaching,” Johns Hopkins’s “Using Slack in the Classroom,” and so many more. Some other schools with Slack instructions easily accessible on their websites are University of Massachusetts, Arizona State University, University of British Columbia, Harvard, Duke University, and more. Slack is growing in the world of higher education, and universities across the world are encouraging the use of this tool.

Since the pandemic, scholarship has highlighted Slack as a tool for connection (Dahiya et al. 2). Slack can be a space for productivity, but it is also a place for communication, connection, and emotion. Slack’s multi-channel platform allows students to reach each other about deadlines, essay topics, or even just what time class is the next day. Slack offers space for students to collaborate and have a common, informal ground.



Figure 3.3 Peer Support on Slack

Students with a voice can be more motivated in their education. It's important to have a voice in the classroom; it allows for confidence and uniqueness, helping students engage in deeper learning. Cavanagh writes, “positive activating emotions are found to be linked to motivation,” and when students have a voice in a classroom, they are activating those positive

emotions (Cavanagh 146). They are growing more confident. Every learner is unique, and when students can feel confident with their unique voices, they can be more engaged with their learning. As Cavanagh writes: “if we’re motivating our students and increasing their interest in the overall process of learning, this can only have good effects in the long term,” and engaging with their learning through their voice is something that, in the long term, will help students to learn more deeply (Cavanagh 130).

The scholarship around Slack has not connected the platform to voice. I don’t have a qualitative or quantitative research study to compare across platforms, however, this thesis is a start of a conversation that hasn’t been thoroughly had yet. This is a reflection on my experiences, and while lots of research has been constructed with Slack, research around Slack’s space for voice would be beneficial to quiet students everywhere, especially in online classrooms.

3.2 A Noncompetitive and Collaborative Learning Atmosphere for Attention

Slack is becoming more and more popular in online classes because teachers can reduce the competitive learning atmosphere and offer their attention to anyone who may need it. Teachers can use slack to provide space for students to connect with them or with each other, whether it’s in a one-on-one way or in a group discussion. There have been various works exploring the levels of connection in an online classroom, including Feliz Arzu Carmichael’s work in 2021. In his writing, he states his concern that his students “might perceive the [online] class as simply submitting assignments as opposed to a space where they are immersed in an online writing experience that promotes belongingness,” meaning that an online class can easily be looked at as just a place to submit work, and not as a place for students to immerse themselves

in a learning experience (Arzu Carmichael 39). This concern, if true, makes it difficult for students to find that deeper level of learning in an online class. Slack can be used as a place for students to immerse themselves in.

Studies have shown that students can learn from posting, reading each other's public posts, and using the platform as a way to be more involved with their classes and learning. A recent 2023 study mentions: "the Slack channel makes sure that we can all learn from other students' questions," highlighting the importance of collaboration (Müller 310). By using Slack, an online class always has a space for questions.

Below, I've attached an image of a discussion on synonyms between four of my students on Slack. Rather than coming to me with questions, they go to each other, working together to discuss the topic. The student marked with blue, who wrote the original post, replied at the very end, asking a question to the student marked with yellow. By doing this, the student immersed themselves in the discussion, asking about and learning from the other student's point of view.

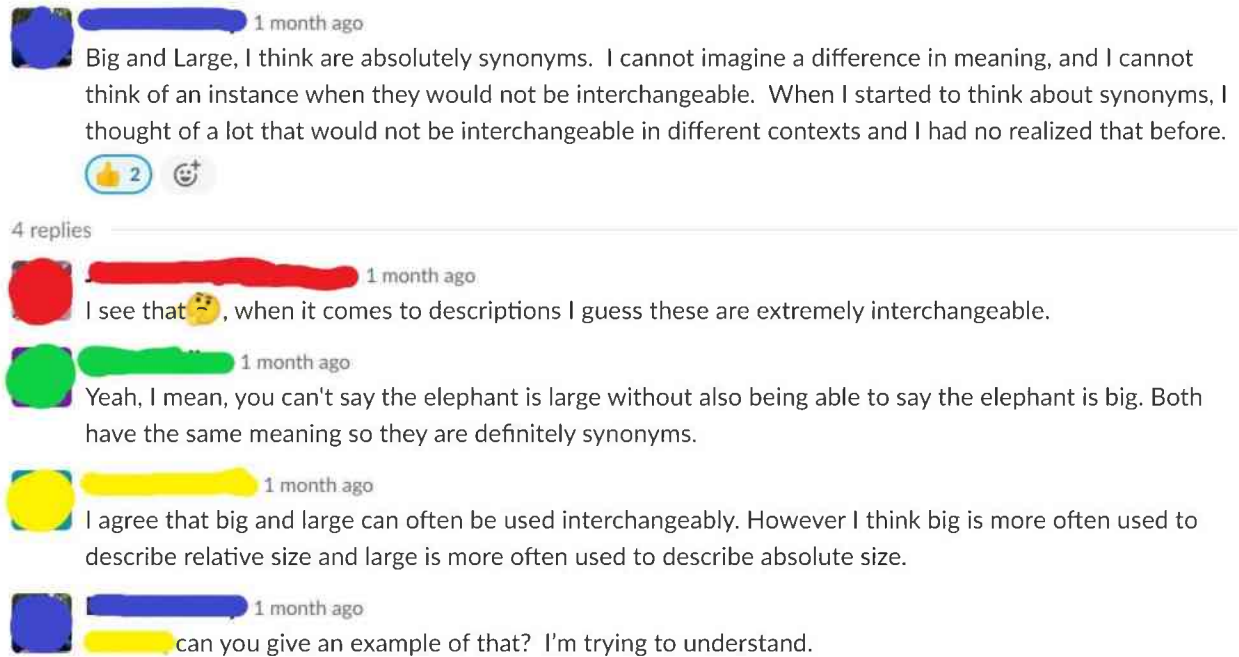


Figure 3.4 Students Collaborating on Slack

These students used Slack as a collaborative space to immerse themselves in their learning. The student marked with green could have said: “I agree,” and left it at that, but they also gave a specific example, showing how they agreed. They connected with each other. Cavanagh writes, “the best predictors of student satisfaction and success are whether students form close-knit friendships,” and by having Slack as a space to collaborate and connect, students can also connect to each other on a deeper level (Cavanagh 51). Using Slack as a space for deeper learning and collaboration can make room for everybody’s voice.

Studies have explored how Slack can be used as a tool for both independent and collaborative learning, and it has shown to be communicative, quick, and helpful (Sabin and Olive 1). When teachers use Slack in their online classes as the platform to present or post their words, nobody’s words are “louder” than anybody else’s. In a traditional classroom, if two

students speak at the same time, only the one with the louder voice will be heard. In an online classroom, if two students post on Slack at the same time, they are both posted, and they can both be read by their classmates. Neither of the posts will overshadow another. By providing Slack as a forum for collaboration, nobody gets looked over, and everybody's posts get the same chance for attention.

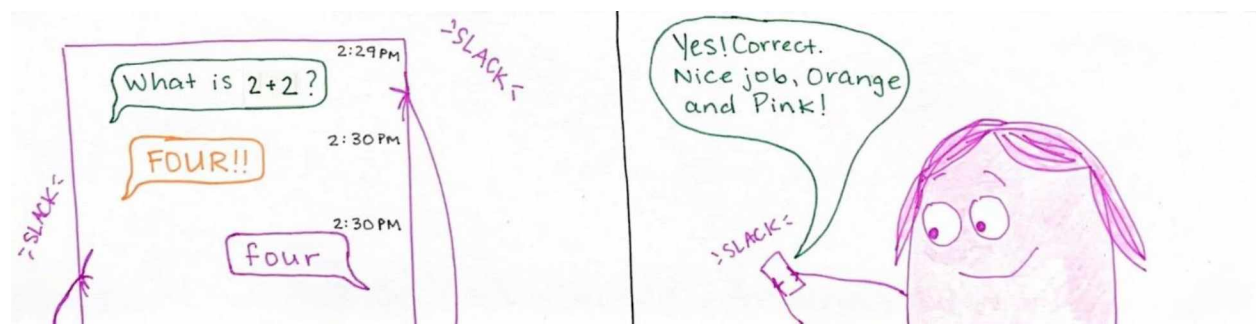


Figure 3.5 A Heard Answer

However, just because studies have explored the depths of learning and connection that classes can reach using Slack, the app does not guarantee it. The main factor is the person typing behind the screen. A teacher can use Slack and set an example for the connections available through the app, but the students also have a role in these connections.

As a college student, I had an especially strong connection with one professor: Gina. I sought out her classes for all my English courses.

Gina prioritized collaboration and connection, and I felt safest in her classroom. She went around the circle that our desks were arranged in, making time for everybody, asking every student to give their opinion or their thoughts. Gina's small classes allowed me to come out of my shell and be different from the quiet, invisible-feeling student that I was in my other classes;

she acknowledged and valued all her students. More than anything, she made the class feel like a two and a half hour long conversation. It was an intimate atmosphere. We found the deepest cracks in books that I wouldn't have ever surfaced on my own; we talked about war, death, and love, and by discovering so many crevices in these texts, I finally felt like I had a voice in the classroom. I was never competing for Gina's attention. Once I had the experience of voice in my education, I showed up differently; I had a newfound willingness to engage because I felt my voice's power and I could feel it developing with my confidence.

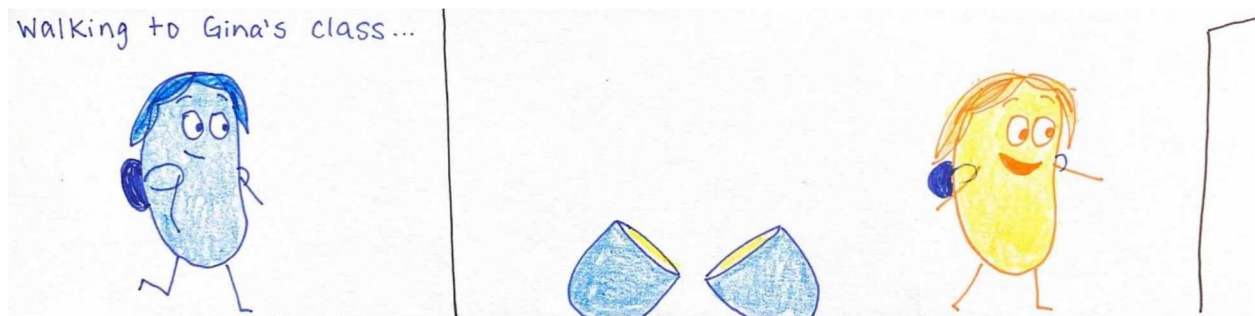


Figure 3.6 Peeled Potato

At the end of my junior year in college, COVID-19 moved all my learning to an online and asynchronous format. I felt like I had lost all chances of ever feeling that intimacy in a classroom again. Once again, my voice was gone. I went from sitting in a circle with my favorite professor and discussing a book freely with my classmates to sitting alone in my apartment and staring at my computer screen. All intimate and informal communication left the class with the in-person structure; I felt isolated through formal emails and discussion posts.

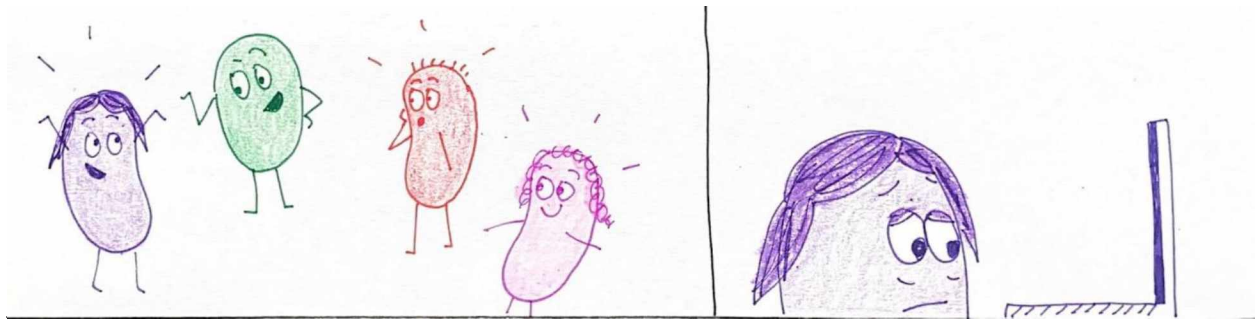


Figure 3.7 Isolating Change of Scenery

Gina, in an attempt to keep our connections strong, sent an individual email to every single one of her students. It was a kind and thoughtful gesture, and it helped me feel valued; I still have her writing to me screenshotted and saved in my photos. Unfortunately, Gina did not have the time to send all her students more than one email for the rest of the semester; connecting via email was too formal and too large a task. Had we used Slack, reaching out to each other could have felt easier and more natural.

Teachers can use Slack to connect with their students outside the classroom. Although email can be used to connect a teacher one-on-one with their students, it becomes difficult for that teacher to maintain an email correspondence with every student in the class. Not only that, but with email, students can't hear other students, which can make them feel more alone in the class. Slack was designed as a collaborative, user-friendly app; it can be used for students to connect with their teachers, but also with each other, helping to feel less isolated from the class. If I had Slack in my online classes as a college student, I likely would have felt more connected with my classmates, teachers, and my learning. I would have had the space to immerse myself in more collaborative, deeper learning.

3.3 Heard Communications for Help

When I was a junior in college, it was difficult for my emotions to grasp onto anything that would benefit my learning, especially because I didn't have anywhere to express my more difficult emotions in the classroom setting. My heavy emotions, with nowhere to go in the classroom, led me to choose working alone on group projects, to skim over long readings, and to be unengaged in my learning. The lack of space for my emotion in the classroom emphasized my lack of voice, leading to a lack of learning. Cavanagh states that: "emotions are likely guiding your hand in every decision you make," just as, she states: "emotions are similarly guiding our students in every stage of their learning" (Cavanagh 5). Students use their emotions every moment that they are learning, whether they are aware of it or not. To encourage students to connect with their learning on a deeper level, teachers can use Slack as a space to connect with their students.

Slack offers a place for informal communication. In an online classroom that utilizes Slack, communication can take place primarily on the app. It can be a consistent and familiar space. When a traditional classroom's communication varies from speaking in front of an entire class, emailing a teacher, or scheduling an office hour appointment to speak one-on-one with a teacher, an online class's communication can be direct and in the same space. There is no need to schedule a conversation on Slack, and there are no formalities needed that are needed in an email. The informality of Slack gives quiet students a space to express their emotions privately and quickly to their teachers.

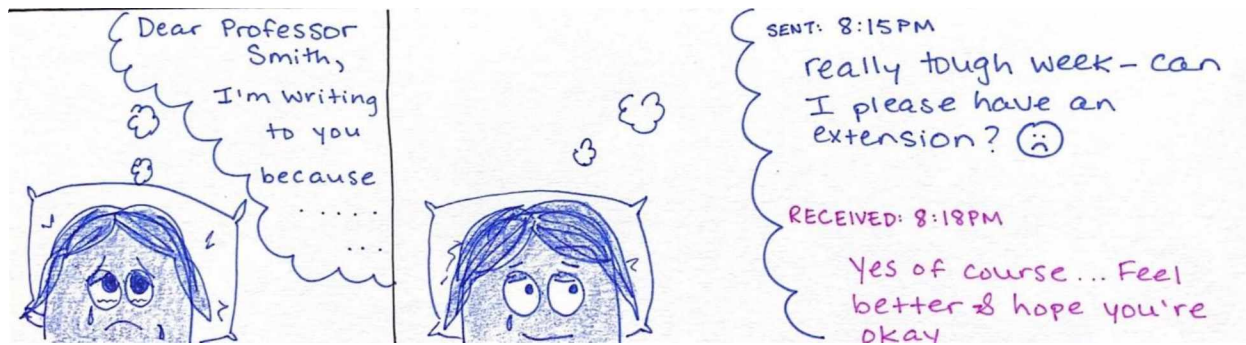


Figure 3.8 Asking for Help

This space for emotion for quiet students comes with control in Slack. Students can control when they want to reach a teacher or another student, they can control what exactly they want to say, and if it helps their communication, they can choose what emojis to include in their messages. And what's even more important is that quiet students know they have this control. As Cavanagh states: "levels of perceived control appear to be a highly important predictor of good outcomes in the classroom, such as low levels of boredom and anxiety, better self-monitoring, and better grades," meaning that as long as students know they have this control, which, with Slack, they will, students will likely have a better experience in the class (Cavanagh 163).

Below, I'm including a screenshot of a private message one of my students sent me. This particular student went a couple weeks without turning anything in for the class or posting anything on Slack, and chose to wait until they were ready to reach out to me.

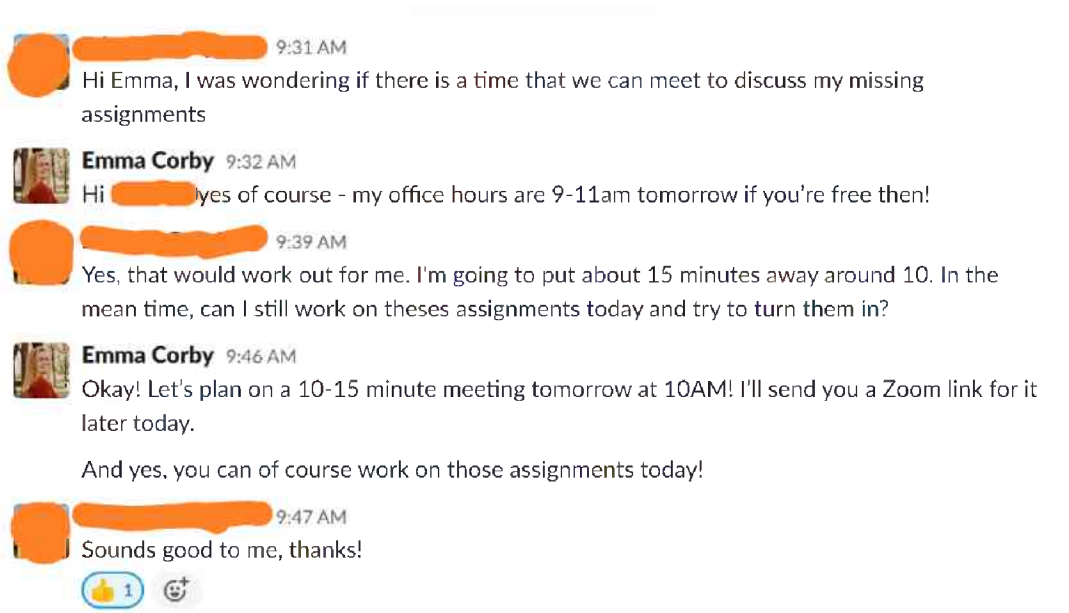


Figure 3.9 Student Slacking Me for Help

This screenshot shows my student expressing their concern to me and is an example of how Slack can be used as a place to express those emotions. My student and I were able to work together and plan a time to meet and discuss the situation over Zoom, but had they wanted to, we could have also discussed over Slack.

Offering Slack as a space to express emotion does not promise that students will; it is up to the students whether or not to use the platform that way. For the student marked with orange in the above screenshot, I had been keeping an eye on their presence in the class. If I hadn't heard anything by the end of the week, I was going to reach out to them. As teachers, we still have a responsibility to look out for our students, and while every teacher's level of looking out is different, Slack does offer a space for easier support.

By offering students a space to have their voice and express themselves, Slack makes room for their emotions. With the emotional room, students have a lot of space to learn freely on

Slack. The informal space allows room to be engaged with content in multimodal ways like using emojis, photos, and even gifs to express nonverbal emotions. If a student were to try to show a gif in a traditional classroom, they may be told to put their phone away.

Making space for emotion in learning leads to making space for a quiet student to have a voice. In my UAF teacher training, I had space in my potato journal to express my emotions. I could write what I felt and why I felt it, and every time I wrote in that journal, I could feel my voice getting stronger because I knew the time would be taken in class to go over our entries.



Figure 3.10 Potato Journaling

Like using a potato journal, using Slack as a tool with its multimodalities is another way of incorporating emotion into a learning space. When I think about voice, I think about my vernacular. I don't think about the auditory component and the mechanical sounds of voice because I have been so accustomed to writing. When we use Slack in a classroom, we have the option for both in multimodalities.

3.4 Read and Answered

My first year of college, my teacher didn't feel present. She was always rushing out of the classroom, making her physical presence limited. She left my email unread and unanswered, making her absent outside of the classroom. If that teacher had used Slack, my question may have been acknowledged; it would have been easier for her to respond to me about Thursday's assignment. Rather than receiving no email in return, I could have received a quick, four-worded Slack message. Some information would have likely been better than none.

When teachers use Slack, it can be a lot easier to have a quick response time and be more present for their students. Here, I'm attaching a screenshot of part of a conversation I had with Sarah, my Thesis Chair:

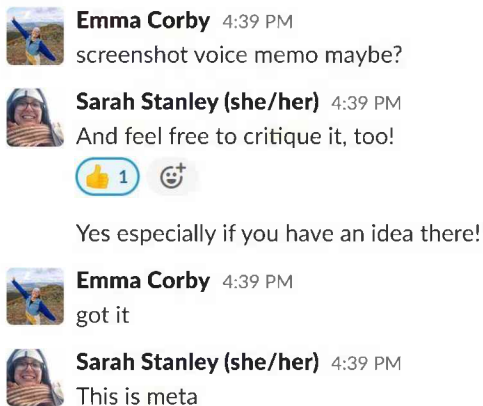


Figure 3.11 One Minute of Slacking with Sarah

This screenshot illustrates the presence that teachers can have while using Slack; notice how all the time stamps in the conversation are 4:39PM. There was enough time in that one minute to ask a question, get advice, get an answer, and respond to that answer while giving a

nonverbal, thumbs-up reaction. Had that first year teacher used Slack, maybe she would have answered my question, rather than leaving my email unread in her inbox.



Figure 3.12 Teaching Presence on Slack

Although Slack does make responding quickly easy, it does not guarantee a quick response. Like any tool for communication, its main purpose is dependent on its user. Last semester, I took a Friday to go for a fifteen mile hike in an area with no cell service. By the time I drove the hour home, showered, and made dinner, checking my phone was the last thing on my mind – I was getting ready for my Saturday hike. I woke up early, went out hiking all day, came home, showered, and then went out for dinner with a few friends. Checking my phone wasn't on my mind that day either. Sunday morning, I sat down to get some schoolwork done, and noticed I had a Slack message from a student... from late Thursday night. I had been sleeping when I received the message and hadn't noticed the notification the following morning, or for the next two days. Slack can be an incredibly useful tool for quick and instant communication, but ultimately, the quickness of that communication depends on the people using the app.

However, my student was able to use Slack to type their message in the instant it came to their mind; although I didn't have the instant reply, I was able to read their voice that was

captured in the moment on Slack. If it were a traditional classroom, the student would have either had to send an email or make a mental note to remember to bring their idea up to me on Monday in class; saving an idea for Monday is likely going to change their voice. Saving an idea until Monday can lead to forgetting details, and for a quiet student, likely a more passive voice. In-person interactions tend to be more difficult for quiet students, and Slack provides the option to make notes quickly and in their own voice, which a formal email may not have a space for.

Below, I am attaching a screenshot from one of my students that was just getting used to the online format of a class. That morning, I was running on a treadmill, but since I had my phone in front of me, I was able to respond in one minute. I wouldn't have noticed an email on my phone, and I was thankful that my student messaged me on Slack.

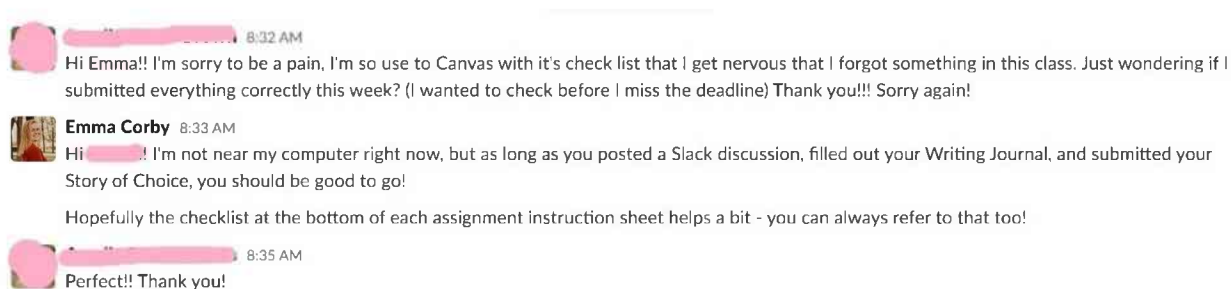


Figure 3.13 Slacking from a Treadmill

Our entire interaction took place over just three minutes, and in that time, I was able to be present and help my student quickly and efficiently. Even though I was not present in the online classroom and able to check this student's submissions, I was able to tell them that I was away from my computer and offer them a checklist that I would be looking for. Cavanagh highlights, "the importance of teachers and students being present for one another in the process of

learning,” and although I may not have given the perfect answer, I read my student’s question and answered right away (Cavanagh 69). I was there for them.

Using Slack as a tool to make me more reachable to my students helps especially with the quiet students. In my first year English class, if I was a louder student, maybe I would have ran after my teacher to talk to her as she rushed to her next class. As a quiet student, just the thought of doing that makes me nervous. Sending a message is something I often chose over finding time for a face-to-face conversation, just like most other quiet students.

3.5 Direct and Limitless in Multimodalities Instead of Margins

Mr. Steele had a type of multimodal communication with me. He wrote in red pen along the margins of my paper, and I always knew that he’d write understanding and thoughtful notes. However, that was the only communication we had. If Mr. Steele had used Slack in his class, I would have had the option to explore other multimodal forms of communication and connection – and they would have been delivered right away.

One way to engage in multimodal communication is by recording and sending voice memos. Teachers can use Slack to send recordings of their words, which send both the message and the tone, capturing the movements of their voice. While this can be done in a traditional classroom through face-to-face speaking, a voice memo can also be replayed and also read as a transcript. Here, I’m attaching a Slack conversation between Sarah and me. She was in the nursery with her newborn, who I could hear cooing in the background.

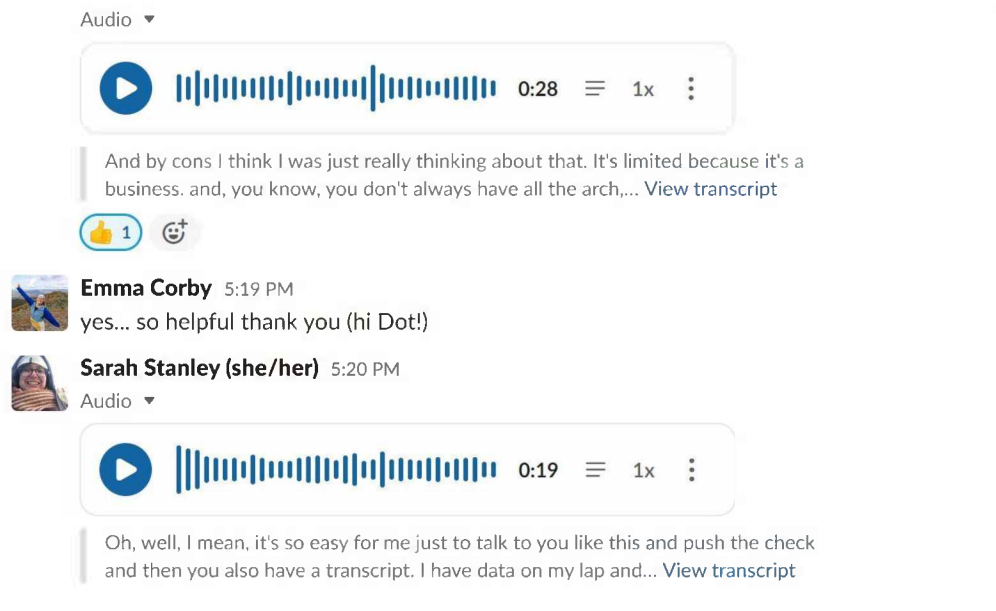


Figure 3.14 Using Voice Memos on Slack

By choosing to use this voice memo, Sarah let me feel her undivided attention. By using this tool, Sarah was able to talk into her phone, which was easier than typing with a newborn in her lap, and I was able to re-listen to her words to better digest her points and listen to her encouraging tone. The authenticity of Sarah’s voice reminded me of mine – by speaking directly to me, I was able to feel more connected with her voice but also with my own.

As well as using Slack as a tool for voice memos, it is also useful to incorporate nonverbal emotion into communications; this can be done by using reactions to messages. These nonverbal emotions shown through reactions can act like a smile, a nod, or even an understanding “mhm” in an in-person interaction, showing students or anybody else I may be messaging that I hear them.

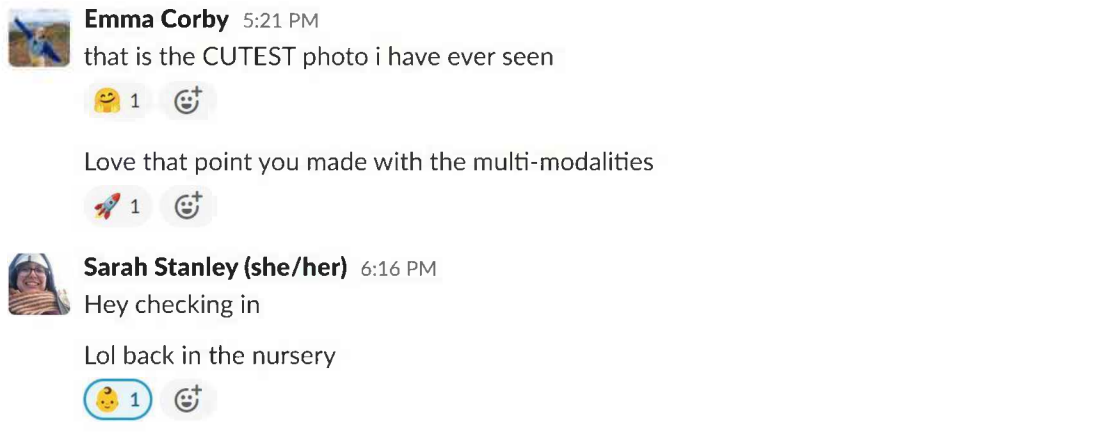


Figure 3.15 Checking in on Slack

When I told Sarah: “Love that point you made with multi-modalities,” she reacted with a rocket ship emoji, rather than responding with an entire message. That’s all I needed; I felt seen and valued. I felt like that idea could take off, like a rocket ship. As shown in the time stamps, she didn’t respond until about an hour later, when she was checking in again, to which I reacted with a baby emoji, showing that I hear her too, and that I’d respond when I got the chance.

Using nonverbal emotion in Slack should, however, be handled carefully; if I were to react to Sarah’s message with a thumbs down emoji and then not respond, it would confuse, concern, or offend her. While a thumbs down emoji would still be a form of nonverbal emotion, communicating on Slack should involve the same respect as communicating in person. Slack as an app is a useful tool, but the users are more important than the platform. When used respectfully and mindfully, this tool can express our emotions in a productive way; it helps quiet students to find and use their voice, and when using Slack’s reactions, quiet students can also feel their voices being heard.

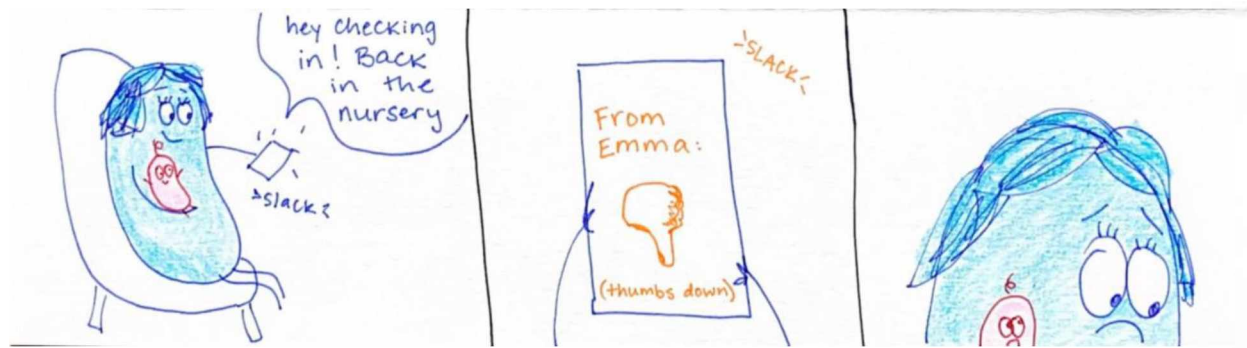


Figure 3.16 Reacting with Emojis

In an online classroom, teachers can use Slack and all its multimodalities to keep students from feeling limited. Nobody's voice is louder than anybody else's and everybody's messages get seen. And, to have a voice on Slack, students don't need to use it to make words; they can use it to express their thoughts through multimodalities like pictures or voice memos or even emojis. This helps students to express their ideas in different ways. If students have a design idea that is better shown through image, they can make a drawing and take a photo of it to send on Slack, or if they connect the class material with something else, they can send a video. With multimodalities, there are no hierarchies. A drawing is not "better" than a video clip; all the different ways that students can express their ideas make room for creativity.

A traditional classroom can also use multimodalities; students can make posterboards or slide shows or even origami figures. However, in a traditional classroom, louder students can still overpower the quieter students. Louder students can bring their projects to the front of the room, boasting or advertising their hard work, and quiet students' work would likely go more unnoticed. Projects presented in-person would still capture the vibrance of a student's creativity, but it wouldn't capture it in the non-biased way that an online class can. If a teacher uses Slack,

they can use multimodal communication as a way to get their students more deeply engaged with their learning.

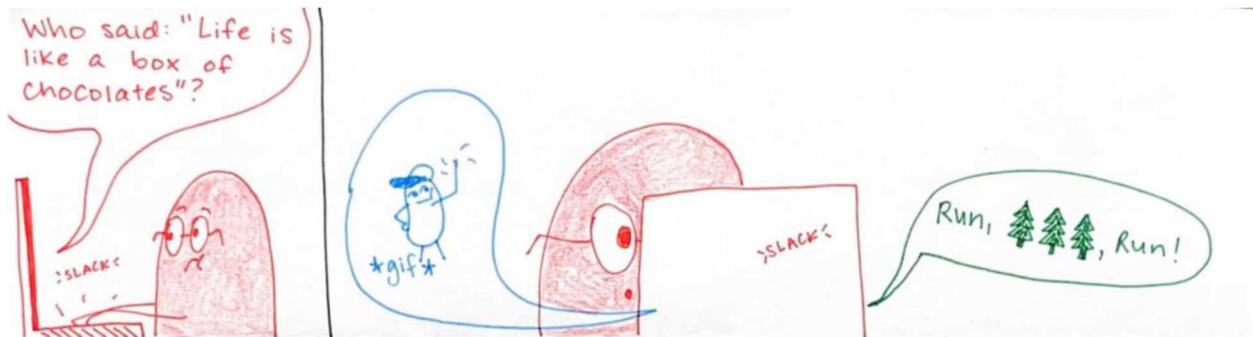


Figure 3.17 Forrest Gump in Multimodalities

In UAF’s teacher training, creativity was encouraged, and in our final projects, nobody’s work was similar. Everybody’s “literacy narrative” was different; Slack allows for this versatility in creativity. If we use it openly, teachers can encourage all kinds of creativity and uniqueness from our students... not only will this help spur their interests and engagement with the class, but it will also help students to feel equal. Quiet students can have just as much of a presence as loud students when multimodalities are used creatively.

When students engage in material creatively, they are vibrant – whether one student paints a landscape of mountains at sunset, or another student makes a collage of their favorite trees, both approaches to nature are creative; one is not better than the other. And by using a platform that offers so many different modalities to use, teachers can encourage students to think more creatively and vibrantly. With creativity comes vibrance, and Cavanagh states: “being vibrant often means being vibrantly yourself,” meaning that students’ creativities are often just highlighted pieces of themselves (Cavanagh 8). Having this space on Slack to connect with

material personally and creatively in a classroom doesn't promise that students will, but it gives them a chance to. It makes room for students to connect with their teachers and their learning outside the margins of a paper.

Chapter 4 Conclusion

Through all eighteen years of being a quiet student in the classroom, I remember most of my teacher's names. I remember their names, what their classrooms looked like, and where I sat every day, but more than anything, I remember how I felt in those classes. I remember feeling talked over, invisible, and voiceless. I remember learning in the background.

As that quiet student, I can look back at my classes and remember stories and feelings from particular days; in most of them, I'm sitting in class silently. I looked forward to getting English papers back because I knew they'd have some sort of feedback on them, especially if they were in Mr. Steele's class. But those English papers were the majority of my communication with my teachers; I didn't have the voice for more.

Had my classes utilized Slack and all its multimodalities as a tool for communication, my voice may have been found earlier. There is a level of emotional expression in an online and asynchronous space that can't be found in a traditional classroom, especially with the use of multimodalities, which can connect students with their teachers, their learning, and each other. For a quiet student, using Slack is an effective way to provide a space for those expressions and connections.

As a teacher now, I can look back at my experiences and learn from them; I know there are quiet students everywhere, and not all quiet students choose silence. A lot of quiet students feel that silence was chosen for them, just as I'd felt. By using Slack as an open and informal forum in an online and asynchronous classroom, quiet students can have the space to grow their voice, both in their classes and in their education.

References

- Arzu Carmichael, Felicita. “‘Sometimes I Forget I’m in an Online Class!’ Why Place Matters for Meaningful Student Online Writing Experiences.” *Composition Studies* 49(3)p.38–55, Oakland University, 2021, <http://hdl.handle.net/10323/11822>. Accessed 27 March 2023.
- Cavanagh, Sarah Rose. *The Spark of Leaning: Energizing the College Classroom with the Science of Emotion*. United States, West Virginia University Press, 2016.
- Dahiya, Shefali, et al. “Lessons from Internet Use and Performance During Covid-19.” *Journal of Information Policy*, vol. 11, 2021, pp. 202–21. JSTOR, <https://doi.org/10.5325/jinfopoli.11.2021.0202>. Accessed 27 March 2023.
- Menzies, Rachel and Zarb, Mark. “Professional communication tools in Higher Education: a case study in implementing slack in the curriculum.” *Proceedings of 2020 Institute of Electrical and Electronics Engineers*, IEEE Computer Society, 21 October 2020, <https://doi.org/10.1109/FIE44824.2020.9273906>. Accessed 27 March 2023.
- Müller, Stefon. “How Slack Facilitates Communication and Collaboration in Seminars and Project-Based Courses.” *Journal of Educational Technology Systems*, Vol. 51, Sage Publishing, 23 January 2023, <https://doi.org/10.1177/0047239523115>. Accessed 28 March 2023.
- Sabin, Jerald, and Andrea Olive. “Slack: Adopting Social-Networking Platforms for Active Learning.” *PS: Political Science & Politics*, vol. 51, no. 1, 2018, [doi:10.1017/S1049096517001913](https://doi.org/10.1017/S1049096517001913). Accessed 28 March 2023.
- Taylor, Natalie. “Centering Silence: Graduate Student Instructors Negotiating Quiet In The Writing Classroom.” *Open Access Theses and Dissertations*, The University of Texas at El Paso, 1 May 2022, https://scholarworks.utep.edu/open_etd/3555. Accessed 26 March 2023.
- Tuhkala, Ari and Karkkainen, Tommi. “Using Slack for computer-mediated communication to support higher education students’ peer interactions during Master’s thesis seminar.” *Education and Information Technologies*, Springer Publisher, 23, 2379–2397, 2018, <https://doi.org/10.1007/s10639-018-9722-6>. Accessed 28 March 2023.