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NOTES FROM THE FIELD

Perspectives on the Evolution of MathChavrusa from Pre-COVID to Now

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Introduction

Chavrusa is a long-term, dyadic study partnership traditionally used in the context of Talmudic study. Chavrusa study includes pairs reading, discussing, and exploring texts together (Liebersohn, 2006). A guiding principle of chavrusa learning is that students interact with each other as both teachers and learners. While long a pedagogical model used in Jewish institutions of learning (Kent et al., 2012), chavrusa has recently made strides in other areas, such as medical education (e.g., Chung & Lee, 2019) and undergraduate coursework (e.g., Bergom et al., 2011). Since chavrusa promotes deep thinking in pair learning, we can naturally ask the question: can chavrusa-style learning positively impact the mathematics classroom?

One application of chavrusa learning is MathChavrusa, a learning model where students are paired and work with a partner for the full duration of a math content course (Flint, 2019). Differing from typical classroom groupwork where students collaborate only for the lifespan of a particular assignment, the student pairings in MathChavrusa last for the duration of the course. As with Chavrusa, text analysis is still central, but MathChavrusa expands texts beyond just a course textbook to include additional course materials like short articles, classwork, and problem sets. In cases where additional social and academic support were necessary, students were put into groups of 3 or 4 in a format called MathChabura (where “chabura” means “group of friends” in Hebrew).

Figure 1

MathChavrusa partners studying Topology in Spring 2019.



What we present is a glimpse into how MathChavrusa is being implemented in graduate mathematics classrooms through the perspectives of the three authors: one facilitating instructor and two participating students. We discuss MathChavrusa’s impact on learning mathematics and the effect COVID-19 remote and hybrid learning had on this learning model. The format of this discussion consists of two overarching questions with written responses from all three participant authors.

Instructor and Students' Perception of MathChavrusa

Question 1: Impact

- a) (For Instructor) How is MathChavrusa intended to impact students' ability to learn mathematics?**
- b) (For Students) How did MathChavrusa impact your ability to learn mathematics?**

Instructor

The most telling way to know if a person has understood something is if they are able to teach it in such a way that the student grasps it. The litmus test is that the student is able to demonstrate their ability to actively solve problems. In the MathChavrusa structure students discuss and unpack what they are learning with a peer, a form of teaching one another. The model creates a comfortable learning environment, alleviating math anxiety and helping students to combat their reluctance to ask questions for fear of being judged (Stoehr, 2017). Through MathChavrusa interactions, one can identify which areas of students' understanding need reinforcement and additional learning opportunities.

When students are in the immersive MathChavrusa experience, they observe and discuss different approaches in solving problems, combating a misconception that there is a unique way to solve problems. Frequently, I witness breakthrough ("aha") moments during conversations between chavrusa partners. The relationship naturally spills over to outside classroom learning and collaboration. It builds a strong bond and trust, creating an overall safe and productive culture for exploring and identifying with mathematics.

Student 1

As an international student from a country whose medium of instruction is not English, I adapted to the American model and its associated mathematical terminologies quicker with my patient and kind MathChavrusa partners who came to understand my strengths and weaknesses and answered my questions. Even though I am confident in my math abilities, I would say that overcoming the challenges of the language and less familiar instructional methods was much easier with a long-time study partnership.

Furthermore, the MathChavrusa model encouraged me to meet my partners outside of the classes. I got more confident about organizing external study sessions with my MathChavrusa partner, which helped me learn the content more deeply.

Student 2

MathChavrusa's long-term partner-based learning provided an extra brain to trade ideas with, helping to hasten understanding of freshly introduced material by encouraging me to discuss mathematics with my partner and ask for guidance more readily than more traditional learning models. The varied assignments that my partner and I worked through were also useful for my mathematical development, as getting another person's thoughts on how to multimodally represent mathematics expanded my own repertoire of mathematical tools.

Question 2: What are the differences between in-person, online, and hybrid MathChavrusa during the COVID-19 pandemic?

Instructor

At its core, MathChavrusa is amenable to online learning. The key is that two partners are working together. Logistically, MathChavrusa required a significant shift when we were catapulted into online learning. Instead of pairing students (MathChavrusa), groups of 3-4 members (MathChabura) were created. This way, if one's partner was absent or distracted (something we frequently contended with during the pandemic) no one would be without a study partner.

At first, the feel that is developed through interpersonal interactions of being in-person over a course of several months was challenging to replicate in online settings. But the intrinsic concept of MathChavrusa as a social learning experience was pivotal in helping my students as we shifted to remote connections, since the MathChavrusa/Chabura model ensured that students had close connections with their classmates to navigate the new and tricky terrain of online learning. In fact, some students related that MathChavrusa time was their only opportunity to meet and engage with other students in all their courses during the semester.

The Zoom breakout room feature was particularly critical in facilitating the MathChavrusa model in synchronous classes. Although breakout rooms disrupted the culture of multiple groups working concurrently in real time, an advantage was that each room had the solitude of their individual chabura without the background distractions of other groups. Once chabura discussions concluded, pooling multiple groups' ideas together was done in a larger group session as opposed to in brick-and-mortar classrooms, where one can turn to a different group to ask questions and compare ideas as situations arise. To compensate for the lag

time caused by breakout rooms, we had shared MathChavrusa Google documents that enabled students and the instructor to share materials and ideas in real time.

The hybrid model of combined in-person and online learning saw students meet with their chavrusas via either modality as circumstances dictated. We incorporated MathChavrusa to be embedded in MathChabura in order to accommodate absences.

Student 1

Considering the key aspects of the MathChavrusa model, my experience was that reading aloud with a partner was not central in online teaching because extenuating circumstances sometimes made it difficult for students to speak. Additionally, Zoom breakout rooms felt more isolating than in-person groups, since I could only share ideas with my MathChavrusa partners rather than everyone else around me. Despite the more restricted nature of remote learning, MathChavrusa made student interactions possible during the pandemic.

The Covid-19 pandemic also resulted in some students being unable to join some classes, and their Chavrusa partners would be left alone. With online classes, one MathChavrusa breakout room tended to include more than two students (two being the number seen as ideal when in-person). Thus, the adaptation to the chabura model functioned to overcome this challenge. The fact that there were more partners was helpful especially when not everyone had access to the same technology. For example, the members with drawing tools could more easily show their work and write mathematical expressions while those without still contributed by typing the presented work to their shared documents. That way, everybody had a chance to contribute to the learning environment.

Student 2

While partner interactions remained in online learning, it was more difficult to communicate some mathematical ideas due to the limitations of computer inputs (e.g. keyboards, mouse controlled drawings, etc.). Additionally, groupwork in Zoom breakout rooms resulted in fewer interactions amongst partners and the class and fewer opportunities for learning and exchanging ideas, something students appreciated during in-person MathChavrusa (Flint & Mei, 2020). However, this was partly compensated by grouping multiple MathChavrusa pairs together in one breakout room during

collaborative study. On the flipside, remote learning made it easier to schedule times to meet with my partner, improving MathChavrusa's out of class social impact. At the macro level, that MathChavrusa mostly maintained its ethos and structure transitioning from in-person to online learning created a comforting familiarity to an otherwise tumultuous time.

Hybrid learning brought about the most fluid version of MathChavrusa. The class was separated into two discrete groups: those online and those in-person. The interesting part came when an online student attended in-person and vice versa. In these cases, the affected student had the benefit of working with both their MathChavrusa partner and other students in their learning setting. This was a novel experience since it organically allowed students to learn with a wide array of peers in an environment in which collaborative learning was encouraged by the culture set by the MathChavrusa learning model.

Figure 2

A student working on a Linear Algebra exercise with her virtual MathChavrusa during hybrid learning in Summer 2022



Conclusion

The three perspectives presented above provide insights into how the instructor and students perceived MathChavrusa's impact on learning mathematics in various learning modes: in-person, online, and hybrid. All participants noted the positive social impact of working with a long-term partner, with discussions between MathChavrusa partners a key factor in improving student learning outcomes. Online and hybrid MathChavrusa each have distinct qualities that promote social interaction, with the former emphasizing small group chabura discussions and the latter highlighting the social flexibility inherent in the MathChavrusa learning model. While these adaptations were crucial for bringing MathChavrusa into the digital realm, they also brought about fewer pair-to-pair interactions than in-person MathChavrusa, something that could perhaps be improved with future developments in digital technologies. Taken together, MathChavrusa is a flexible learning model that can be adapted to both in-person and online learning environments, and provides an especially strong base in growing students' interpersonal academic support networks.

References

- Bergom, I., Wright, M.C., Brown, M.K., & Brooks, M. (2011). Promoting college student development through collaborative learning: A case study of hevruta. *About Campus*, 15(6), 19–25. <https://doi.org/10.1002/abc.20044>
- Chung, E. & Lee, B.H. (2019). The Effects of a havruta method on the self-directed learning and learning motivation. *Journal of Problem-Based Learning*, 6(1), 3–9. <https://doi.org/10.24313/jpbl.2019.00143>
- Flint, R. (2019). MathChavrusa: A partnership learning model. *Proceedings of the 22nd Annual Conference on Research in Undergraduate Mathematics Education*. 1109–1110.
- Flint, R. & Mei, B. (2020). Chavrusa-style learning in mathematics classrooms: Instructor and student perspectives. *Proceedings of the 23rd Annual Conference on Research in Undergraduate Mathematics Education*. 201–209.
- Kent, O., & Allison, C. (2012). Three Partners in study: two people and a text. *A Journal of Jewish Ideas*, 42(6), 90–105.
- Liebersohn, Aharon. (2006). *World wide agora*. USA: Lulu Press.
- Stoehr, K. J. (2017). Mathematics anxiety: One size does not fit all. *Journal of Teacher Education*, 68(1), 69–84.