

Math Debates Synthesis – The Flipped Classroom
Team 3 (Pro) vs. Team 7 (Con)

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***Question:** Is the flipped classroom model more effective than the traditional model in the math classroom?*

Team 3: Pro Flipped Classroom Model

The flipped classroom is a blended learning model where traditional ideas about classroom activities and homework are reversed, or “flipped.” In a flipped classroom, teachers provide students with new material for homework first, and then spend class time discussing the new information and putting those ideas into practice. Students engage with this novel and most often digital content created by their teachers outside of class at their own pace, as a form of home learning. In class, teachers can dedicate more class time to facilitating collaborative work on complex math tasks, and less time lecturing.

Assumptions for Flipped Classroom Success

Teachers and students have robust technology access (hardware, internet, and software) at home for interacting with digital content. Teachers foster a growth mindset and engage students in high level math tasks and formative assessment within the digital content, and that this productive struggle at home will be extended into the classroom. Digital content must include active elements such as formative assessment, have complex math tasks, engage students in authentic mathematical thinking, and must be created by math teachers (Lo & Hew, 2020).

Teachers have plentiful professional development time to produce digital content with colleagues. Also, many teachers have prepared robust flipped classroom content as a result of the Covid-19 pandemic. Teachers train students how to participate in the flipped classroom technique before trying it for the first time. Empirical research on the flipped classroom has primarily taken place at the college level.

Digitally Native

Coming out of virtual learning during the Covid-19 pandemic, students today are comfortable with digital tools and learning, while also recognizing that collaboration between teachers and students are essential for learning within the classroom. Prior to the pandemic, students have reported greater access to teachers and greater collaboration with peers within flipped classroom settings (Steen-Utheim & Foldnes, 2018). The flipped classroom encourages technology use for home learning, and can help remove technology from the in-class experience when it is not necessary and can be a distractor. Students have reported greater levels of attention in-class (Kumar Bhagat & Chang, 2016).

Comfort, Enjoyment, and Differentiation

Research at the collegiate level, where most flipped classroom research has taken place, has shown that students enjoy home learning during flipped classroom (Shukla & Mcinnis, 2021). Students develop a comfort level with the material outside of class that leads to some initial confidence as students prepare to engage in productive students during class t(Lo & Hew, 2020). Students reported that they enjoyed going at their own pace with the ability to pause and rewind video (Shukla & Mcinnis, 2021). In addition, students were more comfortable asking questions when they arrived at class and felt more prepared to collaborate with classmates. Teachers will have data in hand to differentiate high level in-class tasks and groupings based on flipped classroom quizzing or retrieval practice (Shukla & Mcinnis, 2021).

Team 7: Against Flipped Classroom Model

The opposition does not believe that the traditional classroom model is more effective than a flipped model; rather that the most effective and equitable approach in the math classroom would be an instructional strategy that allows all steps to occur inside the classroom (Full Learning Optimal (in) Person). The arguments against a flipped model in the math classroom include:

Digital Inequity

As all children have different access to both digital and material resources at home, the use of a flipped classroom model only exacerbates the digital inequity that already exists in the current educational systems. Additionally, direct instruction in the flipped classroom model through out-of-class activities are limited to a single presentation, and do not provide any differentiation. This may prevent students with learning differences the ability to access the material while at home (Miller & Liu, 2021). There are already existing inequities regarding homework. By flipping the direct instruction to out-of-class activities, these existing inequities extend to core instructional content (Lathan, 2021).

Limiting Productive Struggle

Direct instruction through out-of-class activities leads to priming students before they engage with the math content directly. This can lead students to narrow their thinking towards math tasks and limit the possibility for productive struggle (Sheie, 2016). Research in best math practices support the summary and synthesis of the content at the end of the lesson. In a flipped classroom model, the summary and synthesis happen at the beginning, again limiting the students' thinking about the content (Vondrova, 2009).

Relevant Research on Effectiveness

Research is limited on the effectiveness of the flipped classroom model, particularly in the elementary school setting (Bashay, 2021). Research that does support the effectiveness of the flipped classroom model is based on classrooms where class time was spent taking multiple quizzes each week. This defeats the purpose of providing more engagement and interaction in class by using a flipped classroom model (Lo & Hew, 2017).

What a School Leader Should Know

Empirical studies on the flipped classroom have primarily occurred at the collegiate level , and there have been few empirically rigorous studies in K-12 schools (Weiß & Friege, 2021). Priming of students may increase student comfort, but may decrease the productive struggle necessary for deep learning during class. The flipped classroom is best used strategically by a teacher fostering a growth mindset and engaging students in high level math tasks both inside and outside of the classroom. However, the flipped classroom can be inequitable if students have challenges at home that impact the success of home learning and if students do not have robust technology access to participate in the flipped classroom digital content (Miller & Liu, 2021). In addition, flipped classroom digital content is most successful when created by teachers for their students, not when the digital content is selected from a third party at random (Shukla & Mcinnis, 2021). Consequently, creating flipped classroom digital content can be labor intensive on teachers, and may reduce the energy teachers have to encourage productive struggle during class.

Recommended Articles

Pro Flipped Classroom: Team 3

Weiß, L.-F., & Friege, G. (2021). THE FLIPPED CLASSROOM: MEDIA HYPE OR EMPIRICALLY BASED EFFECTIVENESS? *Problems of Education in the 21st Century*, 79(2), 312–332. <https://doi.org/10.33225/PEC/21.79.312>

Con Flipped Classroom: Team 7

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Kumar Bhagat, K., & Chang, C.-Y. C. Y. (2016). *The Impact of the Flipped Classroom on Mathematics Concept Learning in High school Science Edu-Communication View project Major Depressive Disorders View project*. <https://www.researchgate.net/publication/286047548>

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Shukla, N. J., & Mcinnis, E. (2021). Flipped Classroom: Success with First Year Mathematics Students. *International Journal on Social and Education Sciences*, 3(1), 32–47. <https://doi.org/10.46328/IJONSES.56>

Steen-Utheim, A. T., & Foldnes, N. (2018). A qualitative investigation of student engagement in a flipped classroom. *Teaching in Higher Education*, 23(3), 307–324. <https://doi.org/10.1080/13562517.2017.1379481>

Vereş, S., & Muntean, A.-D. (2021). THE FLIPPED CLASSROOM AS AN INSTRUCTIONAL MODEL. *ROMANIAN REVIEW OF GEOGRAPHICAL EDUCATION*, X(1), 56–67. <https://doi.org/10.24193/RRGE120214>

Weiß, L.-F., & Friege, G. (2021). THE FLIPPED CLASSROOM: MEDIA HYPE OR EMPIRICALLY BASED EFFECTIVENESS? *Problems of Education in the 21st Century*, 79(2), 312–332. <https://doi.org/10.33225/PEC/21.79.312>

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- Lathan, J. (2021). *Education inequity: Homework and its negative impact on students*. University of San Diego. Retrieved February 28, 2022, from <https://onlinedegrees.sandiego.edu/education-inequity-and-homework/>
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