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### Our Experience in a Fully “Flipped” Developmental Math Course

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## Section 10

# Our Experience in a Fully “Flipped” Developmental Math Course

*Gary Blatto-Vallee, National Technical Institute for the Deaf*

*Keith Mousley, National Technical Institute for the Deaf*

For two consecutive semesters we implemented a “flipped classroom” design in a developmental mathematics classroom. Our interest in implementing an alternative instructional method was born out of frustration with the fact that the students we have been teaching in this course needed to gain a better understanding of mathematics than what our traditional instructional methods seemed to be offering them.

The developmental mathematics course is a beginning algebra course covering topics such as systems of equations, quadratic equations and graphing quadratic functions, co-taught by the two of us. Our approach included two different methods of instruction: we used on-line video materials to deliver the basic content of the course and then group work in the classroom where students worked on application and extension problems.

INTERACTIVE 2.16 Session 7C: Blatto-Vallee, Mousley



Tap arrows or tap to enlarge then tap to move to next slide.

## Online Work Outside Of Class

The students were assigned videos to view outside of class on each new topic we were introducing. The videos were created specially by the instructors for the course. Students were then required to complete an assignment that contained practice problems similar to the ones demonstrated in the video. Com-



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bined, the videos and practice problems were the functional equivalent of a traditional classroom lecture and the first 20 – 30% of a typical mathematics homework assignment. If a problem proved to be too difficult, students were encouraged to seek help or view the video a second time.

Once the students viewed the videos and completed the assignment for the topic, they were responsible for doing a set of practice problems on [Khan Academy](#). All students in the class created accounts on Khan Academy and we served as their virtual Kahn Academy instructors or “coaches.”

## **Group Work In Class**

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For each topic, the corresponding videos and practice problems were due on the day the group work related to the topic was to be done in class. Group work involved problems that would normally appear toward the end of a typical mathematics assignment. These were the extension and application problems that would take students to the next step in understanding the material.

The groups were assigned at the beginning of the semester based on mathematical ability and student communication style. During the first semester the student groups remained intact for the semester with minor adjustments due to normal student attrition. During the second semester, due to abnormally

high student absences and attrition, the groups needed to be reformed several times.

All student groups worked at whiteboards mounted to walls in the classroom. Only one math problem could be worked on at a time so all members were engaged in the same problem, and each group was responsible to hand in one solution to an assignment for their group. The instructors were able to observe all groups working at the various whiteboards in the room. That allowed us to provide guidance and encouragement and to catch misconceptions in real time. Once the students in a group completed their work they were done for the day.

## **Results**

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We then looked at students’ grades for the two semesters. When comparing our students’ overall GPA with their course average we found that students earned almost a full point lower in our class compared to their cumulative GPA. We also did not see any real improvement in final course grades compared to previous terms.

## **Conclusion**

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Several factors could be responsible for these results:



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- Some students did not spend enough time independently preparing outside of class. We had hoped the on-line environment and the ability to learn on “their time” would be a positive influence on this issue but for some students it was not. This is definitely an area for exploration in future iterations of this teaching method.
  - Not all students actually know when they do not understand a topic and therefore do not continue to either try to work through it or seek help.
  - Several students reported a preference for more traditional classroom lessons than the pre-recorded lectures viewed online. This was noted in our end of term survey that all students completed and was also a comment we received during the semester from a few students.
  - Some students most likely had not experienced much success in mathematics prior to our class and their lack of self-confidence may have undermined their determination in working through problems independently.

## **Next Steps**

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Our “flipped classroom” approach was used in a development math class of underprepared students. While our goal in using this experimental approach was to reach the students who are most underprepared, this was not the case. One reason could

be that we did not provide enough structure for students who were at risk of failing or that this approach (or our interpretation of this approach) is not best suited for weaker students. It is possible that this approach would be more successful with students who are better prepared initially. We are looking for ways to improve the structure for “at risk” students while also working on another course at the pre-calculus level (one level up from this course offering). Based on what we learn from these experiences, we will see how we can alter our design to maximize the benefit of this approach for students at all ability levels.