CEMC 2020 Summer Conference

Hold the Phone. What Happened to my Classroom?!? Teaching Remotely During the COVID-19 Pandemic

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Rich Dlin

Background and Context

Who I am and where I am coming from ...

- BMath, B.Ed (1993), MMT (2013)
  - MMT is a fully online Masters program offered by the University of Waterloo
- Software developer from 1993-2001
- High school math teacher since 2001
- Spent two years in a Visiting Lecturer role at the University of Waterloo
- Returned to high school classroom in September 2019
  - *Just in time!*
- In Ontario, the COVID-19 school closures were announced on Thursday, March 12
- My school, TanenbaumCHAT, transitioned to a fully online curriculum delivery beginning Tuesday, March 17.
- Retired from teaching as of June 30, 2020 (NOT due to the pandemic!)
- Founded Dlin Academy **https://www.dlinacademy.com**

The Model

Here are the highlights of the model we followed:

- The same daily timetable as pre-COVID-19 was followed
  - School day runs from 8:30 - 4:30, except Fridays which end at 3:30
  - Classes are 60 minutes each, with a 10 minute break in the morning, 45 minutes for lunch, and a 5 minute break in the afternoon.
  - A full course load is 11 full-year courses.
    - ★ Grade 9-10 students take 11
    - ★ Grade 11 students may take one spare
    - ★ Grade 12 students may take two spares
  - Each class meets 3 times/week
- Suggested by administration was to use the 3 classes as follows:
  - One class is fully online, live instruction (synchronous)
  - One class is an online, engaging activity (possibly asynchronous)
  - One class is a work period style support class for students to consolidate learning from the previous two classes (synchronous)
  - Students are expected to devote their scheduled 3 hours of class time to working on that class, but must not be expected to spend *any additional time beyond that*.
- Zoom was mandated as the tool of choice.
- Each teacher was left to decide what works best for them, under these guidelines.

My Journey

- I had never heard of Zoom until the week before the school closures.
- My first order of business was to learn the important aspects of Zoom. The relevant features are:
  - Waiting room and meeting passwords (I learned this one the hard way).
  - Screen sharing
  - Breakout rooms
- My second order of business was to land on a consistent means/source for an "online, engaging activity"
  - The CEMC at the University of Waterloo has online courseware for almost the entire high school math curriculum (the only exception being the Ontario grade 12 Data Management course, a statistics and probability course).
  - My plan was to leverage this for asynchronous learning and consolidate it using synchronous live classes.
- Curriculum topic groups were delivered in 3 stages, which translated to 3 actual classes/lessons.

First Lesson: Intro to topic (asynchronous, sort of)

- Students complete online lesson(s) from CEMC in 1-2 topics (this can also be a pre-recorded lesson of your own).
- These lessons include embedded checks for understanding, which can be regenerated repeatedly until a student is comfortable with the concept these checks test (formative assessment).
- Students were expected to use these to ensure their understanding.
- The lessons also include questions of varying levels of difficulty, with answers provided for all questions, and full solutions provided for odd-numbered questions.
- Students were *not* expected to complete these questions during this window of time - that was reserved for the third lesson.
- Zoom attendance was optional but I was always available for students who wanted to drop in.
- Students did drop in sporadically to get clarification on some of the concepts covered.
- These questions often informed the second lesson ...

Second Lesson: Summary of concepts (synchronous)

- Students join a mandatory, live Zoom class during their normal class time.
- With the understanding that they had already gone through the courseware lesson, I reinforced the concepts, diving deeper where my experience/expectations deemed necessary, and addressing concepts more closely when I determined from questions that this was required.
- During these lessons I used the screen sharing feature in combination with a writing tablet, and the following software:
  - SMART Notebook for intelligent, digital whiteboard
    (can also use OpenBoard, which is less buggy and is free)
  - GeoGebra for graphing/demonstrating other geometric/algebraic concepts
  - MS Excel
  - Windows Snipping tool for embedding work done in GeoGebra and/or Excel into the virtual whiteboard.
- This is 100% consistent with the way I teach in a physical classroom, so students were already accustomed to this style, and these lessons ran with a very similar feel to my physical classroom, complete with student participation, group work, seatwork, etc.
- Lessons are then saved, exported to PDF, and uploaded to the class using the school's existing online learning management software (in our case, Edsby).

Third Lesson: Supported work period (synchronous)

- Practice questions from the courseware and/or textbook and/or prepared worksheets were assigned and posted *ahead of this class*.
- Some students chose to work outside of class time, but they were not required to.
- *Assessment pool questions* from these practice questions were identified to the students as such at the time they were assigned. More on this later!
- The expectation was that there would be no more than an hour's worth of work assigned, and they would do the work during their normally scheduled class time.
- Zoom attendance was optional but I was always available in Zoom for students who wanted to drop in.
- I was *always* busy with students during this entire hour.
- Notes were always saved, exported to PDF, and emailed to the student(s) I worked with.

Assessment - The Challenges

The challenge of executing legitimate forms of assessment was an obvious issue. Here are some thoughts that go in to how to approach it:

- For synchronous assessment (tests, quizzes, exams, etc):
  - A computer only "knows" what's happening on it, and a camera only sees what it's pointed at.
  - There is no way to ensure nobody else is in the room with a student at the time of assessment.
  - There is no way to ensure that a student does not have a second internet-enabled device at the time of assessment.
  - There is no way to ensure a student's workspace is free of "helpful" references.
- For asynchronous assessment (assignments, projects, etc), the same issues as always apply, where there is no way to ensure that the submitted work has not been heavily influenced by "consultants".
- The issue of how work is submitted is also a factor, since physically handing it in can not occur.

Assessment - The Direction

Instead of working to make cheating difficult, it is better to focus our efforts on de-incentivizing academic dishonesty.

- Students love good grades, but most students would ultimately prefer to earn them rather than cheat.
  - This viewpoint is contested often, the argument being that if students preferred to earn good grades, they would not cheat.
  - The sentiment here is that students would prefer to earn them, *but often feel they can not*, which is when they resort to cheating.
  - Students also feel a lot of pressure from the fact that *others* will cheat, and those are the people with whom they ultimately compete for awards, university entrance, scholarships, etc.
- So the goal was to create a framework where the students felt they *could* legitimately earn excellent grades, and teachers felt that those grades were representative of the students' understanding of content.
  - This is a paradigm shift for many students (and some teachers).
  - This is not unique to remote teaching/learning!

Assessment - The Assessment Pool

Assessments were designed as follows, all of which was made clear and reinforced often with students:

- Questions would come from a fully-disclosed pool of assigned homework questions
  - Not copied from the pool, but guaranteed to be of the same style
  - This does not mean easy, and it does not restrict the types of questions that can be asked
  - The pool of questions needs to be curated with this purpose in mind
  - The pool does not need to be all assigned homework, but questions for the pool are clearly identified.
  - These questions are accumulated in a document by the student as the unit progresses.
  - Answers are provided for the assessment pool questions, but solutions are not provided (though solutions can be provided for similar questions from the assigned work).
- Students were required to submit their solutions to the questions from the pool
  - This was graded only for completion, since answers were provided
  - Any form of help in completing these questions is permitted, including and intentionally from the teacher.

Assessment - The Parameters

Assessments were synchronous, with the following parameters:

- They would be open book (closed-book is too unrealistic)
- The following points were made explicitly clear to students verbally and in writing, before and on the day of the assessment
  - Students were allowed to:
    - ★ Look at their own completed test pool of questions.
    - ★ Look at any and all class notes (mine, their own, a classmate's)
    - ★ Look at the course textbook.
  - Students were *not allowed to*:
    - ★ Get help from any other person
    - ★ Use the internet to seek help
  - This is definitely *not* a way to police the process. There are still many ways for them to cheat (chegg.com, etc).
  - These parameters were explained so that students would have a clear understanding of what constituted cheating, and also so that students would understand why cheating was really not necessary to earn high grades.

Assessment - Implementation and Logistics

Assessments were set for the full period, and posted on the class site 10 minutes prior to the start of class. Students knew ahead of time that they were required to:

- Print the assessment and complete it on the printout
- Be on Zoom, video on and pointed at their heads/faces for the duration
- Use an app or an actual scanner to scan the completed test to PDF
- Email the PDF to me, ensuring pages were legible, in order, and oriented correctly
- On receipt, I opened the file and responded right away either with "Received, thanks", or else if there was an issue with the PDF, an email detailing the issue and requesting a resubmit.
- Students knew that if I did not respond it meant I did not get the email.
- Students had a grace period of 10 minutes to complete the scan and email process, after which the submission would be considered late, and quite possibly not accepted.
- If at any time students had an issue with connectivity, printing, or scanning, they were to inform me as soon as possible - essentially immediately, using their phones to email me if that's what it took
- This was an extremely rare issue which I dealt with on a case-by-case basis

The Results

- The assessment results were consistent with observations and conversations made during class.
- Additionally, the evidence suggested that there was some cheating, but that it was not rampant:
- Evidence of cheating:
  - A few weaker students miraculously were able to achieve perfect scores, but this was a handful (around 5%).
  - In most cases these students turned in solutions identical to others. Not similar. Identical.
- Evidence of no cheating:
  - Many careless errors were still made, and they varied by student.
  - Solutions were varied even when correct.
  - Solutions were modeled based on class work, which is unusual when outside help is received.
  - Students still left questions some blank or went completely in the wrong direction for some.
- Students definitely performed more consistently with my expectations, which suggested that the barrier of test anxiety and the downfalls of "cramming" had been overcome in many cases.

Moving Forward

Overall, I would maintain this kind of format even in a physical classroom. Here are some ideas for improving the process:

- Create a standard template for the assessment pool questions to make it "more official" and also to make it easier to grade for completion.
- Consider following up the remotely written assessment with an oral supplementary assessment
  - This is being implemented at many universities currently and in the fall term.
  - The logistics can be tricky but if it can be managed it addresses two issues very nicely:
    - ★ The students who do choose to cheat can get caught
    - ★ Students who don't perform well in writing can still demonstrate understanding, which can be used under the umbrella of conversations/observations
  - It has to have "teeth". One common model is that a student can increase/decrease their grade on an assessment by up to 50% based on their performance in the oral assessment.
    - ★ This means a student who scored 100% by cheating can get reduced to a 50%
    - ★ It also means a student who scored a 50% honestly can have that grade increased to 75% by demonstrating understanding orally.

Techniques that were successful

- The diversity of lesson style was very advantageous.
- In asynchronous mode students can move at their own pace, pause/rewind, and make infinite attempts at the formative assessments to solidify the concepts.
- The synchronous mode allowed students and myself the necessary connection time for me to address and deepen concepts while evaluating their engagement in real time.
- The synchronous work periods provided structure for the student's work time, and allowed them to do so while able to access me in real time.
- It was like a hybrid flipped-classroom model.
- Using the mute functionality in Zoom was a revelation in directing focus
  - Especially in large classes
  - Speaker view vs Gallery view (there is a time and a place for both)
- Breakout rooms in Zoom are indispensable as a tool for encouraging group work.
- Overall, students were as engaged, and in many cases more engaged, than in the physical classroom
  - There were a small percentage of students that disengaged. These need to be addressed quickly and on a case-by-case basis.

Reflections and Looking Forward

- Things that did not work
  - Deviating from the formula so that too much time passed between synchronous lessons left students feeling disconnected
  - Assessment took some time to refine, and refining it is an ongoing process.
- How this experience changed the way I would approach your classes in the future:
  - In a perfect world I think we could now give students a choice of remote learning vs. physical classrooms
  - In either case the model of outsourcing the nuts and bolts of a topic to asynchronous learning then cementing it in person proved to be more efficient regarding the depth one could push to as well as the amount of material that can be covered in a meaningful way.
  - We have long been in need of an assessment revolution. Many of the concepts we used for remote learning are not restricted only to that medium.
- Managing the work/life balance?
  - The danger here is getting consumed by new ideas and tech, or falling into the trap of thinking that since your home is your classroom that school can enter 24/7. *This is NOT the case!*

Thank You!

- Questions or follow-up
- info@dlinacademy.com