Online Learning and Teaching of Mathematics Content Courses for K-8 Preservice Teachers During COVID-19

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Introduction

In Spring 2020, all courses at our university transitioned with little warning to online courses due to the spread of COVID-19. Faculty were given one week after spring break to convert our courses to the online format, unfamiliar to us (the presenters). Our students (K-8 preservice teachers) also faced incredible challenges.

The purpose of our study is to determine what K-8 preservice teachers (PSTs) found helpful or challenging during the switch to online learning in mathematics content courses during the COVID-19 Pandemic (Spring 2020) and what their instructors might do or not do to help them overcome the difficulties in an online learning environment.

Participants

- 211 K-8 preservice teachers
- Enrolled in
  - Math 2008: Foundations in Numbers and Operations
  - Math 3032: Foundations of Data Analysis and Geometry
  - Math 5135: Algebraic Connections for K-8 Teachers
- Challenges faced during Spring 2020:
  - Using a new learning platform
  - Balancing home life with school life because students were expected to move out of campus housing
  - Managing situations at home (e.g., lack of wi-fi, necessity of working or watching siblings full-time)

Instructors

- Early career faculty (pre-tenure)
- Collaborative community pre-established
- Unfamiliar to online teaching & learning format
- All willing to try new platforms and teaching strategies

Redesigned Courses

When we switched to online format, the university required instructors to revise their syllabi and share with students as quickly as possible. Hence, we each redesigned our syllabi.

Other revisions depended on the course format, but included relying heavily on videos, online homework or tasks, and weekly module instructions / guided notes.

Methods

Data Sources

- SurveyMonkey Survey
  - sent to students near the end of Spring 2021
  - anonymous (no identifying information collected)
  - voluntary and no incentives

Design of Instrument

- 10 questions; Focus on question 4
- Question 4: *How effective were learning materials (work others did) and homework, reflection, or assessments (work you did) in helping you learn concepts during these 5 weeks of online learning?*
  - Very effective
  - Somewhat effective
  - Not effective at all
  - Does NOT apply to my course(s)

Data Analysis

- Researchers independently read and reread data, identified themes, shared, and resolved discrepancies through discussion
- Goal was not generalizability, but to inform our teaching to be more effective for Fall 2021

Early Findings

- Positive rating includes "Very" and "Somewhat" effective
- Reporting highest & lowest positive rating percentages
- **Updated course syllabi** were rated highly for all instructors.
- Findings report the top two highest items, *excluding the syllabus*, and the one lowest item.

	Highest %	Lowest %
Instructor 1	Folio weekly learning modules, guided / annotated lecture notes (100%)	Reading assignments (50%)
Instructor 2	Folio weekly learning content (94.4%), non-instructor videos (94.3%)	Reading assignments (68.6%)
Instructor 3	MyLab Math (100%), guided / annotated notes (95.5%)	IXL tasks (60%)
Instructor 4	Instructor videos (94%), Hand-written homework and tests (92.3%)	Weekly reflections (70%)

Reflections

Instructor 1:
- Due to the technology limitation, the instructor videos might have caused students inconvenience to watch and therefore gained one of the lowest ratings. This issue has been solved by adopting Zoom starting in Fall 2020.
- Next step: Explore more online tools and interactive activities in lesson design to improve teaching efficiency.

Instructor 2:
- Students interacted together with Perusall readings, so I provided no feedback.
- Non-instructor YouTube videos were typically posted by teachers illustrating concepts clearly connected to course content.
- Next step: Give students opportunities to reflect on connections between readings and other class tasks and focusing brief discussions on how the tasks connect.

Instructor 3:
- Guided notes were not effective and lack student-to-student interaction.
- Students preferred to meet virtually with their instructor than the peer leader. Videos created by instructors were comparable to videos not created by instructors.
- Next step: Build modules in Learning Management System (LMS) & use discussion boards to increase interactions & active learning.

Instructor 4:
- Written work did not change (students uploaded paper homework and I annotated) - students said the in depth feedback I gave was helpful
- Students did not find weekly reflections helpful, I do this so students reflect on their study habits to make changes, and to identify what content they still have questions about to give additional resources
- Next step: make better connections between all aspects of course tasks

Conclusions

- **Implications:** Since students all rated the updated syllabi highly, this implies that they appreciated clear communication.
- **Limitations**: Students do not have a good understanding of the structure of the course; many items they said was very or somewhat effective but was not a part of our class. This could be due to the overwhelm of the sudden online switch and pandemic.
- **Next step**: Build modules in the LMS and increase transparency of learning goals and how tasks are connected to the course learning goals.

References

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