

Online vs Face-to-Face Instruction: Affordances and Interactions

Valentina Postelnicu
Governors State University

Keywords: online instruction, affordances, interactions

The study reported focuses on the affordances of online instruction (Day & Lloyd, 2007), compared with face-to-face instruction. Participants were 51 undergraduate students, STEM majors, enrolled in two Discrete Mathematics sections, taught by the author, at a four-year university in the United States. In spring 2020, the COVID-19 pandemic changed the course instruction from face-to-face to online. The change affected the students' and the instructor's interactions with each other and with the mathematical content (Cohen, Raudenbush, Ball, 2003, p. 122). The following research questions are addressed:

1. How does the instructor use the online affordances to meet the students' learning needs?
2. How do the students use online affordances?
3. How does the online instruction of the course compare with the face-to-face instruction of the course with respect to meeting the students' learning needs, as perceived by instructor and students?
4. How does the online instruction of the course compare with the face-to-face instruction of the course with respect to students' success, as measured by their performance on the final exam?

The following data were collected: Student Questionnaire (SQ), Instructor Questionnaire (IQ), Blackboard Discussion Forum (BB Discussion Forum), and students' answers on the final exam.

SQ included questions related to how students interacted with the mathematical content, the instructor, and their colleagues during the face-to-face and online course instruction, as well as questions about satisfaction with specific instructional elements and preferences for future interactions.

IQ was a self-administered instrument. For both the face-to-face and the online instruction of the course, the questionnaire asked the instructor to rate her satisfaction with the convenience of the interaction with the mathematical content and the students, the quality of the interaction and the time spent, as well as to propose changes to better serve the students' learning needs.

Students posted their homework in Blackboard/Discussion Forum and were required to read their colleagues' postings and comment on one or two of their colleagues' answers. Data collected for this study came from two homework assignments with four tasks related to mathematical induction.

Students' answers on the final exam on two tasks referring to mathematical induction were scored and compared with previous scores from the final exams administered during the previous three semesters, when the course was delivered face-to-face. The scoring rubric for induction tasks was based on the mathematical and pedagogical considerations stated by Ernest (1984).

Data were analyzed using statistics, and social network analysis (Chai, Le, Lee & Lo, 2019; Ye & Pennisi, 2022).

The findings will be discussed and will inform recommendations for practitioners and directions for new research. Among those findings will be those referring to the importance of the BB Discussion Forum as a learning resource for students during the online delivery of the course, and the patterns of interaction between students.

References

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