Comparative analysis of students' learning engagement and interactive behavior in online and offline teaching models in Physiology

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In this paper, five-year clinical medicine students of Xiangya School of Medicine who participated in the Physiology SPOC in the spring semester of 2019 (609 students) and 2020 (686 students) were selected. In the spring semester of 2019, it is an offline teaching model of "SPOC + face-to-face lectures", and in the spring semester of 2020, it is a completely online teaching model based on the Internet. We analyze the characteristics of students' online learning behaviors in two different teaching models: traditional offline teaching and new online teaching, in terms of learning engagement (video viewing, document review, topic discussion and test scores) and interactive behaviors (human-computer interaction and interpersonal interaction). Students' overall SPOC learning engagement ($z = 14.356$, $P < 0.001$), video viewing ($z = -12.716$, $P < 0.001$), document review ($z = -11.124$, $P < 0.001$), and topic discussion ($z = -4.419$, $P < 0.001$) were significantly higher in online teaching model than in offline. This suggests that students showed higher levels of SPOC learning engagement in online teaching. Students' learning engagement in both online and offline teaching tended to decrease with course delivery ($b_{online} = -0.016$, $b_{offline} = -0.004$, $P < 0.001$). The number of video viewers in offline teaching dropped to half of the total number of participants in the SPOC approximately at 12th week, while the actual number of participants in online teaching was consistently higher than half of the total number. It is suggested that there is generally increasing resistance to student focus maintenance and learning engagement as the course progresses, but that students' focus maintenance is higher in online teaching than in offline. The level of human-machine and interpersonal interaction in online teaching was higher than in offline ($z_{human-machine} = -11.708$, $z_{interpersonal} = -16.176$, $P < 0.001$). The overall interaction behaviors of students in both online and offline teaching were moderately correlated with SPOC test scores ($r_{online} = 0.523$, $r_{offline} = 0.419$, $P < 0.001$). And the correlation was stronger for interpersonal interaction behavior ($r_{online} = 0.546$, $r_{offline} = 0.604$, $P < 0.001$). On the one hand, this suggests that online teaching may contribute to the level of students' interactive behaviors. On the other hand, it also shows that interpersonal interactions contribute better to learning outcomes, which may be related to the fact that interpersonal interactive behaviors provide a stronger sense of interaction and cooperation.

Keywords: Online Teaching; Offline Teaching; Learning Engagement; Interactive Learning Behavior; Medical Education