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Using a Narrative-based Gamified Teaching Approach to Improve International Students' Sense of Belonging

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ABSTRACT

It is well-established that a sense of belonging is important for students' academic success. This is especially true for international students in introductory programming courses. In higher education, students' sense of belonging is closely associated with their interest in the subject and related career. This study explores the use of a narrative-based gamification approach to enhance students' sense of belonging in introductory programming courses. The gamified design was piloted with 32 Chinese students enrolled in a big data analytic course using Python at a British university. Results showed that the narrative-based gamified approach greatly improved students' sense of belonging in terms of peer relationships and relatedness to the subject, and increased their learning motivation, career interest, class engagement, and learning retention.

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1 PROBLEM STATEMENT

In higher education, a student's sense of belonging is closely associated with their interest in the course and associated career pathways [3]. This is especially the case for international students, and a lack of sense of belonging amongst students is a significant barrier to success in their study such as programming courses. A preliminary survey of Chinese data science postgraduate students in UK universities showed that students lack a sense of belonging to the course and its relevance to their career aspirations, with a cognitive dissonance between what is learnt in class and its application in professional practice [1].

2 METHODS AND RESULTS

Narrative-based gamification is seen as a promising pedagogical tool to strengthen students' connection to data science careers, thereby enhancing their academic experiences and performance, with a view to success in future learning and employment [2]. We narrativized the lengthy worksheets using real-world data science case studies (airplane business and criminal case), and broke it down into smaller tasks that required team collaboration to complete. In addition to the narrative elements, team collaboration and challenges, the gamified design also incorporated a range of game elements known to increase sense of belonging amongst students, including an animated trailer, role-play, and a leaderboard.

We piloted the gamified design in four practical sessions of an introductory programming course on big data analytic with Python to 32 Chinese students enrolled in the course at a British university. We evaluated the effectiveness of the story-based gamified design in enhancing sense of belonging through survey, participatory observation and focus group interviews to gain in-depth insights with triangulation. Results showed that the gamified approach greatly enhanced students' sense of belonging in terms of peer relationships and subject-related career aspirations, as well as their motivation, engagement, academic confidence and retention.

3 IMPLICATIONS AND FUTURE WORK

The gamified design has certain areas of improvements, such as the lack of immediate and personalised feedback, limited team collaboration, and the lack of effective communication with other classmates outside the group. This study also had several limitations: a small sample size and the relatively short duration of the gamified design implementation which did not allow for evaluating long-term effects. To address those limitations in the future work, we are developing a scalable gamified educational system for diverse learner groups, to provide more insights into how a gamified approach can be used to enhance a sense of belonging.

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