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Actionable Personalised Learning Strategies to Improve a Growth-Mindset in an Educational Setting Using Artificial Intelligence

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Abstract : This study will evaluate a growth mindset intervention with Junior Cycle Coding and Senior Cycle Computer Science students in Ireland, where gamification will be used to incentivise growth mindset behaviour. An artificial intelligence (AI) driven personalised learning system will be developed to present computer programming learning tasks in a manner that is best suited to the individuals' own learning preferences while incentivising and rewarding growth mindset behaviour of persistence, mastery response to challenge, and challenge seeking. This research endeavours to measure mindset with before and after surveys (conducted nationally) and by recording growth mindset behaviour whilst playing a digital game. This study will harness the capabilities of AI and aims to determine how a personalised learning (PL) experience can impact the mindset of a broad range of students. The focus of this study will be to determine how personalising the learning experience influences female and disadvantaged students' sense of belonging in the computer science classroom when tasks are presented in a manner that is best suited to the individual. Whole Brain Learning will underpin this research and will be used as a framework to guide the research in identifying key areas such as thinking and learning styles, cognitive potential, motivators and fears, and emotional intelligence. This research will be conducted in multiple school types over one academic year. Digital games will be played multiple times over this period, and the data gathered will be used to inform the AI algorithm. The three data sets are described as follows: (i) Before and after survey data to determine the grit scores and mindsets of the participants, (ii) The Growth Mind-Set data from the game, which will measure multiple growth mindset behaviours, such as persistence, response to challenge and use of strategy, (iii) The AI data to guide PL. This study will highlight the effectiveness of an AI-driven personalised learning experience. The data will position AI within the Irish educational landscape, with a specific focus on the teaching of CS. These findings will benefit coding and computer science teachers by providing a clear pedagogy for the effective delivery of personalised learning strategies for computer science education. This pedagogy will help prevent students from developing a fixed mindset while helping pupils to exhibit persistence of effort, use of strategy, and a mastery response to challenges.

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