Effects of a Digital Guided Peer Feedback System on Student Learning and Satisfaction

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Abstract: This study investigates the effects of a digital guided peer feedback on students' learning and satisfaction. Participants were 203 students who were randomly assigned to groups of three. students were asked to explore various perspectives, and the 'pros and cons' on the topic of 'Genetically Modified Organisms (GMOs)'. The findings show that the digital module fosters students' learning and satisfaction.

Keywords: attitudinal change, digital learning module, learning, peer feedback, student satisfaction

Introduction

Digital learning modules are increasingly introduced in higher education, including in the life sciences (Noroozi & Busstra et al., 2012). They provide students with various modes of information presentation, such as texts, exercises, graphs, diagrams, animations, pictures etc., that can support students' learning. The use of such modules can also be challenging especially in real educational settings in which motivational aspects for learning are crucial. An approach to stimulate motivation for students to embrace such modules in their courses is to design and develop modules with peer feedback possibility that provide them with pleasant opportunities for learning. Despite the fact that scientific literature highlights the importance of feedback for learning (see Bayerlein et al., 2014), there remains a challenge for students to construct good quality feedback in collaborative settings (see Noroozi & Weinberger et al., 2012, 2013). As a result, the feedback may remain at the surface level and lack solid arguments for promoting deep learning. Thus, additional feedback support is needed if students are to willingly and with a high degree of motivation provide high-quality feedback in such modules. This study thus designs, implements, and evaluates a digital learning module with an intensified peer feedback support. The goal is to explore whether a digital module with guided peer feedback which encourages challenges and motivation support students' domain specific knowledge gain. In addition, the extent to which the use of such a digital learning module is appreciated by students is studied as well.

Methods

The study took place at Wageningen University in the Netherlands with 203 BSc students who were divided into groups of three students. The topic for discussion was Genetically Modified Organisms (GMOs) with the focus on the use of "cultured meat manufacturing – insect cells". A digital module was designed with a web-enabled platform that provides students with various modes of information presentation, such as texts, exercises, graphs, diagrams, and pictures with the feedback features The feedback features was designed in such a way as to guide the interaction style for both synchronous and synchronous interactions – promoting reasoning, critical discussion, and justified arguments – (see Figure 1). Overall, the session took about 4 hours and consisted of four main phases.

Table 1: Features of a good reflection report and guided peer feedback embedded in the digital module

Number	Features of a good reflection report by panel of experts and teachers	Guided peer feedback embedded in the digital module using input text boxes and sentence openers
1	The intuitive opinion on the topic.	To what extent your learning partner present his/her intuitive opinion on the topic? Is that clear? Why or why not? (30 to 50 words).
2	The arguments in favour of the topic (pros).	To what extent your learning partner provide arguments in favour of the topic? To what extent your learning partner reflect the opinion of the advocates on the topic? (30 to 50 words).

3	The scientific facts in favour of the topic (pros).	To what extent your learning partner provide arguments against the topic? To what extent your learning partner reflect the opinion of the opponents on the topic? (30 to 50 words).
4	The arguments against the topic (cons).	To what extent your learning partner provide scientific facts in favour of the topic? (30 to 50 words).
5	The scientific facts against the topic (cons).	To what extent your learning partner provide scientific facts against the topic? (30 to 50 words).
6	The opinion on the topic taking into account various pros and cons.	To what extent your learning partner integrate various pros and cons of the topic? (30 to 50 words).
7	The arguments and scientific facts (evidence, examples, figures, facts etc.) to support opinion.	Does your learning partner come to a conclusion based on his/her arguments? What do you think about his/her conclusion? (30 to 50 words).
8	The final conclusion and statement on the topic.	What are your suggestions for improving the quality of the reflection report of your learning partner? (30 to 50 words).

A pre-test post-test questionnaire was used to measure students' domain-specific knowledge gain. This questionnaire consisted of 17 multiple-choice questions. A questionnaire was used to assess students' motivation and satisfaction with the learning experiences. This questionnaire consisted of four main sections and 36 items in total on a five-point Likert scale ranging from "almost never true", "rarely true", "occasionally true", "often true" through to "almost always true".

Findings

Repeated measurement for ANOVA test showed that the domain-specific knowledge of students improved significantly from pre-test to post-test. This indicates the positive effects of the digital learning module on the domain-specific knowledge gain of students. Students' motivation and satisfaction with the learning experiences appeared to be sufficiently high (around four on a five-point Likert scale) for all students.

Conclusions and implications

This study used a digital learning module that also supported peer feedback process to engage students in an intensified processes of learning and writing about a controversial topic. The module was designed in such a way as to provoke students for exchanging and directing diverse and multiple conflicting opinions towards deeper reasoning. The use of peer feedback support guided the students in appropriate ways to analyse learning partners arguments about the topic, express agreements/disagreements and when possible integrate various points of views in their own reflection report. This digital learning module provided a safe and respectful learning environment for students to also practice their argumentation and exercise critical discussion and reasoning skills without recourse to, or fear of, personal statements, enhancing their awareness of the topic. Exchanging diverse and multiple conflicting opinions, analysing one another arguments, and expressing agreements/disagreements supported with scientific facts, arguments, logical evidence and examples were then reflected in the attitudinal change of students towards the controversial topic of the GMOs from pre-test to post-test.

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