Online Quizzing During Corona-Crisis: Games in Education

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Abstract: For several years a quiz game has been used in a course at the Inland Norway University of Applied Science. The course has many registered students, but only a part of them shows up for lectures. Using the quiz game is a part of introducing other elements other than lectures, assignments, discussions, mandatory assignments, and advising sessions. The students report on wanting more mandatory assignments, but that is not possible due to the resource situation with little staff and vast numbers of students. A quiz game consists of questions where there are up to four answers where at least one is correct. Prior to the gaming, the students are to develop the questions in groups and post them via email. The questions are added in the quiz game and at the end of the lecture, they play the quiz. This year our University closed on the 13th of March due to restrictions from the Government. However, the lecturing should proceed. "Business as usual" via the internet and suitable tools, meant that the quiz game also had to be conducted online. The paper presents the results from how this was undertaken in the online setting and how the students worked prior to and during the quiz game. We compare the results from previous years on-campus quizzing with this year's online quiz game.

1. Introduction

In the course Social Science Research Methods at the Inland Norway University of Applied Sciences, we have varied the classes using a quiz-game. Ordinary lecturing, working on assignments, and discussions are the ordinary way of doing a seminar, but replacing an exercise by adding the quiz-game has been very welcomed by the students. When we introduced this for the first time, the immediate response was very positive.

Games in education is not a new phenomenon (Bergeron 2006). Research on games for learning has also been going on for some time (Gee 2003, Gee 2007, Gibson et al. 2007, Prensky 2001). The balance between the pedagogy and game design has always been delicate; too much pedagogy reduces the fun and engagement, and too much "pure" game design may blur the learning (Gee 2007, Gibson et al. 2007).

However, instead of "just" playing the quiz, we have practiced a twist to the quiz-game; the students are divided into groups and make the questions for the quiz-game. This is quite easy to organize on campus. Our challenge turned up when the University closed down on March 13th. Transferring all education to the online media was a true challenge to many lecturers. First the choice of media, then to learn what these media had to offer regarding features to make use of. We found ways of conducting the quiz, but would it have the same effect for the students?

Hence our research question is: How is the students' experience with online quizzing compared to regular on-campus quiz-game?

In this paper we will present the theory that has enlightened our study. Then we present the case and the research method we used to answer our research question. The results and the discussion end in a conclusion.

2. Theoretical foundation

In this section, we will present the theory that has enlightened our study. Since this is a quiz game, we first need to define what a game is. Then we need to explore the learning from games. It is also interesting to detect what can contribute to an enhanced learning outcome from gaming.

There are several studies of games being used in education (Pløhn 2014, Wang and Bian 2009, Wang et al. 2007). There are several ways to utilize games in education. It can replace exercises, it can enhance motivation and participation, or the students can develop games as part of the lectures (Wang and Bian 2009) For the lecturer it can be about monitoring the students, participating with the students, or to teach skills.

The definition of a game was offered by Salen and Zimmerman (2004) as " a system in which players engage in an artificial conflict, defined by rules that results in a quantifiable outcome". A quiz-game easily fits this definition as the players engage in a competition, the rules are clear (press the right buttons to score) and they collect points to win. However, this is difficult to combine the learning with fun, as this requires a delicate balancing of the designers. Too much learning tends to drain the fun, and too much fun hides the learning potential (Gee 2007, Plass et al. 2015, Plass et al. 2010). Game-based learning is about redesigning a task to "make it more interesting, meaningful, and, ultimately more effective for the learning than either a nongame or gamified task" (Plass et al. 2020).

As there are different objectives for games it is difficult to pinpoint which types of games that provide "the best" learning outcome. Modality, personalization, pretraining, coaching and self-explanation were the five features Mayer (2014, 2020) discovered that would enhance the learning outcome from the games used in education. For a quiz game pre-training coaching and self-explanation may be possible. Adding pre-game experiences can be organized prior to the quizzing. Coaching by adding feedback that shows the player the correct answers can be done, and this also allow the self-explanation as they can understand and reflect during the game (Plass et al. 2020). Challenge is an important feature in games (Sweetser and Wyeth 2005), and challenge is related to skills of the player according to the theory of flow by Csikszentmihalyi (1990) (1990). According to Cagiltay et al. (2015) the game's skill level should be decided by the level of skills with the players. Another feature is control. This is about the degree of influence the players have on a game (Pavlas et al. 2009).

Competition is often mentioned as a feature that supports learning outcome, but researchers still do not agree (Plass et al. 2020). Another feature is the interaction between the players. It can be cooperation and/or competition (Pavlas et al. 2009). According to Hong et al. (2009) competition is: "goal-oriented, directed towards achieving one's own goals, even though this may have a negative effect on other competitors." They (Hong et al. 2009) further state: "Coexistent competition occurs when actors do not see one another as competitors and they therefore act independently of each other. Finally, in cooperation the teams involved strive towards the same goals, for example by working together in strategic alliances or projects." Competitors interaction may also vary and can involve both cooperation and competition (Easton and Araujo 2016, Hong et al. 2009).

There are different types of competition in games; team competition, user versus computer, user versus himself/herself, user versus chance and time (Vandercruysse et al. 2013). Competition can support the motivation to learn and support cooperation, but it can also lead to anxiety and a sense of loss of empowerment, which may hinder learning (Cagiltay et al. 2015).

Schwarts and Plass (2020) claim that engagement is related to the learner's action and that the learner is focused on the game. They also suggest that the learner is putting effort into the game and that the game environment is where the playful learning material is. Hence the definition by Schwarts and Plass (2020): "Engagement in games is the active and focused investment of effort in a game environment".

"Flipped gaming" (Vold et al. 2017, Vold et al. 2018) is about how it is possible to engage the gamer in the development of the game. Here principles from adult learning are utilized in order to support engagement and commitment (Nonaka 1994) to the experiencing. Here, the experience would be gaming.

3. The case

The quiz-game we used is called "Kahoot!" and is developed in Norway as a student assignment at the Norwegian University of Science and Technology (NTNU) (Kahoot! 2016). We have used the game as a part of doing preparations for the exam in the Social Science Research Methods course. Beforehand we have developed a list of extra questions in case of missing questions. The students are divided into groups and have been given the assignment of making two questions from the core curriculum with additional answers. These questions have then been used by the teachers to create a quiz game. Before starting, the students are asked to join the game individually (some play two and two) using their cell phones, logging on with a game pin. After ending the game, the participants were asked to register with email and names on a list, in order to receive a link to a questionnaire. When the corona-crises forced the lockdown of our University, we decided to use Zoom (a video conferencing tool) for performing the lectures. In Zoom there are several features, e.g. "Breakout Rooms" which allow lecturers to divide students into groups. This gave us the opportunity to activate the students in groups as we do in the ordinary campus lecture.

4. Method of inquiry

The design of the study has a longitudinal approach, as the data material is collected over several years with the same questions but different respondents (time series)(Creswell 2003, Creswell and Clark 2007, O'Dwyer and Bernauer 2013). These are small groups of students following a seminar as part of the course in Social Science Research Methods. Over the last two years we have asked 61 students who have participated in the quizzing games for feedback. A total of 19 students have responded, the response rate is 31%. We asked the students about what they thought about using Kahoot! as part of the lecture, whether it was fun, whether they learned from making the questions and whether they thought they learned from the quizzing game.

When in 2020 we had to move the lectures online due to the corona-crisis, we also asked the students that followed the webinar the same questions following the Kahoot! to get their feedback. The questionnaire was divided in two parts: We wanted to know the students' attitudes towards using the quiz as a teaching method in the course, and secondly how they found preparing the quiz in an online medium.

In addition to the surveys, we have used unstructured interviews and observations conducted during the preparations for the quiz and observing the students during the game sessions. After game sessions, short questionnaires have been distributed to get the students' feedback about making the questions and performing the Kahoot!. The questionnaires have been prepared and distributed through two different survey systems (Questback and Nettskjema). The results are generated through the same channels. Based on the output from the survey systems, we have calculated the average score for every question/student group and compared this to the average value for the whole group of respondents. The highest value of score is 5 =very satisfied/high level of agreement. Lowest is 1=not satisfactory/ do not agree. The results are not to be generalized but have transferal value to similar cases and conditions.

5. Result and Discussion

In the following, we will present results from our study regarding the students' response to using the Kahoot! as part of the lecture and compare with the feedback from students participating in this year's online quizzing. The respondents represent a small group of students, but the results give us an indication of the students' experience of using gaming as part of the lectures.

In our study the quiz game was used not only for learning but for motivating for learning and as a different approach to learning (Wang and Bian 2009, Wang et al. 2007). Our material shows that the students overall are very satisfied with using gaming as a part of the lecture, with the average score 4,8. In the following the average score is presented in brackets. Their answers show that they find "Kahooting" fun with an average score 4,8. Our notes from observations of the students in the classroom tell us that the students show their engagement when the gaming is about to start and that the competition makes them put effort into taking part in the game. This implies that our attempt to "redesign" a task (making them go through the textbook and answer questions) did make it "more interesting, meaningful, and, ultimately more effective for the learning than either a nongame or gamified task" as claimed by Plass et al. (2020).

Our take on "flipping" the gaming (Vold et al. 2017, Vold et al. 2018) has been by activating the students to prepare for the game by making the questions and answers. Our "flipp" can be viewed as "adding a pre-game experience" that can support the total learning outcome as it provides an opportunity to understand and reflect (Plass et al. 2020).

When we later asked the students about what they thought of making the questions themselves, their responses were mostly positive about this with an average score (4,4). "Flipped gaming" is an activity that might be new to the students as they may be used to playing Kahoot! with questions made beforehand by the teacher. However, they all seem to be positively aware of the learning aspect of making the questions to the quiz themselves (4,4).

We also have noticed on one occasion that students reacted negatively in the lecture when "their" questions were not part of the quiz. This tells us that it's important for the students to experience that their efforts in contributing to the pool of questions are taken seriously.

The students' responses regarding the learning outcome, show that they find the gaming educational (4,6). They are also positive about using gaming as a part of the lectures on a more regular basis (4,6). All of the students were positive about the use of Kahoot! in the lecture (4,6). The student responses show that they found gaming as a good way of bringing variation into the lectures. The variation is in the form of challenge and competition as opposed to working on an assignment. Competition can support the motivation to learn and support cooperation according to Calgitay et al. (2015).

Table 1: Overview of results of feedback from students 2018-2020. Average score. Highest value of score is 5= very satisfied/high level of agreement. Lowest is 1=not satisfactory/ do not agree.

Questions	2018 nov (n=4)	2019 april (n=6)	2019 nov (n=4)	2020 april (n=5) digital	Total (n=19)
What do you think about using Kahoot! to work with the core curriculum?	5	4,8	4,7	4,6	4,8
What do you think about making the questions for the quiz yourself?	4,5	4,3	4,5	4,4	4,4
What do you think about using Kahoot! as part of the lectures in social science research methods?	4,5	4,7	4,2	5	4,6
Kahoot! is fun	4,2	5	5	5	4,8
Using Kahoot! is educational	4,7	4,5	4,2	5	4,6
To formulate questions and find answers was educational	4,7	4,7	4,5	4,6	4,6
It brings variation to the lecture	5	5	5	5	5
Average score	**4,7**	**4,7**	**4,5**	**4,8**	**4,7**

5.1 How did developing the questions and quizzing as an online activity work out?

During the spring 2020 we had to move the lecture online due to the pandemic, using Zoom as an online medium. When comparing with the average score for all respondents (4,8), the online students had a slightly higher score when it comes to being satisfied with using Kahoot! (5), think it's fun (5) and learn from it (5). They also agree to that using Kahoot! gives variation to lectures (5). Compared to the respondents average score (4,7), the online quizzers were slightly more satisfied (4,8).

Mayer's (2014, 2020) five features for enhancing learning outcomes from games in education were about modality, personalization, pretraining, coaching and self-explanation. Regarding the medium in use for the gaming, the online setting seems to be working just as well as the on-campus activity. The personalization is maintained through the pre-training activity of developing the questions, which they claim worked very well and as Mayer (2020) predicted supported the learning outcome. The Kahoot! is self-explanatory and needs very little coaching, hence, little time spent on introduction and training.

6. Conclusion

The online quiz-game turned out to be the same success as the on-campus version. The breakout rooms in Zoom worked very well and the students, though randomly put together in groups, handed in what was expected of them.

The results from the survey from the online quiz-game showed about the same answers, even slightly more positive, as the on-campus quiz-game. They claim to have learned both from the quiz-game and developing the questions for the quiz-game. It is possible that using gaming as a part of the lecture will increase the motivation for the course content.

6.1 Further research

Since this was just as successful as the on-campus quiz-game, we would like to test this out in other online classes. The Inland Norway University of Applied Sciences delivers a substantial number of online courses, and the next step is to introduce this in some of the courses that we offer as our online courses. We will also continue to offer our on-campus courses online until our Government thinks it is safe to meet in person. Hence, it will be tested out in a few of our courses in order to establish if it is equally successful in these courses.

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