MASTER'S THESIS

Exploring the relationship between desire for learning and number of preferred out-of-class activities in flipped classroom courses.

Nevels, Dennis

Award date:
2021

Open
Universiteit

Verkenning van de relatie tussen desire for learning en totaal aantal voorkeuren in out-of-class activities in flipped classroom courses

Exploring the relationship between desire for learning and number of preferred out-of-class activities in flipped classroom courses

Dennis Nevels

Masterthesis Onderwijswetenschappen

Open Universiteit

Cursus name and cursus code: Scriptieplan OM9906

Name supervisor: Dr. Christian M. Stracke

Date:19-07-2021

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Samenvatting

Afstandsleren wordt in toenemende mate toegepast als alternatief voor leren in het klaslokaal door de invloed van de huidige pandemie. Afstandsleren is een andere methode van onderwijs, dat zijn eigen uitdagingen kent en deze scriptie heeft al doel om bij te dragen aan de onderwijskundige literatuur omtrent dit vakgebied. Onze focus ligt op een onderwijskundig model dat een combinatie is van afstandsleren en klaslokaal leren en heet flipped classroom courses in het hoger onderwijs. Flipped classroom course zijn in de scriptie gedefinieerd als:

> "a set of pedagogical approaches that: (1) move most information-transmission teaching out of class, (2) use class time for learning activities that are active and social, and (3) require students to complete pre- and/or post-class activities to fully benefit from in-class work" (Abeysekera & Dawson, 2015, p.3).

Studenten kunnen de leeractiviteiten thuis (out-of-class activities) uitvoeren die normaal gesproken in het klaslokaal gedaan worden. In plaats daarvan kan de fysieke les zelf gebruikt worden voor activiteiten die het huiswerk kunnen vervangen (Bergman & Sams, 2012; Sohrabi & Iraj, 2016).
Er is wetenschappelijk onderzoek beschikbaar met veelbelovende resultaten (zie tabel 1 voor een overzicht). Flipped classroom course mogen dan in zijn algemeenheid voordelen hebben voor studenten, het is ook mogelijk dat dat voor een gedeelte van de studenten niet opgaat. Het kan zijn dat zij onvoldoende voorbereidt zijn om zich aan te passen aan dit onderwijskundig concept. Immers zij moeten zich thuis voorbereiden voordat ze naar de les gaan. In deze studie hebben we desire for learning geadopteerd als construct omdat naar onze mening dit helpt te begrijpen waarom niet iedere student een voordeel behaalt aan flipped classroom courses. Dit roept de vraag op of deze studenten hun voorkeuren wat betreft het type leeractiviteiten die zij zouden willen doen binnen een flipped classroom course? Dit zijn de out-of-class activities en om een antwoord te vinden op deze vraag is er in deze scriptie een onderzoek uitgevoerd onder studenten in het Nederlandse hoger onderwijs. Het doel was het meten en analyseren van de twee constructen, desire for learning en het totaal aantal voorkeuren in out-of-class activities. In welke mate beschikken studenten over desire for learning en bestaat er een relaties met het totaal aantal out-of-class activities die zij zouden willen doen in een flipped classroom course? Het doel is om te zijn of deze correlatie bestaat en zo ja, of die positief of negatief is en hoe sterk? In deze studie hebben we ook een aantal demografische kenmerken opgenomen; grade point average, sex, academic status en preference for group work. Het doel van het meenemen van deze demografische kenmerken is om te zien of er variatie bestaan tussen de studenten. De onderzoeksvraag in deze studie luidt als volgt: In what way is the level of desire for learning

among higher education learners associated with the number of preferred out-of-class activities in flipped classroom courses?

Deze onderzoeksvraag is gespecificeerd in vier hypothesen en een survey met 30 vragen zal gebruikt worden met een explanatory research design om te zien of er co-variatie bestaan tussen deze twee constructen. Beide constructen zullen gemeten worden door middel van vierentwintig vragen (ieder twaalf) en de demografische kenmerken bestaan uit vier vragen. Twee additionele vragen meten de eventuele eerder opgedane ervaringen met flipped classroom courses. In dit onderzoek participeerden 59 studenten van 20 verschillende klassen van de Haagse Hogeschool middels een online survey. In deze survey vulden zij vragen in die het niveau van desire for learning and the number of preferences in out-of-class activities meet. De resultaten rapporteren een positieve lineaire relatie tussen het niveau van desire of learning en the number of preferred out-of-class activities in flipped classroom courses. Dit betekent voor onze onderzoeksvraag dat de correlatie bestaat tussen hoge scores op desire for learning en hoge scores op aantal out-of-class activities die studenten graag zouden willen doen. De type out-of-class activities die de high desire for learning groep wil doen zijn; leesactiviteiten (artikelen, hoofdstukken uit een boek etc); een Powerpoint presentatie bestuderen; een reflectie opdracht en luisteren naar een audio opname van een les. Er is geen bewijs dat studenten met eerdere opgedane flipped classroom courses ervaring meer activiteiten zouden willen doen dan studenten zonder deze ervaring.

Summary

Due to the current pandemic, distance learning has been increasingly used as an alternative to classroom learning and is offering the possibility for students to continue their study remotely. Distance learning is a different delivery mode that comes with its own challenges and this thesis aims to contribute to the educational literature in this specific area. Our focus is on an educational model named flipped classroom courses in higher education and combines classroom activities with out-of-class activities. Flipped classroom courses are defined in this study as:

> "a set of pedagogical approaches that: (1) move most information-transmission teaching out of class, (2) use class time for learning activities that are active and social, and (3) require students to complete pre- and/or post-class activities to fully benefit from in-class work" (Abeysekera & Dawson, 2015, p.3).

Thus, in flipped classroom courses, learners carry out learning activities at home (out-of-class activities) that normally are done in the classroom and classroom time is used for activities that

constitutes homework (Bergman & Sams, 2012; Sohrabi & Iraj, 2016). There is research available about its effectiveness with promising results, (table 1 provides an overview). Even though flipped classroom courses might benefit learners in general, it is also possible that for a number of learners the benefit is absent. They might not be prepared to adapt and participate in this new educational concept, which requires them to complete learning activities on their own before going to class. In this study we have adopted desire for learning as a construct, that in our assumption helps to understand why not every learner benefits from flipped classroom courses. The question that arises is whether these learners have other preferences when it comes to the type of out-of-class activities?

In an attempt to find an answer to that question, we have developed and carried out this study among learners in higher education in The Netherlands to measure, analyse and compare the two constructs: the desire for learning and number of preferred out-of-class activities in flipped classroom courses. To what extent do learners have a desire for learning and is there a relationship with the number of out-of-class activities that learners prefer to carry out in a flipped classroom course? The goal is to see whether this correlation exists and if so, whether it is a positive or negative correlation and how strong? Based on this goal we have formulated the following research question: In what way is the level of desire for learning among higher education learners associated with the number of preferred out-of-class activities in flipped classroom courses?

In the study we have also included a number of demographic characteristics; grade point average, sex, academic status and preference for group work. The purpose for including those characteristics is to examine whether those allow for variation between higher education learners.
This research question is specified in four hypotheses and a thirty-item survey will be used in an explanatory research design to see whether the two constructs co-vary. Both constructs will be measured in twenty-four items (twelve each) and the demographic questions count for four items in the survey. Two additional questions measure learners' potential experience with flipped classroom courses. In this study 59 learners from 20 different classes of The Hague University participated. They agreed to fill out an online survey to gauge their desire for learning and the number of preferences in out-of-class activities. The results report a positive linear relationship between the level of desire of learning and the number of preferred out-of-class activities in flipped classroom courses. This means for our research question that the relationship exists and that learners who score high on the desire for learning scale also indicate a high number of preferred out-of-class activities that they would like to do. The types of out-of-class activities that the group with a high desire for learning likes to do are; reading activities (articles, book chapters etc); reviewing a PowerPoint presentation; a reflection assignment and listening to an audio lecture. There is no evidence that learners with prior flipped classroom experiences prefer a higher number of out-of-class activities.

1 Introduction

1.1.1 Title and fit in thesis circle

The title of this thesis is*:* Exploring the relationship between desire for learning and preferences for out-of-class activities in flipped classroom courses. This thesis aims to carry out a correlational study on the possible relationship between the two constructs desire for learning and learners' preferences for out-of-class activities in flipped classroom courses.

1.1.2 Problem sketch of the research

In higher education in The Netherlands, flipped classroom courses are for example used by the Rijksuniversiteit Groningen (RUG). This institution has started programs to assist their staff in developing flipped classroom courses within their own educational programs (Rijksuniversiteit Groningen, 2020). The RUG claims that flipped classroom courses will benefit learners' critical thinking skills. However, the literature about the effectiveness of flipped classroom courses is contradictory (Hao, 2016). Some researchers (Flumerfelt & Green, 2013; Tune, Sturek & Basile, 2013) conclude that students in flipped classrooms may outperform their counterparts in traditional lecture-based classrooms, other studies claim that students' responses as well as being ready for flipped classroom courses are not comprehensively positive (Missildine, Fountain, Summers & Gosselin, 2013; Wilson, 2013). This study is aiming to contribute to this research gap by focusing on our hypothesis that different learners prefer different out-of-class activities. It is our assumption that learners that score high on the readiness to flipped classroom courses construct are able to indicate the out-of-class activities that matches with their interest. A component of the readiness to flipped classroom course construct is self-directed learning readiness and has been studied extensively in the literature (Fisher, King & Tague, 2011). Self-directed learning readiness on its turn consist out of three components. In this study the component desire for learning has been identified as the construct that may help explaining different preferences in out-of-class activities. The reason is when learners are expected to prepare at home for the classroom activities one can assume that learners with a high desire for learning can do this more successfully. Learners with a lower desire for learning are less likely to complete this preparation. We would like to know if the high desire for learning group prefers a higher number of out-of-class activities in flipped classroom courses. The answer might help to explain why the effectiveness of flipped classroom courses is contradictory.

In addition, we are also interested if learners who already have prior experiences in flipped classroom courses have other preferences than learners who do not have these experiences. The answer to our research question can help in understanding why the flipped classroom courses research reports mixed results. We aim to contribute to the literature by providing more insight in the relationship between the two constructs desire for learning and preferences in out-of-class activities. If learners have a high desire for learning would that mean that they prefer certain types of learning activities in flipped classroom courses? Do these preferences differ compared with learners with a low desire for learning? We are also interested if learners who are more experienced in flipped classroom courses also have other preferences than learners with little or no experience. This research aims to provide answers to these questions.

1.1.3 Theoretical framework

In this theoretical framework the following five topics will be outlined. First, a conceptualization of flipped classroom courses is given. Second, the literature overview regarding flipped classroom courses will be presented. Third, the construct out-of-class activities will be discussed. Fourth, the concept desire for learning will be introduced and how it relates to flipped classroom courses. Fifth, the research question, hypotheses and conceptual framework will be explained.

1.1.4 The flipped classroom courses

There is not a single conceptualization of what exactly a flipped classroom course is. It has also been labeled as the inverted classroom, where technology is being used to re-arrange the learning activities (Strayer, 2012). The knowledge content itself is moved outside of the classroom enabling learners to practice inside the classroom and therefore, be more 'active' (O'Flaherty & Phillips, 2015). A number of researchers support active learning strategies. Richardson, Abraham and Bond (2012) report a positive influence of active learning on learning achievement. Berrett (2012) argues that information should be provided outside of the classroom and in-class activities should be, for example, a group of students working together to solve problems. Another research finding is from Leo and Puzio (2016) whose study was in a high school setting and they found positive results on student achievement and as well as learners' appreciation of active learning. These studies with their diverse research findings do not provide us with a precise definition of the flipped classroom courses as they are using different definitions. We adopt the following definition of the flipped classroom courses by Abeysekera and Dawson:

> "a set of pedagogical approaches that: (1) move most information-transmission teaching out of class, (2) use class time for learning activities that are active and social, and (3) require students to

> complete pre- and/or post-class activities to fully benefit from in-class work" (Abeysekera & Dawson, 2015, p.3).

This definition considers that out-of-class activities are meant as preparation for the face-to-face activities in class and in addition that active and social learning is expected and required during those classroom sessions. Following this definition of flipped classroom courses, a literature review of this method is provided in the next paragraph.

1.1.5 Literature review flipped classroom courses

Although the literature about flipped classroom courses concepts is growing there are still research gaps (Akçayır & Akçayır, 2018). Akçayır and Akçayır reviewed 71 articles and provided an overview of the challenges and advantages of the flipped classroom courses. A few constructs that have received attention from researchers are: learning performance (Bhagat, Chang & Chang 2016); satisfaction (Bösner, Pickert & Stibane, 2015; Al-Zahrani, 2015).; engagement (Khanova, Roth, Rodgers & McLaughlin, 2015) and motivation (Huang & Hong, 2016; Abeysekera & Dawson, 2015; Hidi & Harackiewicz, 2000; Abdullah, Hussin & Ismail, 2019 and Cho, Park & Lee 2019). Motivation in particular is one example that has been researched frequently. A study by Yilmaz (2017) has addressed learners' readiness within the context of a computer course. Yilmaz emphasizes that students' readiness to e-learning differs and that it is an important variable to incorporate when determining students' motivation to participate in flipped classroom courses. As we mentioned before the evidence around flipped classroom courses effectiveness is contradictory and we suspect that learners that do perform well are more ready for this educational approach. After all, learners are expected to prepare for the classroom activities at home and not every learner is equipped to do this successfully. In our opinion a learner needs to be 'ready' for flipped classroom courses and readiness can be an important factor for students to be able to complete the out-of-class activities on their own or with their peers. Therefore, this learners' readiness to flipped classroom courses variable is considered to be relevant and will be explored in more detail in section 1.1.7. Secondly, we also suspect that learners who score high on the learner's readiness for flipped classroom courses, prefer a higher number of out-of-class activities, than learners who score low on the learners' readiness scale. In the next section we focus on the different out-of-class activities that learners carry out in flipped classroom courses prior to the classroom activities.

1.1.6 Out-of-class activities within the flipped classroom courses

In the following, we discuss the out-of-class activities in more depth. First, the pedagogy around those activities, then the different types of activities that have been researched and finally a discussion around the possibilities of personalization that can be deployed with the use of different out-of-class activities.

Ryan and Tilbury (2014) have identified a number of pedagogical ideas for the future of higher education. One of them is learner empowerment, which is defined as "actively involving students in learning development and processes of 'co-creation' that challenge learning relationships and the power frames that underpin them, as part of the revitalisation of the academic project itself" (p.5). Examples that enable learner empowerment are: flexible learning (Nguyen, Yu, Japutra & Chen, 2016) and individualized learning (González-Gómez, Jeong, Airado Rodríguez & Cañada-Cañada, 2016), which are incorporated in flipped classroom courses (Akçayır & Akçayır, 2018).

Other researchers have specifically focussed on the type of out-of-class activities within the flipped classroom courses such as Sahin, Cavlazoglu and Zeytuncu (2015). They have examined the use of video lecturers in a higher education setting for a calculus course. Their main question was, whether students would feel better prepared in flipped classroom courses or not and the research findings were affirmative. Besides video lectures, a whole variety of out-of-class activities are possible. Examples of such activities that researchers have analysed in a flipped classroom courses are: readings (Kiviniemi, 2014); quizzes (Wanner & Palmer, 2015); discussion (Weaver & Sturtevant, 2015); PowerPoint presentations (Howitt & Pegrum, 2015); homework (Smith, 2013); reflection (Sage & Sele, 2015); online modules (McLean, Attardi, Faden & Goldszmidt, 2016); web quest (Hung, 2015); further research (Nguyen, Yu, Japutra, & Chen, 2016); audio lectures (Bösner, Pickert, & Stibane, 2015) or interactive tutorials (Eichler & Peeples, 2016), see table 1 for an overview.

Table 1.

Out-of-class activities in flipped classroom courses

#	Types of out-of-class activities	Literature
1	Videos	Teo, Tan, Yan, Teo, &Yeo (2014)
2	Readings	Kiviniemi (2014)
3	Quizzes	Wanner & Palmer (2015)
4	Discussion	Weaver & Sturtevant (2015)
5	PowerPoint presentations	Howitt & Pegrum (2015)
6	Homework	Smith, (2013)
7	Reflection	Sage & Sele, (2015)
8	Online Modules	McLean et al. (2016)
9	Web Quest	Hung, (2015)
10	Further Research	Nguyen et al. (2016)
11	Audio Lectures	Bösner et al. (2015)
12	Interactive Tutorials	Eichler & Peeples (2016)

Note. This is an overview of the out-of-class activities in flipped classroom courses. Adapted from "The flipped classroom: A review of its advantages and challenges," by G, Akçayır, & M, Akçayır, 2018, *Computers and Education, 126,* p.342.

Table 1 shows an overview of different types of out-of-class activities, that can be incorporated in flipped classroom courses. This means for our study that learners can have different preferences and need options to choose from, so they are able to personalize their own learning. There is literature available that has examined personalization and flexibility in flipped classroom courses and some examples are presented and discussed below.

Wanner and Palmer (2015) have conducted an experiment among learners to gather their perspective around personalization and flexibility in a flipped classroom course. Specifically, they focused on the role of assessments within the teaching and learning process. Learners could choose their own assessments practices instead of the conventional approach that their teachers deliver the same type of assessments for all learners. This study reported that learners have a positive attitude towards flexible assessments. Clark and Caw (2019) examined adaptive learning in flipped classroom courses and reported that adaptive learning enabled higher scores on free-response question. In both examples it was the teacher who created the personalized learning activity. These examples show that personalization does not necessarily mean that the learners choose their own learning activities, but it can also be realized by a computer or a teacher (Gordon, 2014). McNally et al. (2017) have conducted a study about preferences in both, out-of-class activities and face-to-face activities in flipped classroom courses. They discovered two distinctive groups: 'flip endorsers' with a positive attitude towards flipped classroom courses and 'flip resisters' who were more negative. Mature students and females were more likely to be found in the flip endorser group. Self-efficacy scores were similar between both groups.

In the next paragraph, the construct learners' readiness to flipped classroom courses is explored in more depth and one of its components, desire for learning, is introduced and discussed. To my knowledge this has not yet been studied in the flipped classroom courses literature.

1.1.7 Learners' readiness to flipped classroom courses and desire for learning

In section 1.1.5, several examples of variables regarding flipped classroom courses were shown and we have identified learners' readiness to flipped classroom courses as a variable worth exploring in more depth (Yilmaz, 2017; Fisher, King & Tague, 2011). Several studies evaluated learners' readiness to flipped classroom courses: Dray, Lowenthal, Miszkiewicz, Ruiz-Primo and Marczynski (2011) have developed, evaluated and validated a self-assessment instrument that learners can use to evaluate their own competence regarding learning. In two studies Magolda (1992; 2001) reported that males and freshmen have a higher preference for teacher-directed instruction than females and more advanced

students. That is supported by the study of McNally et al. (2017). Two further studies are in particular relevant for our research question: Hao (2016) and Fisher, King and Tague (2011). Hao (2016) proposed in her study five variables that represent learners' readiness to flipped classroom courses: Four variables of them, namely: academic status, sex, grade point average and preference for group work are the personal characteristics and will be measured as demographic characteristics in our study. Hao (2016) adopted, the fifth variable, self-directed learning readiness from the study of Fisher, King and Tague (2011). Self-directed learning readiness is an instructional method that is defined "as the amount of responsibility a student accepts in ownership of learning" (Fisher, King & Tague, 2001, p.517).

In this study an existing learners' readiness survey was improved, tested and validated. Three components of self-directed learning readiness have been identified: Self-management, desire for learning and self-control. Self-management is a way of how learners prioritize their work, use a plan when they solve problems and how organized they are. Desire for learning is about the extent to which learners like to learn: Those learners with a high desire to learn have a specific need to know why and enjoy learning new information. Self-management is about the extent to which learners prefer to set their own goals, making their own decisions and as well as having high personal expectations.
The construct desire for learning is adopted in our study because from years of own professional experience, we have seen that learners who have a higher desire for learning seem to be more successful in selecting and completing classroom activities. We believe this also applies to activities that those learners perform at home. It is our assumption that high desire for learning also has a correlation with the number of preferences in out-of-class activities in flipped classroom courses.

To our knowledge, there is no scientific research available that studied the relationship between desire for learning and preferences in out-of-class activities in higher education in The Netherlands. We would like to end this section with a conclusion from Hao (2016) stating that only thirty-nine percent of the sample confirmed that flipped classroom courses design met their learning needs. Thus, a majority of learners were not satisfied with flipped classroom courses. A reason could be that the out-of-class activities did not match their needs. More insight in learners' preferences and a possible distinguishment based on desire of learning is a research gap that is addressed in our research design.

1.2 Research question, hypotheses and conceptual model

In section 1.1.6 we have seen a number of examples from the literature concluding that the use of flipped classroom courses showed both positive as well as negative results for several constructs. As mentioned in the problem sketch of the research, this could be related to the type of activities that the

learners have to complete. This negative evaluation by some learners does not necessarily mean that those learners automatically reject completely flipped classroom courses. In this study, we would like to contribute specifically to the research on out-of-class activities within flipped classroom courses to examine whether there is variation in learners' preferences.

From the literature, we are adopting two constructs; desire for learning and preferences in out-of-class activities. The focus of this study is on the construct desire for learning because from our experiences in practice we believe that this construct is the most related to our construct: the preferences for out-of-class activities in flipped classroom courses, which means the type of activities that learners prefer to do in flipped classroom courses before they pursue the face-to-face activities. In table 1, a large variety of out-of-class activities are outlined. We raise the following assumptions to examine in this thesis. If learners could indicate the activities they would like to do, there would be a preference in type of activities. Learners with more experiences in flipped classroom courses would have more preferred activities. And learners who have a high desire for learning prefer other learning activities than learners who have a low score on the desire for learning scale. These assumptions are in fact the hypotheses in this study. Now we will introduce the research question, hypotheses and conceptual framework.

The research question is:
In what way is the level of desire for learning among higher education learners associated with the number of preferred out-of-class activities in flipped classroom courses?

The following hypotheses are developed based on the research question;

H1 There is a correlation between desire for learning and number of preferred out-of-class activities.

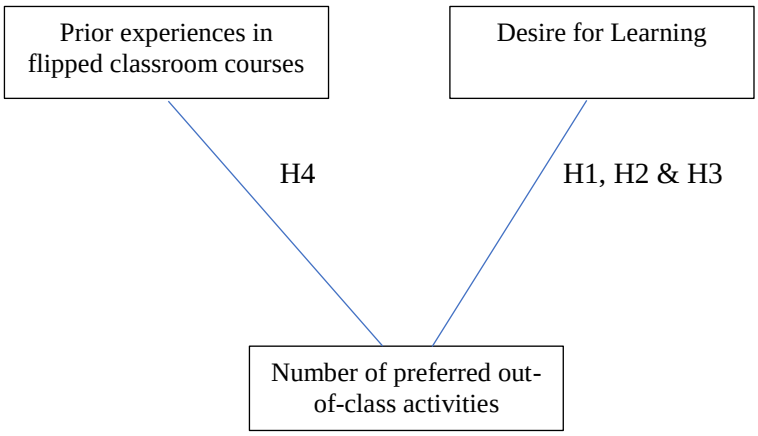
H2 Learners who score high on desire for learning will also score high on number of preferred out-of-class activities.

H3 Learners who score low on desire for learning will also score low on number of preferred out-of-class activities.

H4 Learners with prior experiences in flipped classroom courses will score high on number of preferred out-of-class activities.

Figure 1

Conceptual Framework



Note. This conceptual framework is a visual representation of the study. The constructs desire for learning and prior experiences in flipped classroom courses were tested for a correlation with number of preferred out-of-class activities

2. Method

2.1 Design

The first step was to execute a power analysis to determine the sample size needed to be able to detect significant results. The Pearson product-moment correlation coefficient has been used (see table 2). Our data met the requirements to perform this test; the two constructs are continuous, there is a linear relationship between the two constructs (see figure 2); there are no significant outliers (see figure 3a, 3b) and the data is normal distributed (see table 4), (Field, 2014). A power of 0.8 and a Pearson Correlation parameter of 0.5 was chosen. The power analysis resulted in a required sample size of 29 (see table 2). According to Creswell (2014) a minimum of 30 participants is needed for a correlational study that relates variables and 350 participants for a survey study. Creswell (2014) is followed and the threshold is therefore 30 participants.

In the next phase a sample method was determined and the most appropriate method to reach our large population is through the multistage clustering sampling method. Twenty classes are selected from one University of Applied Sciences and these learners are invited to participate. We use an online cross-sectional survey where the correlation of the two constructs (desire for learning and preferences for out-of-class activities) are measured. The unit of analysis is on the level of the

individual student, because our interested is in measuring the individuals' preferences and desire for learning (Creswell, 2014). A cross-sectional survey design collects data at only one point in time from the sample (Creswell, 2014).

The sample is split in two groups to enable to compare based on their level of desire for learning. Students who qualify for the high desire for learning group score on the construct desire for learning a least 40 out of 60. A student who scores a 39 or less out of 60 is allocated to the low desire for learning group.

We also assume that experience with flipped classroom courses can elicit the number of learners' preferences in out-of-class activities. Experience with flipped classroom courses means that the student has had a least one prior experience. Students who do not recall having that experience will be analyzed as a separate category and student who indicate that they have never attended a prior flipped classroom course will be the third category. In the analyses we will compare these three groups.

Table 2

Power analysis Pearson Product-Moment Correlation

Power Analysis Table

	N	Actual Power [b]	Test Assumptions			
			Power	Null	Alternative	Sig.
Pearson Correlation[a]	29	.814	.800	0	.5	.05

a. Two-sided test.

b. Based on Fisher's z-transformation and normal approximation with bias adjustment.

Note. The power analysis table shows that a sample size of 29 is required.

2.2 Participants

Currently 134,738 students are registered at an HBO (Hoger Beroeps Onderwijs) education of which 45,028 are studying in the field of economics (Vereniging Hogescholen, 2019). We have randomly selected The Hague University of Applied Sciences as our first cluster and the economics department with ten bachelor programs in the area of business and economics as the second cluster (multistage cluster sampling method). The bachelor programs are: communications, commercial economics, business studies, accountancy, communication and multimedia design, facility management, finance and control, international financial management and control, international business and entrepreneurship and retail management. Three of these programs (facility management, international financial management and control and international business), use English as the language of instruction and for this reason the data collection will be in English as well. A random sample of students from two classes of each bachelor program (in total 20 classes) who are registered at one of

these bachelor programs (age group 17-25 years old) received an information letter for participants one week prior to receiving the link with the informed consent and the online survey.

2.3 Materials

In this paragraph the materials needed to support this research is explained in more depth.
In this study a survey was used to measure two constructs. The first construct is learners' desire for learning. This is a component from the self-directed learning readiness scale developed and tested by Fisher, King, and Tague (2001). This survey has thirty questions in total with twelve questions measuring desire for learning on an interval scale level (see appendix a). The Cronbach's alpha of the scale desire for learning is 0.847. A Cronbach's alpha greater than 0.7 is considered to be an acceptable level of internal consistency. The second construct is out-of-class activities and consists of 12 questions adopted from table 1. All questions were asked on a five-point Likert scale varying from strongly disagree to strongly agree on an interval scale measurement level. According to Field (2014), it is possible to treat both constructs as interval although they are strictly ordinal. Field states that when equal intervals on the measurement scale represent equal differences it is possible to choose this path. Both of our constructs meet the requirement of having equal intervals on the measurement scale and therefore, they will be treated as interval in this study.

The remaining four demographic questions are: sex (nominal level), grade point average in current academic year (ratio level), preference for group work (nominal level) and academic status (ordinal level). The software program Lime Survey is an online survey tool and was used to collect this data online and the analyses will be executed with the software program Statistical Package of Social Sciences (SPSS). Other materials that were used during this study are a cover letter and an informed consent for the potential participants.

2.4 Procedure

In the fall semester (quarter one) starting in August 2020, the data collection took place.
The cross-sectional survey was tested among a small sample (n=5) the population to receive feedback and making sure the questions meet the criteria of clarity and unambiguity. Since the questions are already validated for the construct desire for learning, the focus was on the questions relating to the preferences for out-of-class activities as well as the demographic questions and questions measuring learners' experiences with flipped classroom courses. After having the survey reviewed by the sample and improved based on their feedback, the data collection began. The institution involved has provided the researchers permission to carry out the study. The students attending (the virtual) class received an information letter on their institutional e-mail one week prior to receiving the online survey request. The students who chose to participate could use the link in their e-mail address. They needed to solve a mathematical question first to prevent a robot from participating in the survey. Subsequently an

informed consent appeared to which they needed to agree on before participating in the survey. Participants needed to complete the survey at once, a saving and resume option was not available. A small minority of these students may not have reached the age of 18 years yet, but the nature of this study does not require consent from their legal representative, due to the fact that this does not involve an experiment where students are exposed to manipulation. The AVG ('De algemene verordering gegevensbescherming') law was maintained and the data were and will be stored conform guidelines approved by the ethical commission.

2.5 Data analysis

To be able to get insights in the relationship between desire for learning of higher education learners and their preferences for out-of-class activities, we used a variety of data analysis methods including display of scores in histograms, scatterplots and correlation matrices. The correlation between the respondents' answers in terms of direction, form and strength was examined. The coefficient of determination was calculated to interpret the magnitude and direction of the correlation. The coefficient of determination representing the effect size was used to either accept or reject the four hypotheses. Pearsons' correlation coefficient was used, because we have continuous variables (Field, 2014). We have also used the guidelines of Cohen & Manion (1994) to classify the strength of the correlation between two variables.

2.6 Scientific significance

This research aimed to contribute to the literature of flipped classroom courses studies. There is literature about self-directed learning readiness in flipped classroom courses. However, to our knowledge there are no studies available, examining the relationship between desire for learning and preferences in out-of-class activities. We can learn from this study that learners with a low desire for learning would feel more comfortable with other out-of-class activities than learners from the high desire for learning group. Thus, a major contribution to the literature is provided.

2.7 Society significance

This research contributes to society significance, regarding curriculum development of higher education institutions and other places, like learning & development departments of commercial firms and other types of organizations. An example is that the preferred out-of-class activities impact the design for flipped classroom courses and change the way how formal education and informal learning at companies and higher education are offered. Awareness around desire for learning might increase. It

is possible that the focus of learners will shift towards participating in courses that enable them to do learning activities, which fit their needs better.

3. Results

After finishing the data collection, 21 partially filled in surveys and 59 completed surveys were downloaded from the Lime Survey website. Our first step was to clean the dataset, which meant omitting the 21 submitted surveys that had missing values. The remaining 59 surveys were manually checked for anomalies or irregularities for each participant (e.g., a participant who had always selected 'strongly agree' as the answer to every question). The following descriptive statistics were used; the highest/lowest given answer, sum, mean and standard deviation for each question and all 59 completed surveys seem to be answered seriously by the participants. The final sample size is therefore 59. In the following, we will answer the four hypotheses.

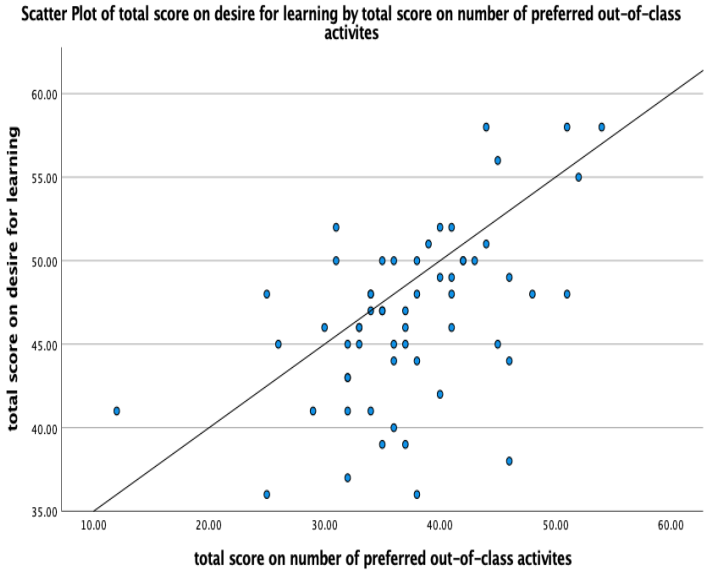
Hypothesis 1 reads as follows:

H1 There is a correlation between desire for learning and number of preferred out-of-class activities

To answer H1, we performed the following analyses on the data: Firstly, a scatterplot, where we plotted both constructs to check visually for a possible correlation (see figure 2). Secondly, a correlation matrix (see table 3), to test if there is a significant correlation between both constructs. The scatterplot (figure 2) shows a visual representation of a positive linear relationship between the two constructs. In addition, we have performed a correlation matrix to compare the total score for desire for learning and the total score for number of preferences for of out-of-class activities (see table 3). The correlation matrix shows that the correlation between the two constructs is significant $r(57)= .511$, $p<.001$. and therefore we can conclude that this correlation exists. The strength of this positive relationship between the two ratio constructs is measured with Pearson's correlation, which has a value of $r=.511$. This number falls in the category usefulness for limited prediction (Cohen & Manion, 1994).

Figure 2

Scatterplot of the constructs desire for learning and number of preferred out-of-class activities



Note. The scatterplot shows a positive linear relationship between the constructs desire for learning on the vertical axis and number of preferred out-of-class activities on the horizontal axis.

Table 3

Correlation matrix of the constructs desire for learning and number of preferred out-of-class activities

Correlations

		total score on desire for learning	total score on number of preferred out-of-class activites
total score on desire for learning	Pearson Correlation	1	.511**
	Sig. (2-tailed)		.000
	N	59	59
total score on number of preferred out-of-class activites	Pearson Correlation	.511**	1
	Sig. (2-tailed)	.000	
	N	59	59

**. Correlation is significant at the 0.01 level (2-tailed).

Note. The correlation matrix shows a significant correlation between the constructs desire for learning and number of preferred out-of-class activities.

Hypothesis 2 reads as follows:

H2 Learners who score high on desire for learning will also score high on number of preferred out-of-class activities

The required analyses for hypothesis 2 are an independent sample t-test (see table 5 and 6) to determine if the mean score of number of preferred out-of-class activities from high desire for learning group significantly differs from the low desire for learning group. We have used this information and the scatterplot from hypothesis one to formulate an answer to the second hypothesis. The assumptions for the t-test are met; two independent observations, the dependent variable has a normal distribution (see table 4) and there is homogeneity of variances F(57)=.000, p =.997 (see table 6), (Field, 2014). As concluded earlier, the scatterplot (see figure 2) shows a positive relationship, meaning a respondent with a high score on one construct also has a high score on the other. An independent sample T-test was carried out to see whether the total score on number of preferred out-of-class activities significantly differs between the high desire for learning group and the low desire for learning group (see table 5 and 6 independent sample T-test). The threshold is discussed in 2.1 design and allocates 22 participants in the high desire for learning group and 37 in the low desire for learning group. Table 6 shows a significance of t(57)= .-9.009, p <.001. and therefore, we can conclude that a correlation exists between high desire for learning scores and a high score on number of preferred out-of-class activities.

Table 4

Normal Distribution

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
total score on desire for learning	.089	59	.200*	.975	59	.258
total score on number of preferred out-of-class activites	.093	59	.200*	.967	59	.108

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Note. In this table the Shapiro-Wilk test shows that for both constructs desire for learning and number of preferred out-of-class activities the data is normally distributed.

Table 5

Group statistics independent samples t-test

Group Statistics

	high desire for learning and low desire for learning groups	N	Mean	Std. Deviation	Std. Error Mean
total score on number of preferred out-of-class activites	low desire for learning	37	33.1622	5.03054	.82702
	high desire for learning	22	44.6818	4.22449	.90066

Note. This tables visualizes the allocation for the participants in either the low desire for learning group (37) or the high desire for learning group (22).

Table 6

Results independent samples t-test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
total score on number of preferred out-of-class activites	Equal variances assumed	.000	.997	-9.009	57	.000	-11.51966	1.27868	-14.08018	-8.95914
	Equal variances not assumed			-9.421	50.429	.000	-11.51966	1.22276	-13.97513	-9.06418

Note. This table shows for the construct number of preferred out-of-class activities an equal variance between high desire for learning group and low desire for learning group. It also shows a significant different result in the score on the total number of preferred out-of-class activities for the high desire for learning group compared to the low desire for learning group.

Hypothesis 3 reads as follows:

H3 Learners who score low on desire for learning will also score low on number of preferred out-of-class activities

The data from the previous hypotheses is used to address hypothesis 3; the scatterplot (see figure 2) and the independent sample t-test (see table 5 and 6).

As described in the analyses of H2, 37 out of the 59 participants were allocated to the low desire for learning group. This third hypothesis assumes a correlation between a low score on desire for learning and a low score on number of preferred out-of-class activities. Again, the scatterplot (see figure 2) is used as evidence here and shows a positive linear relationship, meaning that participants who score low on one construct also score low on the other construct. A scatterplot is a descriptive statistic and the independent sample t-test is used to determine if this correlation is significant (Field, 2014). Table 6 shows the result $t(57) = -.9.009, p < .001$. and this implicates that the correlation exists and we

can conclude that learners who score low on desire of learning, also have a lower number of preferred out-of-class activities.

Hypotheses 4 is as follows:

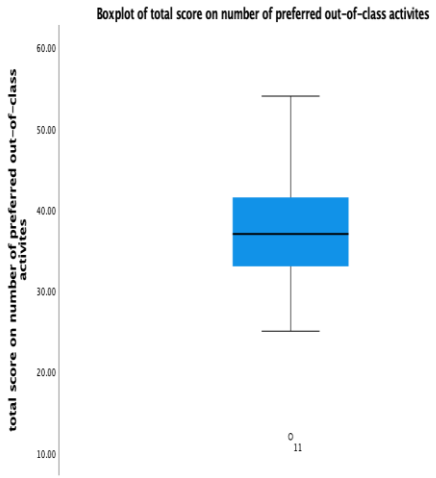
H4 Learners with prior experiences in flipped classroom courses will score high on number of preferred out-of-class activities

To formulate an answer to hypothesis 4, we have performed a one-way ANOVA test (see table 7 and 8) to examine whether learners with prior experiences in flipped classroom courses have a higher number in preferences for out-of-class activities than learners who have not participated in flipped classroom courses before and learners who do not remember having done so. The one-way ANOVA test has six assumptions that we were able to meet in order to use it for our analyses. The construct number of preferences in out-of-class activities is a ratio scale; there are more than two groups; the three groups are independent observations; the data has only one outlier (see figure 3a and 3b); the construct has a normal distribution W (57)= .967, p =.108 (see table 4); and there is homogeneity of variances F(2,56)=1.705, p=.191 (see table 9).
To collect the necessary information, we asked the question in the survey "Have you ever participated in a flipped learning course before?" (See appendix a). Table 7 shows that from our sample 15 participants indicated that they have participated in a flipped learning course before. 29 participants have not participated in a flipped learning course before and the remaining 15 participants did not recall if they have participated in a flipped learning course before.

It is important to emphasize that we did not ask these 15 participants who answered yes, how many times they have participated in a flipped classroom course before. Thus, experience in this hypothesis mean that they participated in a flipped classroom course at least once (see 2.1 design). We compared these three groups based on their scores on number of preferred out-of-class activities. As explained in 2.5 data analysis, the construct meets the six requirements of the one-way ANOVA test. The output of the one-way ANOVA test indicates a significance level of F(2,56)=.527, p= .593 (see table 8). This means that the difference between the three groups concerning the number of out-of-class activities that they prefer is not significant. Therefore, we can conclude that having prior experiences in flipped classroom courses does not correlate with the number of preferences for out-of-class activities.

Figure 3a

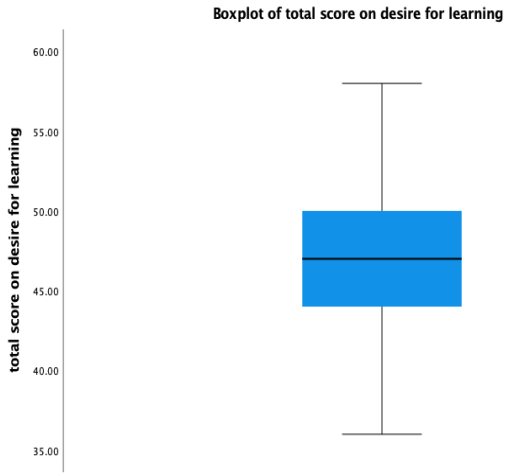
Boxplot of total score on number of preferred out-of-class activities



Note. The boxplot shows a graphical representation of the distribution of the total score of participants on the construct number of preferred out-of-class activities. The lowest score, first quartile, median, third quartile and highest score are displayed. There is one outlier present with a score of 11.

Figure 3b

Boxplot of total score on desire for learning



Note. The boxplot shows a graphical representation of the distribution of the total score of participants on the construct desire for learning. The lowest score, first quartile, median, third quartile and highest score are displayed. No outliers are present in this boxplot.

Table 7

Frequencies of prior participation in a flipped classroom course.

Have you ever participated in a flipped learning course?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I don't know	15	25.4	25.4	25.4
	No	29	49.2	49.2	74.6
	Yes	15	25.4	25.4	100.0
	Total	59	100.0	100.0	

Note. This frequency table displays the answers given to the question; have you ever participated in a flipped learning course? 15 participants did not know, 29 did not participated before and 15 did participate before in a flipped learning course.

Table 8

One-way ANOVA table of the three groups related to prior flipped classroom experiences.

ANOVA

totalscoreNoPA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	57.605	2	28.802	.527	.593
Within Groups	3059.039	56	54.626		
Total	3116.644	58			

Note. In this table three groups were compared. The first group had no prior experiences in flipped classroom course, the second group didn't know if they had prior experiences and the third group had prior experiences in flipped classroom courses. The total score on number of preferred out-of-class activities of each group were compared and no significant differences were found.

Table 9

Homogeneity of variance between the three groups, with no prior experience, don't recall prior experience and prior experience in flipped classroom courses.

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
total score on number of preferred out-of-class activites	Based on Mean	1.705	2	56	.191
	Based on Median	1.286	2	56	.285
	Based on Median and with adjusted df	1.286	2	43.538	.287
	Based on trimmed mean	1.659	2	56	.200

Note. This table shows that the variance was equal on total score on number of preferred out-of-class activities of the three group. These three groups are; no prior experiences in flipped classroom course group , didn't know if they had prior experiences group and had prior experiences in flipped classroom courses group.

4. Discussion & Conclusion

Discussion

In the results section, we discussed the analyses of the four hypotheses that are part of the research question. In these analyses, we found a correlation between desire for learning and number of preferred out-of-class activities. Meaning, a high score on one construct indicated a high score on the other construct and in contrast a low score on one construct also correlated with a low one on the other construct, thus a positive linear relationship was established. We have also examined if prior experiences in flipped classroom courses correlated with a higher number of preferred out-of-class activities, but our data did not find this correlation.

The results of this study provide an interesting implication and, in our opinion, learners should self-select their out-of-class activities, because that might have a positive impact in their evaluation of flipped classroom courses. Due to the fact that prior research reported mixed results in the effectiveness of flipped classroom courses, we believe that self-selection could play a role here. Our results showed that learners with a high desire for learning also wanted to do a higher number of different out-of-class activities then the learners with a low desire for learning. This may implicate that some out-of-class activities do not match with the expectations of the low desire for learning group. This result is outside of the scope of our research question, but interesting for our discussion. From that data appeared that the following 4 out-of-class activities received low ratings from the low desire for learning group (less than 8 times a 4 or 5 rating).

- I prefer to do reading activities (articles, book chapters etc) as an out-of-class activity.
- I prefer to review a PowerPoint presentation as an out-of-class activity.
- I prefer to do a reflection assignment as an out-of-class activity.
- I prefer to listen to an audio lecture as an out-of-class activity.

This means that the low desire for learning group does not want to do these out-of-class activities and could perhaps explain why not every learner rated flipped classroom courses positively. Hence students should be more in control of the types of activities that they are doing in flipped classroom courses.

Limitations of the study

This study has several limitations that need to be addressed. Firstly, a number of 59 respondents is a small sample size and may not adequately distinguish the high desire for learning group from the low desire for learning group. Secondly, there are very few learners with earlier experiences in the sample which may explain the non-significant result in the fourth hypothesis. Thirdly, this non-significant result also applies to the other four background characteristics; sex, grade point average, preference for group work and academic status: Thus, meaningful conclusions based on these background characteristics were not feasible. Fourthly, this study is conducted only in The Netherlands and international results may produce different outcomes. Cultural background could very well have an impact on the choices that higher education learners make. It is possible that foreign learners were present in this sample, but we have not asked specifically about that. Fifthly, other types of out-of-class activities may exist that we were unable to identify and include in the study. Sixthly, examining to what extend he different out-of-class overlap. We suggest that clustering some of these activities is a possibility worth to explore. Seventhly, we have not examined which type of out-of-class activities learners with a high desire for learning and learners with a low desire for learning would like to do. As established in our discussion our focus was on the number of preferred out-of-class activities, but it is worth in follow-up studies to see if a tailored approach in terms of self-selecting out-of-class activities would enable more effectiveness in flipped classroom courses.

Conclusion

In the results we found a correlation between desire for learning and number of preferred out-of-class activities. The results also demonstrated that having prior experiences does not show a significant relationship with the number of preferred out-of-class activities. With these findings we can formulate an answer to our research question. Our research question is as follows: In what way is the level of desire for learning among higher education learners associated with the number of preferred out-of-class activities in flipped classroom courses? We have found a correlation in the form of a positive linear relationship between the level of desire of learning and the number of preferred out-of-class activities in flipped classroom courses. Therefore, we conclude that students with a higher desire for learning also prefer to do more out-of-class activities. These students rate more activities as useful that students with a low desire for learning. These results support a different way of designing flipped classroom courses. We recommend faculty to design a wide variety of out-of-class activities that are aligned with the classroom activities of the flipped classroom courses. Subsequently faculty should allow their learners to choose the out-of-class activities they would like to do in preparation for the classroom activities. In our opinion further research should examine whether this learners' selection of out-of-class activities positively impacts the retention rates of flipped classroom courses.

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Appendix A: Survey Flipped Classroom Courses

Survey Flipped Classroom Courses

Background

1 In which semester of your study program are you? (Choose between 1 to 8: Semester 1 is the first semester of the study and 8 is the semester of graduation)

2 What was the last grade that you obtained for your last completed course. (The grade can vary between 1-10 and we are asking for an integer number. that means: a grade 7.5 is 8 and a grade 7.4 is a 7)

3 What is your gender?

1 Female 2 Male 3 Other

4 Do you prefer to work alone or in a group in learning activities?

1 Yes 2 No 3 I don't know

5 Have you ever participated in a flipped learning course?

1 Yes 2 No 3 I don't know

Desire for Learning

In this section we will provide you with 12 statements. We would like to know to what extent each statement reflect your situation. You can choose between: 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree.

1 I want to learn new information.
2 I enjoy learning new information.
3 I have a need to learn.
4 I enjoy a challenge.
5 I enjoy studying.
6 I critically evaluate new ideas.
7 I like to gather the facts before I make a decision.
8 I like to evaluate what I do.
9 I am open to new ideas.
10 I learn from my mistakes.
11 I need to know why.
12 When presented with a problem I cannot resolve, I will ask for assistance.

Out-of-class activities

In this section we will ask you twelve statements about flipped learning courses. We would like to know for each individual out-of-class activity to what extent you would like to do that activity in a flipped learning course. It is important to realize we do not ask you to compare the activities but to rate each activity individually. Again, the answer categories are: 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree.

1 I prefer to watch a video lecture as an out-of-class activity.
2 I prefer to do reading activities (articles, book chapters etc) as an out-of-class activity.
3 I prefer to do a quiz as an out-of-class activity.
4 I prefer to participate in a discussion as an out-of-class activity.
5 I prefer to review a PowerPoint presentation as an out-of-class activity.
6 I prefer to do a homework assignment as an out-of-class activity.
7 I prefer to do a reflection assignment as an out-of-class activity.
8 I prefer to do an online module (studying a specific topic with interactive elements) as an out-of-class activity.
9 I prefer to do a Web Quest (a research focused assignment where the information can be found online) as an out-of-class activity.
10 I prefer to conduct further research (both online and offline) on a given topic as an out-of-class activity.
11 I prefer to listen to an audio lecture as an out-of-class activity
12 I prefer to do an interactive tutorial (a structured collection of navigable web pages and contains any combination of text, images, audio, video, self-test questions and other interactive elements) as an out-of- class activity