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Undergraduate Students' Perceived Success Factors on Learning: An Online Flipped Classroom for Designing Pervasive Games

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Abstract

This study aims to identify undergraduate students' perceived success factors in designing a pervasive game using an online flipped classroom approach. Since the context coexisting with the Covid-19 epidemic, online teaching has become the new norm. Implementing the flipped classroom approach to online teaching is quite different from traditional teaching. Furthermore, teaching pervasive game design online with a flipped classroom procedure is undoubtedly a great challenge. After successfully applying the online flipped classroom approach to design pervasive games, a series of one-on-one interviews were conducted with 34 students, in which the data were analyzed using grounded theory. Through the analysis process of open coding, axial coding, and selective coding, six influential factors were found to determine the success of online flipped classrooms for pervasive game design, i.e., professional guidance, a clear mission, autonomic learning, mutual communication, team cooperation, and instrument strategy. These factors influence and link to each other, in which each factor plays a vital role in pre-class, in-class, and after-class learning. These six factors were integrated to form a preferred learning model advocated in this study, which can be referred to by other teaching and learning contexts similar to the flipped classroom for pervasive game design.

Keywords: pervasive game design, influence factors, grounded theory, flipped classroom, preferred learning model

INTRODUCTION

To this day, the Coronavirus remains a global pandemic. This situation is a catastrophic blow to the field of education, and the old days will be gone for students and instructors who had a glimmer of constantly face-to-face classes (Tang, Abuhmaid, Olaimat, Oudat, Aldhaeebi & Bamanger, 2020). In

in-game design, many instructors have had to face the reality of online instruction. Nevertheless, teaching such complex game design to students is already a problem, and is it even possible to do it online? Now, pervasive games design education incorporating high quality anytime-anywhere online learning. The ubiquitous access to the internet and burgeoning digitization presents us with an opportunity, which simultaneously adds more difficulty to teaching online.

Among the teaching in universities, the flipped classroom is a teaching method that has been advocated in recent years. It has been known for its efficiency (Rehman & Fatima, 2021). The flipped classroom has been enabled by creating digital video recording, digital media, and interactive web pages (Nighojkar, Plappally & Soboyejo, 2021). Many resources allow students to obtain content online where outside of class time is easily accessible by themselves (Yen, 2020). Using the internet resources and online teaching platform-tools under the existing condition to enter the education effect is an urgent problem (Tian, 2020). Online teaching pervasive game design in flipped classroom is a question that needs to be studied.

This study used flipped classroom to take students through a successful pervasive game design process online. After that, 34 interviews were conducted to collect data, and the data were analyzed by grounded theory. At last, a preferred learning model for the online flipped classroom on the pervasive game design was developed from the results.

BACKGROUND

Pervasive Game Design

Pervasive games, also known as location-based games, had existed for a long time, long before information technology became widely portable (Taborda, Arango-Lopez, Collazos, Vela & Moreira, 2019). People gathered to play various treasure hunt games or participate in a big adventure in live-action roleplaying. The pervasive game encourages people to get out of the house, motivates people to take action, engages people in healthier habits, and explores the whole city in a gamified way (Calafiore & Rapp, 2016).

Pervasive game design is an essential category, and it has been studied more in academia. Among the large-scale pervasive games, there is Ingress, which connects the virtual world with the actual city (Söbke, Hauge & Stefan, 2017). Players navigate the city's physical surroundings, and their avatar in the game moves through the virtual Ingress area that they can see on their smartphone screens (Sengupta, Tantoush, Bassanino & Cheung, 2020). Pokémon GO also places different virtual monsters in different physical spaces, allowing players to experience the joy of searching even while fighting monsters to upgrade (Arjoranta, Kari & Salo, 2020). Among the small-scale pervasive games, there is explicitly designed based on the campus environment in Granada, Spain (Forte, Gazquez, Arango-Lopez, Vela & Moreira, 2019). There is also designed specifically for older adults by fitness, including traditional cultures in Japan (Santos et al., 2021).

Since pervasive games like Ingress and Pokémon have not yet entered mainland China, corresponding small pervasive games are rare. As a result, there is not enough research on the design of pervasive games. This study will lead students to develop a small pervasive game through a game design course, which will open the door to pervasive game design.

Flipped Classroom

Bergmann and Sams (2012) made their students catch up on their school work due to sickness or other variety of reasons. They create a series of lecture videos for the absentees to watch at home. Soon, other educators and students found and used the videos, and then the word got out. Bergmann and Sams (2012) realized that this way could be more effective to achieve teaching and learning outcomes. In other words, the conventional instructional model could be "flipped."

In a standard instructor-centered classroom, the instructor delivers lectures throughout class time and gives students homework after class. In a flipped classroom, things are carried out the other way round. It is student-centered learning (Lundin, Rensfeldt, Hillman, Lantz-Andersson & Peterson, 2018). The instructor "delivers" lectures earlier than class in the form of pre-recorded videos and spends classification time engaging students in mastering activities that involve collaboration and interaction. Passive getting-to-know activities such as unidirectional lectures are pushed to outside type hours to replace active mastering activities in class (Mok, 2014).

Instructors have forever struggled to get students to study independently (Serin & Khabibullin, 2019). That is when the real learning happens, not when the teacher is lecturing, droning on and on (Fung, 2020). Subsequently, this study carried out the pervasive game design course online in the flipped classroom. Applying a flipped classroom, which is not easy, to an online classroom makes teaching even more challenging (Sarani, Zarei & Navidinia, 2020).

Grounded Theory

This qualitative study employed grounded theory to explore participants' experiences in flipped classroom to design a pervasive game that finished. The grounded theory involves constant comparative analysis whereby groups are contrasted based on theoretical similarities and differences (Hakkola, Ruben, McDonnell, Herakova, Buchanan & Robbie,2021). Grounded theory is appropriate for understanding how people make sense of their shared experiences and constructing a model from observations using a process of theoretical sampling data (Corbin & Strauss, 1990; Jobe, Engstrom & Lindberg, 2021). A grounded theory research method is divided into three steps: data collection, data coding (open coding - axial coding - selective coding), and theoretical saturation test. The data compilation allows for bottom-up problem identification and deductive inquiry into the connection and construction of influence factors of pervasive game design in online flipped classrooms.

METHODS

Course Structure

An Interactive Game Design and Development course in a public university in Henan province, China, was used for this study. The course required of all juniors in the interaction design program of digital media art students was taught over 12 weeks as a four-credits. Entirely offline completed as initially planned with this course. However, due to the outbreak of several new cases of Coronavirus in the city where the school is located, the entire 12-week course was completed online for the first eight weeks and face-to-face for the last four weeks. Once a week in classes, every Monday from 8:00 am until 4:00 pm, a two-hour break at noon.

The course is the students' first exposure to pervasive game concepts in the curriculum. In the meantime, the students were familiar with their campus scenery and remembered every exact location where they were located. This situation met the requirement that the design concept of the pervasive game had to be location-based. Students designed a pervasive game for older adults on campus during the first eight weeks of the course, then returned to school to resume classes and spent the last four weeks field testing the game with the design already in that place. The feedback was quite successful (Tan, 2013), and students accomplished their goal of designing a pervasive game for older adults on campus online using a flipped classroom format (Figure 1).

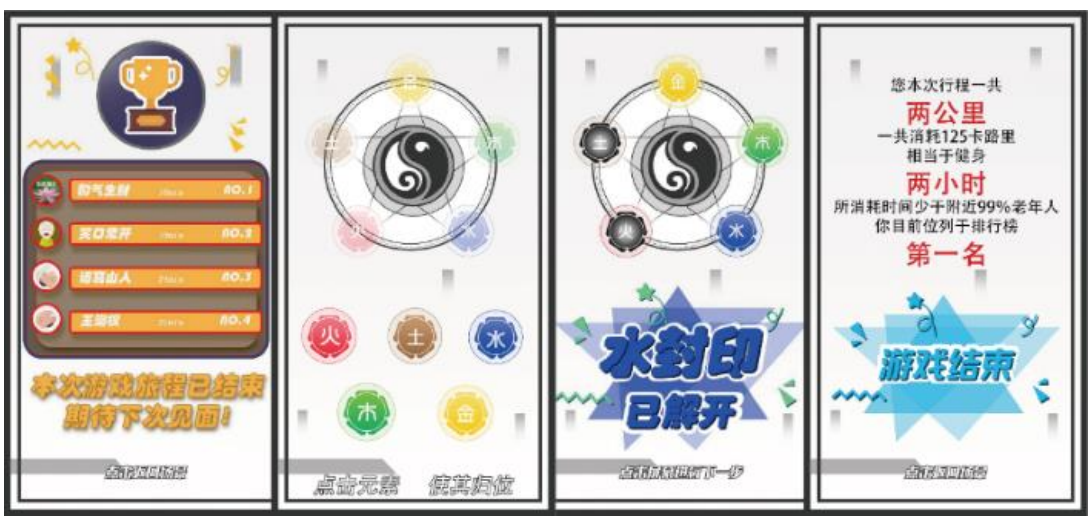

Figure 1: Some pervasive game design interfaces of students

Massive Open Online Course (MOOC) is a rising form of online studying based on network and intelligence technology, and the quantity of China's MOOC has topped the global list ever since (Zheng, Chu, Wu & Gou, 2018). Not only was the MOOC used throughout the flipped classroom, but

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the students also took the initiative to watch videos on other websites such as bilibili.com, and other necessary tools or platforms were used. For example, the teamwork used WPS Office, lecture communication used VooV Meeting, and game creation used www.ih5.cn. In order to make the class engrossing and fascinating, the instructor sometimes uses some additional tools to liven up the atmosphere by illustrating the Wheel of name (Figure 2). All of these have produced positive effects in the classroom.

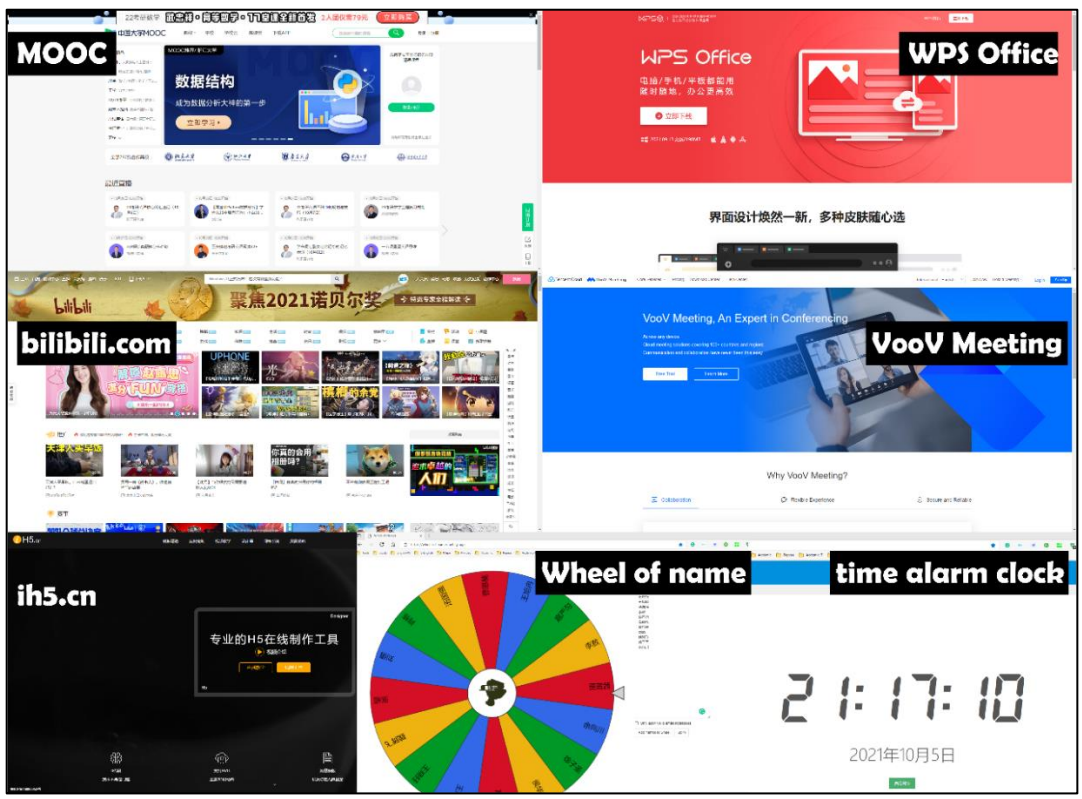

Figure 2: Used some platforms and tools of the online flipped classroom

Research Design

A total of 36 out of 103 students from three different majors in the Department of Digital Media Arts enrolled in this course in the October semester of 2021. These participants were third-year undergraduate students, 19 male, and 17 female students. At the beginning of the course, all students were assigned to five groups, with about seven students in each group. All five groups designed games with the same theme, and the theme of this project was to design a pervasive game on campus for older adults. They all went through professional training in design and had taken two game design courses,

although this was the first time, they encountered a task on pervasive game design. Students were physically active in the class learning activities while completing assignments outside of the class. Finally, most of them achieved satisfactory results in the course.

This study conducted a series of interviews with 34 students two weeks after they attended this course (Tan, Johnston-Wilder, & Neill, 2010). Two of the supposed 36 students were not able to join the interview due to their unavailability on the data collection day. Interviews were carried out when the students were not having class, with one student at one time, and the average time for each interview session was about 20 minutes. Individual students relaxed in a comfortable office by starting with a casual conversation. The first step is to start with some closed-ended questions with simple answers, such as whether they are satisfied with the course, so that the student can quickly get into the rhythm of the interview. Then, some semi-structured questions were asked to guide the student to respond appropriately, such as whether they think teamwork is essential or not. Eventually, an open-ended question was asked to know what they think is the most important matter about the online flipped classroom for pervasive game design. The whole interview was recorded with the consent of the participants and in a warm and pleasant atmosphere.

This research deploys grounded theory to conduct a qualitative inquiry into the concept of flipped learning on pervasive game design. The initial processing of the raw data went through the following three steps: First, the recorded interview data was converted into textual material through the *Express Transcribe* tool. Second, the Chinese text data was translated into English by professional translators. Finally, the English data were imported into MAXQDA software for analysis.

ANALYSIS RESULTS

The analysis process of grounded theory can be divided into three steps: open coding, axial coding, and selective coding. Open coding conceptualizes and scopes the raw data to understand and generalize each raw sample data and lays the foundation for axial coding (Glaser, 2002). The coding process must follow an objective factual basis and avoid subjective thinking (Charmaz, 2017). Open coding extracts 54 concepts and categories from the original data.

Based on further development and extension of the categorization extracted from the phenomena, the axial coding discovers the connection between the interview data categories and refines the distinction to form the main categories (Berthelsen & Hameleers, 2021). The axial coding is a deeper analysis of the interview data, abstracting the main category that best reflects the theme from the existing categories and ensuring its authenticity and reliability by linking it to the primary sources (Glaser, 2002). As a result of axial coding, six main categories were identified based on 31 categories from the potential logic of different categories, as shown in Table 1.

Table 1: The axial coding and their corresponding categories

Main categories	Categories	Connotation
Professional Guidance	Instructor Lecture	Acceptance of the instructor's knowledge
	Teaching method	The presentation style of the instructor's lessons
	Classroom atmosphere	Affirmation of the substantial learning atmosphere in the online flipped classroom
	Pace control	Acceptance of the instructor's overall course pace
	Atmosphere setting	The instructor's use of teaching techniques to regulate the learning atmosphere
Clear Mission	Clarity of Assignment	Instructor approval of assignment clarity
	Can solve problems	Students feel they can solve the problem on their own
	Clear division of labor	Each student knows precisely the goal that they are working on
	There are goals	Each student has a relatively clear direction to work towards
Autonomic Learning	Have strong beliefs	Students themselves demand high standards from themselves
	Interest driven	Students have a very high interest in what they are learning
	Self-driven	Students can self-flagellate in the learning process
	Students are motivated	Students have a very positive attitude towards learning
	Self-discipline in learning	Learning is very efficient
	Proactive in asking questions	Students will actively approach instructors to ask questions that they cannot solve
Mutual Communication	Information Exchange	Degree of exchange of opinions on design content
	Meeting	Joint discussion of the team together
	Number of chats	Degree of discussion between team members and team members
	Understanding each other	The level of mutual understanding among team members
	Problems of interference	Ability to remove interfering problems
	Good mindset	The ability to maintain some optimism when encountering difficulties
Team Cooperation	Leadership Perception	The team leader's perception of the situation
	Error tolerance	Acceptance of errors and faults
	Leadership openness	Acceptance of new and different opinions
	Team dynamics	The state of team members' commitment to work
	Organizational	The tendency of the organization to engage in and

	innovation climate	support activities innovative activities
	Interpersonal trust	Perceived trust from team members
Instrument Strategy	Ability to integrate information	Degree of processing of numerous information elements
	Software level	Proficiency in the operation of relevant software
	Technical support	Degree of knowledge of relevant technologies
	Tool sensitivity	Degree of adaptation to new technologies and software

Selective coding proposes core categories in the main category based on axial coding as the relationship (Bacete, Freire, Perrin & Gamboa, 2021). The core category is a re-excavation of the category, and the relationship between the main category and other related subsidiary categories is explored in-depth, followed by establishing a theoretical framework (Antwi-Boampong & Bokolo, 2021). This study concludes that the core category is pervasive game design for online flipped classroom based on the relevant data and information. Six main categories are involved, namely professional guidance, a clear mission, autonomic learning, mutual communication, team cooperation, and instrument strategy in the lead.

According to the "storyline" sorted out in the process of grounded theory analysis, described the behavioral phenomena among the categories and the preferred learning model of the online flipped classroom design pervasive game influence factors were obtained, as shown in Figure 3.

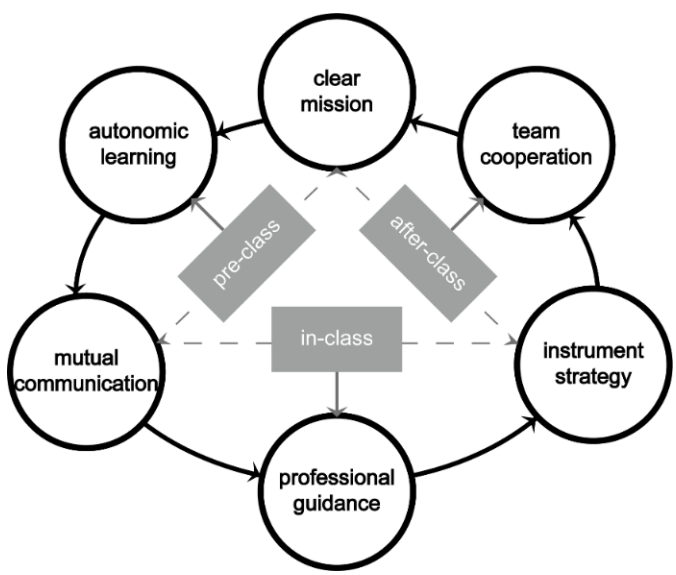

Figure 3: A preferred learning model based on six successes factors

Theoretical saturation is an integral part of determining whether the sample collection can be terminated in the process of grounded theory research (Mesana, Guzman & Zerrudo, 2021). Theoretical saturation is defined as the saturation of the theory when no new initial concepts or categories are analyzed in the collected sample data (James & Tunison, 2020). In order to improve the reliability and validity of the study, set five interviews aside to retrieve the analysis codes and test the theoretical saturation. The open coding and axial coding process of the original interview data of the five interviewees did not reveal any new main category relationship structure. Therefore, the theoretical model was saturated.

FINDINGS

Professional Guidance

There is no doubt that the role of the instructor is critical in the process of online teaching (Serin & Khabibullin, 2019). The pervasive game design professional guidance in the online flipped classroom plays a decisive role.

First, the instructor has to spend more effort preparing the course content. Some encountered situations require the instructor to spend more time preparing the lesson, carefully preparing the learning video before the lesson, wisely preparing the teaching plan in the lesson, and sensibly preparing the production content after the lesson. Secondly, instructors need to grasp the progress and pace of the course. The instructor should not lecture full of knowledge points in the classroom but should inspire and guide the students to explore themselves in the right direction. Therefore, the instructor should be in complete control of the pace of learning, both in-class and out-class, and be ready to change at any time. Finally, instructors need to do excellent teaching skills in the online classroom. The instructor only faces a large computer screen and sometimes stares at the students' web avatars. The instructor has to regulate the content and criterion as a facilitator in the class when an online problem occurs. When the instructor senses that some students are tired out on the other end of the network, the instructor should also motivate the students to respond positively to various design problems.

In conclusion, flipped classrooms increase instructors' workload. More than the average student interviewed felt that pervasive game design was relatively new and motivated to learn when they first started the online flipped classroom. However, by the middle and late stages of the entire course, students are also experiencing burnout when the instructor's role becomes more critical.

Clear Mission

In the interviews, several students said that a clear mission was the key to their successful pervasive game design. If the instructor or students cannot clarify the specific tasks of each step, it can be a mess that loses its direction.

A flipped classroom moves most information transfer instruction out of the classroom and devotes class time to active learning activities to fully benefit from classroom work (Abeysekera & Dawson, 2015). Nevertheless, assuming they do not know what they are learning, it can be scary to keep up with or simply not work with the instructor to complete the interactive content in class. If this happens a few times, the students will gradually become confused and develop a certain amount of boredom.
Students need to work together for team cooperation in after-class learning, which requires a clear mission. Students' design and aesthetic foundation are relatively weak, and their technical skills are still base. If they do not obtain a clear mission, they will have no idea what to do during and after the class. This issue requires instructors to give students a clear mission in all aspects of teaching to be clear about their goals and position in the team, the direction of the team's work, and the responsibilities of the team's mission. The clear mission has its essential in online teaching. There is the opportunity to discuss matters in a face-to-face environment, but it is not easy to get in touch to discuss matters once online teaching is over. Thereby, it is vital to ensure that each step of the pervasive game design has a clear mission that can be progressed step-by-step and completed in a step-by-step manner.

Autonomic learning

In this era of such rapid information updating, students' ability and experience are in some aspects more potent than instructors. Instructors always think that they have to teach students knowledge, but students' ability to actively acquire knowledge is much more powerful. "Once you engage the students' minds, there is an eagerness to learn, to be right, to master" (Berrett, 2012, p. 5). The instructor's task is to understand the students' level of knowledge, help them dissect their experience and abilities, and guide them on the feasibility of the pervasive game design.

In the interview, more than 12 students said, "Instructors do not have to manage too much. Students will deal with many problems by themselves". In the past, instructors always considered every detail of the design and let students execute it unconditionally, which erased students' initiative. Now, let students lead the project process, from the initial design problem construction to the design problem analysis to the design problem-solving process. Let students choose whom they team up with, let them research design node timing, let them coordinate design content meetings, and let them organize their design debriefing presentations.

The survey revealed that students like to work at their own pace and time (Gilboy, Heinerichs & Pazzaglia, 2015). Seventeen interviewees said they would master flexible time, enhance operational skills, strengthen self-discipline, reinforce the sense of innovation, improve self-learning ability, and thus quickly improve their ability to adapt to new teaching models. Therefore, practice shows that the significance and the changes brought about by instructors' conscious guidance or decentralization of students are revolutionary.

Mutual communication

Mutual communication is an essential influencing factor (Lo, 2018). Face-to-face communication is intuitive in offline classes, so there is a challenge in communicating a pervasive game design in an online flipped classroom.
First of all, in online teaching, a student who does not communicate with the instructor then really cannot be reached. For instance, the instructor knows the student is in class but does not know if there is something to eat, play, or distract next to the screen. Second, 29 students in the interviews mentioned that the design of an excellent pervasive game depends directly on the number of meetings to communicate. The students said that only through constant communication can design doubts be solved, and only through frequent communication can creative ideas be opened. Finally, during the interview, 23 students have mentioned that team-to-team communication is also essential. Since all five groups had the same design theme for this pervasive game, everyone can learn from each other. The students said that when they designed the pervasive game in class, they found out in the team-to-team communication that where one team missed some points, the other team would learn from the lessons and find ways to fix the gaps. Sometimes, the ideas that this team discarded would become ideas that another team would actively develop.

Team cooperation

The current instructional trend fosters collaborative skills or team learning as 21st-century learning skills (Sojayapan & Khlaisang, 2020). Due to the inherent nature of pervasive game design, it is not a one-person job but rather a job that requires multiple people to work together. Pervasive games are inherently complex and innovative, and these characteristics suggest that multiple people need to work together.

There is no such thing as a perfect individual, but there is a perfect team. Each student has different abilities, experiences, and skills, and if they can combine effectively with each other, they will also unleash a great deal of energy. Therefore, it is crucial for each person in the team to work together with others. When forming a team, students should discuss other students' temperament, knowledge and ability, production level, design experience, and other factors and examine their strengths and weaknesses and professional strengths. They can complement each other's strengths and weaknesses based on mutual understanding to achieve a win-win situation.

Teams and teams are not relatively isolated but need to be integrated. Eighteen students interviewed indicated that they saw their shortcomings in communicating with other teams and stimulated their creativity in the process of discussing with other teams. Not only that, a subtle competition will be formed between teams. If the instructor gives the proper guidance, students will clarify the tasks among themselves, and with good communication, this kind of healthy competition will bring significant benefits to pervasive game design.

Instruments Strategy

The instructor and students were in different locations for the class, and no more than two students were together, all scattered in different physical spaces and unable to meet each other. In this case, pervasive game design again requires teams to work together to complete it, so choosing the proper collaboration tools is vital.
Using the right tool can increase productivity while choosing the wrong tool can significantly reduce it (Algayres & Triantafyllou, 2020). More than half of the students said they were all new to web collaboration tools in the interviews. Among them, 24 students clearly stated that the success of their pervasive game design depended on the use of web collaboration tools.

They must quickly learn to use and navigate these latest tools. The previous section shows that MOOC and bilibili.com provide good content videos for independent learning in pre-class. VooV Meeting provides an excellent interactive platform for a flipped classroom in in-class learning or after-class learning. WPS Office provides a good editing strategy for shared documents, and ih5.cn provides a good production platform for pervasive game design. These web collaboration tools undoubtedly supply the necessary guarantee for designing pervasive games in online flipped classrooms. The right choice of tools motivates the students to learn and increases their learning efficiency.

DISCUSSION

This paper studied the factors influencing the design of pervasive games for online flipped classrooms through grounded theory, and six successful factors are summarized. These six factors are not isolated from each other. Relatively, they are interdependent, influencing, and coexisting with each other. For example, in the design of the pervasive game in the online flipped classroom, students' assignments will be evident when prepared the instructor's instruction adequately; when students are motivated to learn on their own, they can actively participate in interactive communication; when students realize the importance of teamwork, they will actively search for the right instrument. These situations are only a tiny part of the picture, revealing the intertwined and complex interactions between six factors.

At the same time, six successful factors cannot be categorically separated into pre-class learning, in-class learning, and after-class learning if instructors or students want to achieve success in pervasive game design in online flipped classrooms. For example, there should be professional guidance for clear mission assignments before class to proactively form teams and use the right online collaboration tool strategies for effective teamwork, with much mutual communication in between. Six factors also need to complete the pervasive game design process in three learning stages. As we can see, they are interconnected in the entire online flipped classroom pervasive game design, and one is indispensable throughout. Thus, the correct application of these six factors is necessary to ensure the success of the pervasive game design in the online flipped classroom.

Limitations

The one limitation is that the instructor was the researcher simultaneously. On the one hand, the advantage was that it allowed the instructor as the researcher to observe and interview students closely and personally. On the other hand, because the instructor had control over their final grade, students were fearful of the instructor's status as a supervisor and thus biased in their perception of the interview questions.

Another limitation is that students were not appointed together at random and only belonged to digital media art and design department students. Because of the lack of random assignment, the researcher cannot build generalizations about some more significant students' clusters within the traditional sense.

CONCLUSION

The flipped classroom notion is not new. Flipped teaching has been extolled for its ability to interact with students and develop critical-thinking skills (Rehman & Fatima, 2021). This article aims to establish a preferred learning model of rudimentary foundation on pervasive game design in an online flipped classroom. The instructor operates the concept of grounded theory using interviews with students who have successfully designed pervasive games. It was found that professional guidance, a clear mission, autonomic learning, mutual communication, team cooperation, and instrument strategy are six influence factors for an online flipped classroom on pervasive game design. These six factors are interrelated and interdependent. As a result, they automatically generate a learning model for designing pervasive games for online flipped classrooms. This interview has shown that students had enjoyed the experience, with a significant number believing that it was an effective pedagogy. This study observed that using the learning model correctly had brought about a positive change in the students' ownership and responsibility toward learning. This model provides some reference value and is meaningful for other instructors to teach pervasive game design in online flipped classrooms. It can also be incrementally introduced to other courses that will benefit from this pedagogy.

REFERENCES

Abeysekera, L., & Dawson, P. (2015). Motivation and cognitive load in the flipped classroom: definition, rationale and a call for research. Higher Education Research & Development, 34(1), 1–14. https://doi.org/10.1080/07294360.2014.934336

Algayres, M., & Triantafyllou, E. (2020). Learning analytics in flipped classrooms: a scoping review. The Electronic Journal of E-Learning, 18(5), 397–409. https://doi.org/10.34190/JEL.18.5.003

Al-Samarraie, H., Shamsuddin, A., & Alzahrani, A. I. (2020). A flipped classroom model in higher education: a review of the evidence across disciplines. Educational Technology Research and Development, 68(3), 1017–1051. https://doi.org/10.1007/s11423-019-09718-8

Antwi-Boampong, A., & Bokolo, A. J. (2021). Towards an institutional blended learning adoption model for higher education institutions. Technology, Knowledge and Learning. Advance online publication. https://doi.org/10.1007/s10758-021-09507-4

Arjoranta, J., Kari, T., & Salo, M. (2020). Exploring features of the pervasive game Pokémon GO that enable behavior change: qualitative study. JMIR Serious Games, 8(2). https://doi.org/10.2196/15967

Bacete, F. G., Freire, S., Perrin, G. M., & Gamboa, P. (2021). Reasons for disliking a classmate: a comparative study with Spanish and Portuguese students. International Journal of Educational Research, 105, 101700. https://doi.org/10.1016/j.ijer.2020.101700

Bergmann, J., & Sams, A. (2012). Flip your classroom: reach every student in every class every day. International society for technology in education.

Berrett, D. (2012). How 'flipping'the classroom can improve the traditional lecture. The Chronicle of Higher Education, 12(19), 1–3.

Berthelsen, R., & Hameleers, M. (2021). Meet today's young news users: an exploration of how young news users assess which news providers are worth their while in today's high-choice news landscape. Digital Journalism, 9(5), 619–635. https://doi.org/10.1080/21670811.2020.1858438

Calafiore, A., & Rapp, A. (2016). Gamifying the city: Pervasive game elements in the urban environment. In Workshop on Fictional Game Elements 2016 Co-Located with the ACM SIGCHI Annual Symposium on Computer-Human Interaction in Play (CHI PLAY 2016), 1715, 1–6.

Charmaz, K. (2017). Special invited paper: Continuities, contradictions, and critical inquiry in grounded theory. International Journal of Qualitative Methods, 16(1), 1609406917719350. https://doi.org/10.1177/1609406917719350

Corbin, J. M., & Strauss, A. (1990). Grounded theory research: procedures, canons, and evaluative criteria. Qualitative Sociology, 13(1), 3–21.

Forte, J. L. B., Gázquez, D. P., Arango-López, J., Vela, F. L. G., & Moreira, F. (2019). Geolympus - cloud platform for supporting location-based applications: a pervasive game experience. In World Conference on Information Systems and Technologies, (pp. 256–266). https://doi.org/10.1007/978-3-030-16187-325

Fung, C.-H. (2020). How does flipping classroom foster the STEM education: a case study of the FPD model. Technology, Knowledge and Learning, 25(4), 479–507. https://doi.org/10.1007/s10758-020-09443-9

Gilboy, M. B., Heinerichs, S., & Pazzaglia, G. (2015). Enhancing student engagement using the flipped classroom. Journal of Nutrition Education and Behavior, 47(1), 109–114. https://doi.org/10.1016/j.jneb.2014.08.008

Glaser, B. G. (2002). Conceptualization: On theory and theorizing using grounded theory. International Journal of Qualitative Methods, 1(2), 23–38. https://doi.org/10.1177/160940690200100203

Hakkola, L., Ruben, M. A., McDonnell, C., Herakova, L. L., Buchanan, R., & Robbie, K. (2021). An equity-minded approach to faculty development in a community of practice. Innovative Higher Education, 46(4), 393–410. https://doi.org/10.1007/s10755-020-09540-8

James, W., & Tunison, S. (2020). Beyond unexamined professional learning: understanding the opportunities in the self-assessment processes of K-12 professional developers. Professional Development in Education, 1–15. https://doi.org/10.1080/19415257.2020.1853592

Jobe, I., Engström, A., & Lindberg, B. (2021). Exploration of how to make the collaborative planning process work - a grounded theory study. Cogent Medicine, 8(1), 1896426. https://doi.org/10.1080/2331205X.2021.1896426

Koh, J. H. L. (2019). Four pedagogical dimensions for understanding flipped classroom practices in higher education: a systematic review. Educational Sciences: Theory and Practice, 19(4), 14–33. https://doi.org/10.12738/estp.2019.4.002

Lo, C. K. (2018). Grounding the flipped classroom approach in the foundations of educational technology. Educational Technology Research and Development, 66(3), 793–811. https://doi.org/10.1007/s11423-018-9578-x

Lundin, M., Rensfeldt, A. B., Hillman, T., Lantz-Andersson, A., & Peterson, L. (2018). Higher education dominance and siloed knowledge: a systematic review of flipped classroom research. International Journal of Educational Technology in Higher Education, 15(1), 1–30. https://doi.org/10.1186/s41239-018-0101-6

Mesana, J. C. B., Guzman, A. B., & Zerrudo, E. B. (2021). Through thick and thin: theorizing festival loyalty development among Filipino repeat visitors. Anatolia, 1–13. https://doi.org/10.1080/13032917.2020.1871045

Mok, H. N. (2014). Teaching Tip: the flipped classroom. Journal of Information Systems Education, 25(1), 7–11.

Nighojkar, A., Plappally, A., & Soboyejo, W. O. (2021). Animated concept-in-context maps as a materials science learning resource in an online flipped classroom. MRS Advances(6), 351–354. https://doi.org/10.1557/s43580-021-00069-2

O'Flaherty, J., & Phillips, C. (2015). The use of flipped classrooms in higher education: a scoping review. The Internet and Higher Education, 25, 85–95. https://doi.org/10.1016/j.iheduc.2015.02.002

Rehman, R., & Fatima, S. S. (2021). An innovation in flipped class room: a teaching model to facilitate synchronous and asynchronous learning during a pandemic. Pakistan Journal of Medical Sciences, 37(1), 131–136. https://doi.org/10.12669/pjms.37.1.3096

Santos, L. H. D. O., Okamoto, K., Otsuki, R., Hiragi, S., Yamamoto, G., Sugiyama, O., Aoyama, T., & Kuroda, T. (2021). Promoting physical activity in Japanese older adults using a social pervasive game: Randomized controlled trial. JMIR Serious Games, 9(1), e16458. https://doi.org/10.2196/16458

Sarani, A., Zarei, M. J., & Navidinia, H. (2020). Effect of online flipped classroom on students' writing development at senior high school. Journal of English Language Teaching and Learning, 12(26), 495–515. https://doi.org/10.22034/elt.2021.44600.2348

Sengupta, U., Tantoush, M., Bassanino, M., & Cheung, E. (2020). The hybrid space of collaborative location-based mobile games and the city: a case study of Ingress. Urban Planning, 5(4), 358–370. https://doi.org/10.17645/up.v5i4.3487

Serin, H., & Khabibullin, A. (2019). Flipped classrooms in teaching method courses at universities. International Journal of Academic Research in Business and Social Sciences, 9(1), 573–585. https://doi.org/10.6007/IJARBSS/v9-i1/5459

Söbke, H., Hauge, J. B., & Stefan, L. A. (2017). Prime example Ingress reframing the pervasive game design framework (PGDF). International Journal of Serious Games, 4(2), 39–58. https://doi.org/10.17083/ijsg.v4i2.182

Sojayapan, C., & Khlaisang, J. (2020). The effect of a flipped classroom with online group investigation on students' team learning ability. Kasetsart Journal of Social Sciences, 41(1), 28–33. https://doi.org/10.1016/j.kjss.2018.02.003

Taborda, J. P., Arango-López, J., Collazos, C. A., Vela, F. L. G., & Moreira, F. (2019). Effectiveness and fun metrics in a pervasive game experience: a systematic literature review. In World Conference on Information Systems and Technologies, (pp. 184-194). https://doi.org/10.1007/978-3-030-16187-318

Tan, W. H. (2013). Game coaching system design and development: a retrospective case study of FPS Trainer. International Journal of Game-Based Learning, 3(2), 77-90.

Tan, W. H., Johnston-Wilder, S., & Neill, S. (2010). Exploring the educational potential of game-based learning through the eyes of game industry practitioners. International Journal of Technology, Knowledge and Society, 6(1), 41-54.

Tang, T., Abuhmaid, A. M., Olaimat, M., Oudat, D. M., Aldhaeebi, M., & Bamanger, E. (2020). Efficiency of flipped classroom with online-based teaching under COVID-19. Interactive Learning Environments, 1–12. https://doi.org/10.1080/10494820.2020.1817761

Tian, L. (2020). The practice of "SPOC+online flipped classroom" hybrid model in the course of international marketing. International Journal of Frontiers in Sociology, 2(5), 41–46. https://doi.org/10.25236/IJFS.2020.020507

Yen, T.-F. (2020). The performance of online teaching for flipped classroom based on COVID-19 aspect. Asian Journal of Education and Social Studies, 57–64. https://doi.org/10.9734/ajess/2020/v8i330229

Zheng, M., Chu, C. C., Wu, Y. J., & Gou, W. (2018). The mapping of online learning to flipped classroom: small private online course. Sustainability, 10(3), 748. https://doi.org/10.3390/su10030748