The Impact of Gamification on Self-Assessment for English Language Learners in Saudi Arabia

Wala A. Bagunaid, Maram Meccawy, Arwa Allinjawi, Zilal Meccawy

Abstract—Continuous self-assessment becomes crucial in self-paced online learning environments. Students often depend on themselves to assess their progress; which is considered an essential requirement for any successful learning process. Today's education institutions face major problems around student motivation and engagement. Thus, personalized e-learning systems aim to help and guide the students. Gamification provides an opportunity to help students for self-assessment and social comparison with other students through attempting to harness the motivational power of games and apply it to the learning environment. Furthermore, Open Social Student Modeling (OSSM) as considered as the latest user modeling technologies is believed to improve students' self-assessment and to allow them to social comparison with other students. This research integrates OSSM approach and gamification concepts in order to provide self-assessment for English language learners at King Abdulaziz University (KAU). This is achieved through an interactive visual representation of their learning progress.

Keywords—E-learning system, gamification, motivation, social comparison, visualization.

I. INTRODUCTION

IN Saudi Arabia, the difficulty of learning English is a problem that is of concern for students, parents, and teachers alike. It becomes difficult for every individual to cope with the language and learn it. As English is well-associated with many subjects nowadays such as medicine, engineering and computer science, it has also become necessary to learn the language. Thus, the lack of students' proficiency in English may affect them negatively during their academic journey, especially in colleges based on English in their curriculums.

Almost all universities in Saudi Arabia have a foundation year, where the key subjects for academic success are taught. English is one of these subjects.

There are many challenges facing employing English as a language course at the Foundation Year at King Abdulaziz University [1]. The students come from different backgrounds and different schools, as they come from public, private or international schools. Therefore, all students have to take a

placement test which results to decide at which level they should be placed. There are four levels of English as a foreign language (EFL) classes in the Foundation Year in KAU; where they use the European Learning Framework and address four areas: listening, writing, speaking and reading [2]. The students are placed in various levels from beginner to pre-intermediate depending on the placement test score. Some students, who have achieved a higher score at the placement test could be placed level 4. While to be exempted from all these levels, they have to take a TOEFL/IELTS test with a specific score based on their track (science/arts). In any English class at KAU there are numerous students, as a result of which, the instructors are unable to provide individual feedback to each student other than separate assignments or exams results. Moreover, any given feedback shows the student only his/her performance but does not allow him/her to relate his level to the entire class level as a comparison.

In order to overcome these challenges, the latest personalization tools and techniques can be used as online platforms for social comparison visualization [3].

For the purpose of continually assessing the progress of the students, we applied the Open Social Student Modelling (OSSM) approach [4] integrated with gamification to provide the learner with a platform of self-assessment. In general, the term 'gamification' is widely used to refer to the use of game-based elements in contexts which are not game based, like learning. Here, game dynamics and game mechanics are used to engage the people and make the non-game context more interesting and exciting for them. For instance, there may be the use of pointers, leader boards, badges, scoreboards to make the process interesting and to maintain the spirits of the people [5].

We used this model to show the progress of each of the students through a *car racing* visualization which has been implemented as an online self-assessment tool. This tool makes the information easy to comprehend and allows a proper comparison of one's progress with the rest of the students in order to enable the learner to cope with the rest of the students or even help their peers.

The provision of this platform aims to establish a link between visualization, self-assessment, and gamification, so that English learners at KAU are able to get a proper feedback of their progress and can track their learning progress by themselves.

II. LITERATURE REVIEW

The learning experience of a student can be uplifted by providing them with the ability to self-assess continuously.

Wala Bagunaid is with Information Systems Department at the Faculty of Computing and Information Technology at King Abdulaziz University, Jeddah, KSA (phone: +61 450557533; e-mail: Bagunaid.w@gmail.com).

Maram Meccawy is with Information Systems Department at the Faculty of Computing and Information Technology at King Abdulaziz University, Jeddah, KSA (e-mail: mmeccawy@kau.edu.sa).

Arwa Allinjawi is with the Computer Science Department, at the Faculty of Computing and Information Technology at King Abdulaziz University, Jeddah, KSA (e-mail: aallinjawi@kau.edu.sa).

Zilal Meccawy is with English language Institute (ELI) at King Abdul-Aziz University, Jeddah, KSA (e-mail: zmeccawy@kau.edu.sa).

World Academy of Science, Engineering and Technology
International Journal of Educational and Pedagogical Sciences
Vol:13, No:2, 2019

Constant feedback plays a vital role in their progress, but it is not feasible for the teachers to provide feedback to each student due to the high numbers of students enrolled in the courses at universities. The teachers can assist in evaluating the performance of students at an individual level, but they cannot assess their progress at the group or class level [6].

It is necessary that each of the students know their progress and are provided with proper feedback at regular intervals. In order to enhance learning, self-assessment is essential. As a huge number of students do not properly get feedback from their instructors and also that the feedback system does not provide them a view of the progress of other students, the method does not help in self-assessment. In order to give the student personalized feedback about their learning performance, this user needs to be modeled. Information about the progress of a student in comparison to the rest of the class can be a powerful tool for self-assessment. Student modeling is a powerful technique that can assist with the same [7].

Open Student Modeling (OSM) is a proven technology for revealing multiple student models for enhancing the engagement levels of students and encouraging them to improve [8]. Open Social Student Modeling (OSSM) is the latest variation of OSM that focuses on improving the cognitive processes of the model along with social aspects by facilitating individual modeling and group or class-level modeling for assessing one's progress [9].

OSSM is an extended version of OSM (Open Student Modelling) where the technologies help the learners to explore and engage well in their learning process. This technology motivates the learners and increases their knowledge as well. The OSSM aims to enhance the cognitive aspects of OSM along with certain social aspects as it allows the learners to view the models of their peers as well as a that of their class model [10]. Thus, it can be said that OSSM is an extension of OSM which is social and which provides an easy access to the self-assessment of students and an easy and interpretable process. The visualization process embedded in this model provides a clear picture of the learner's progress. It makes the process of self-assessment more interesting.

A primary approach that assists pupils in monitoring their progress is visualization [11]. Students who are currently undertaking a course can employ web-based visualization tools and gamification to track their progress in relation to their peers.

There are multiple tools available that support visual interpretation of OSSM. They utilize a visual user interface for providing an interactive environment to the students. Various studies involving visualization tools have established their encouraging effects on learning aptitude in students [12]. These Web-based visualization tools along with the gaming concepts are known to be useful to the learners as they self-assess themselves at learning. They can also compare their progress with that of others and establish self-motivation to enhance their progress and achieve better results [13].

In OSSM, visualization is achieved through a gaming user interface, regardless of whether the system is web-based or not. A key point of graphical user interfaces is interactivity.

According to several reports, the use of visualization tools for learners help in involving the learner in the learning process and it also has positive impacts on the individual learner.

The concept of 'gamification' started becoming popular in 2010. It represents the utilization of dynamic and mechanical elements of games in real-world scenarios for enhancing the cognitive abilities of people by providing an interactive and engaging environment for learning [14], [15].

Gamification of education can be defined as the use of elements which are game-based in a learning environment [16]. This technique has gained popularity as it is a new approach in learning. It is popular for reasons such as students' motivation and student involvement in the process of learning. The students find the use of gaming elements in education interesting and this makes gamification in education a potential tool to engage students in learning through fun and increases the quality of the learning process [17].

Gamification utilizes specific game mechanic tools and techniques for creating a competitive environment. The participants are awarded points, rewards, and badges for accomplishing tasks represented as quests. Leader boards representing the performance of participants in relation to each other may also be employed. Gamification can also be integrated with education. The encouraging effects of gamification, particularly motivating students and increasing their level of engagement, have been demonstrated by multiple studies [18]-[20].

In the field of education, the impact of gamification has been already studied. It makes the entire process of learning interesting and learners are more involved as they find fun in using the game-based elements like score-boards, badges, progress levels etc., for their self-assessment in learning [21].

The importance of student engagement is a key factor in improved learning, and many studies have indicated the vital role of students' engagement led to more positive impact on learning outcomes [22].

In the literature, previous researches on gamification have indicated that it is effective in motivating and engaging people to improve their performance and to influence desired outcomes in a positive way [23], [24]. There is increasing interest in using gamification in education; many teachers have tried to apply its concept to learning activities. In addition, several studies have been conducted to demonstrate the potential for gamification in teaching and learning [25]. However, this work aims to enhance the learning experience by motivating students for performance improvement during the semester to achieve better results. In this study, a visualization tool will be introduced in integrated with gamification that allows students to see their progress visually. The social visualization tool allows each student to display his or her own model, alongside the progress of peers as presented in the car racing.

It is expected to add another layer of motivation and guidance, it empowers the students to define and adapt their objectives by leveraging group awareness indicators. They can monitor their progress at an individual level as well as compare it to the rest of the class or group as a whole.

World Academy of Science, Engineering and Technology
International Journal of Educational and Pedagogical Sciences
Vol:13, No:2, 2019

Increasing individual engagement and motivation are important considerations in our approach since for learning to be successful at the group level, it has to be successful at the individual level.

A range of researches have been carried out in order to measure the positive outcomes of the e-learning process; the aim of this paper is to make positive contributions towards the techniques that will enhance the degree of e-learning. Coupling of progress visualization and gamification is associated with scopes of tracking the learning progress of

students in a visual manner. As gamification allows the scope of tracking the degree of learning progress of the entire class, by using this tool, students can compare their progress level with that of their classmates and take the initiative for improvement accordingly. This statement can be better understood with a practical example, if a student comes to know that he exists in the top 5% or bottom 5% of his class, then he will get more encouraged to perform his learning activities with a greater degree of effort [26].
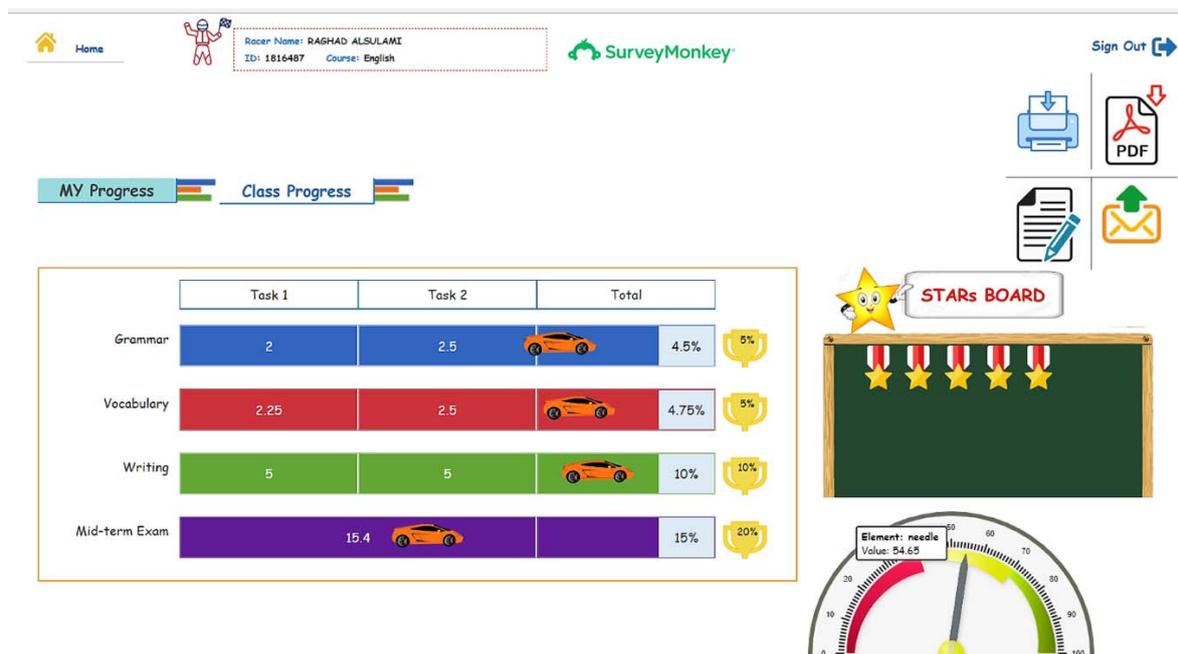

Fig. 1 Student Progress Interface

III. Experiment Design

A. Study Design and Procedure

In order to study the impact of gamification in the learning environment, we created a tool called *Track My Progress,* where the students can track their progress in learning through the visualization of a car racing theme. This tool was implemented in KAU for the students and the teachers. The tool will provide the learners with feedback as to their learning progress. The main aim of this tool is to improve the performances of the learners.

In order achieve the objectives, an experiment methodology was designed. The classroom studies were carried out in the undergraduate course "English Language according to the European Learning Framework - module 103" offered for orientation year students at the English Language Centre at the King Abdulaziz University. The tool was accessible to students through the website kau-tp.com. The platform is able to provide continuous feedback for students' learning progress. In the second week, the tool was introduced in one class and for a time-period of six weeks, and during this time they were asked to log in and track their progress of learning. After the period ended, the students were given a post-test for

evaluation and participated in a short survey to inquire about the use of the tool.

B. System Design

To study the effects of gamification in the learning environment, this study had been performed. The main aim was to apply the techniques of gamification in learning and increase the engagement and motivation of the students in the learning process. The web-based tool, *Track My Progress,* was designed based on OSSM in order to observe the impacts of gamification in education. Thus, this visualization tool was developed and implemented for a group of undergraduate students.

Two views are offered by *Track My Progress* for students. One represents the current progress of students in each skill like writing, grammar, vocabulary and midterm exam, as shown in Fig. 1. The figure shows the progress of individual students that includes the progress line of each student in accordance with their tasks and skills. The progress tracker shows the grade achieved by the student out of 100, a starboard shows how many stars have been given by teachers. Also, there are options for downloading including PDFs, print options, note taking, and sending and receiving messages

World Academy of Science, Engineering and Technology
International Journal of Educational and Pedagogical Sciences
Vol:13, No:2, 2019

between the student and teacher, and among the students themselves.

The other view provides students with the ability to track of the progress of other students in the form of car racing game, as shown in Fig. 2. In order to add a better visual understanding of the four paths of racing, different colors have been used. The pink car indicates the student, while gray cars display the classmates anonymously. Personal information like name or student ID, have been kept hidden in order to maintain privacy. The cup identifies the student's ranking among their classmates in each skill.
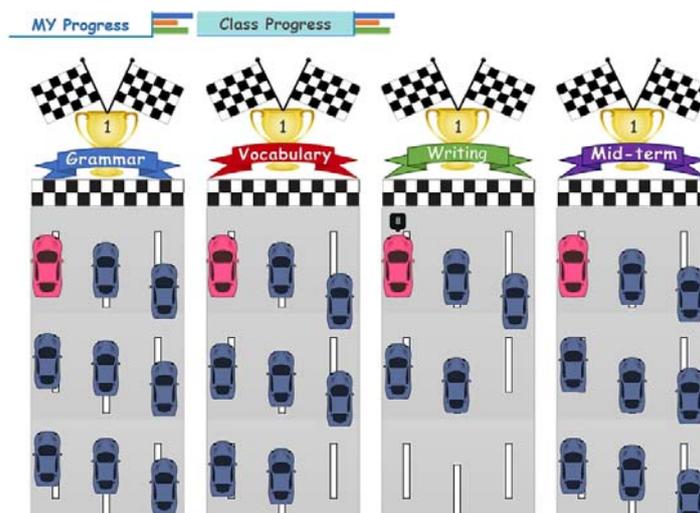

Fig. 2 Class Progress Interface

With alternation of the progress level of the specified student and their classmates, the order of the cars will also change. Such kinds of visualization power of *Track My Progress* will help the student to carry out an effective personal SWOT analysis to improve their own performances [27]. As students can identify their strengths and weaknesses, and that of their peers, they can help each other improve their performances.

In order to encourage the strategy of social learning, the *Track My Progress* tool has been included the scope of identification of students' progress in terms of various group models via which they can effectively track their own learning skills gaps. Hence, the action for filling those gaps can be taken by them at a very initial stage.

C. Experiment and Results

In order to observe the impact of using *Track My Progress*, a short survey was conducted to collect the feedback from the students. A questionnaire survey was given to the students after the completion of the final-tests and the users were asked to evaluate the questions on a 5-point Likert scale. The instructor was also surveyed in order to receive their feedback in respect to the use of the tool in achieving the expected outcomes and also in identifying which students require more attention and help than the rest, and how the tool helped in providing an insight to the overall performance of the class. There were 28 questions in the questionnaire reflecting on five different categories like visualization/gamification, privacy and data sharing, ease of use, and motivation. A total of 23 students responded out of 31. The results of the survey can be found in summarized form in Fig. 3. This shows that the students were able to track their progress easily from the tool

in an individual way and also that they were able to compare their progress with their peers. The students were of the opinion that as they could easily track their progress and compare it with that of the rest of the class, they were able to identify their strengths and weaknesses.

The survey results also showed that the students could easily interpret the information displayed on *Track My Progress* about their learning progress. According to the results of the survey, more than 70-80% of the students were of the opinion that the tool was helpful to them in many ways such as tracking their progress, comparing their progress with others as well as motivating them to improve their performances. Most of the students agreed that it was important to track the progress of the rest of the students in order to compare their individual progress to the overall progress of the class where they found it significant for improving their performance.

While surveying about the visual aspects of *Track My Progress* tools, it has been found that the car racing game has gained popularity within the majority of learners. The gaming feature made the tool interesting, and the students found it easier to interpret their progress in comparison to their peers in the form of a car race. Out of 23, 18 respondents have highly rated the visual presentations of the *Track My Progress* tool. Along with that, 19 out of the 23 respondents agreed with the fact that knowing the list of the top-ranking students also adequately helped them as part of their personal development plan, as in the case of asking for help from those identified as the top-ranked students. Regarding privacy, as not everyone likes to share their information with others; out of 23 respondens, 15 agreed with the statement of providing a

World Academy of Science, Engineering and Technology
International Journal of Educational and Pedagogical Sciences
Vol:13, No:2, 2019

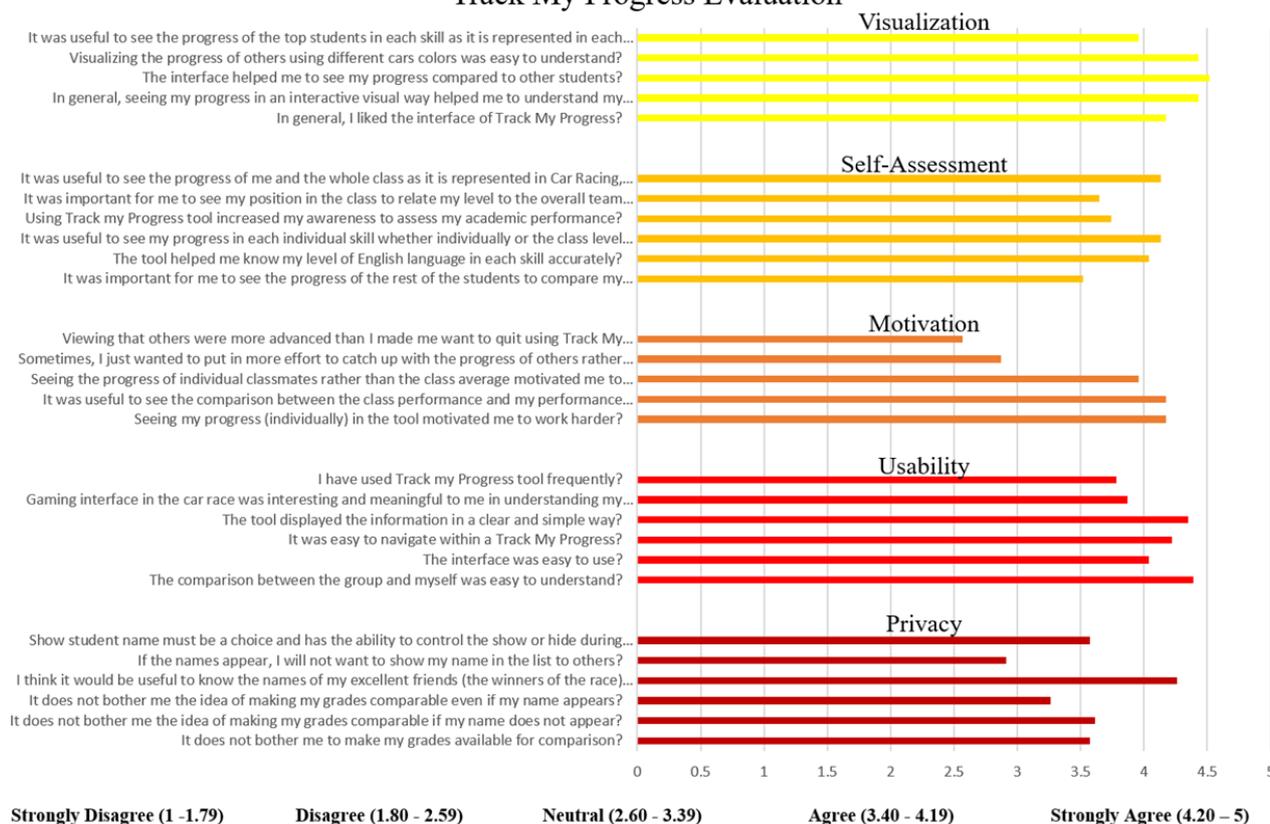control feature or option that enables them to display or hide their names as desired.

Fig. 3 Summary of Survey Evaluation

IV. DISCUSSION AND CONCLUSION

This study explored the use of social visualization in a learning environment. It observed the performance of the students after the implementation of the *Track My Progress* tool. The paper contributed to the idea of involving gamification in a learning environment with the use of an OSSM interface. This established a new avenue on the use of gamification in non-gaming environments. It has provided new insights on making learning interesting and improving the performance of the students to a great extent. Thus, the introduction of gamification was introduced and results observed through this project.

The students also got to view their results in an interactive visual manner which created an interesting way for them to track their progress and assess themselves at the individual and group levels at regular intervals. This aspect of visualization helped the students to inculcate self-motivation and significantly improve their performances.

The gamification of this platform to encourage students with self-assessment makes the learning progress more interesting for the learners and helps them in viewing the progress of their peers as well. Thus, it can be said that this visualization creates motivation in the learners and results in better performances.

It can be said that the overall impact of using the tool was satisfying for the students as they were able to understand their progress and compare their performance with that of their peers. They also felt motivated to improve their performance. However, accuracy in the project was low, and due to this, the measurement of correlation between motivation and performance could be calculated accurately. Thus, it can just be assumed that though the students benefitted immensely from using *Track My Progress*, due to the self-awareness and monitoring, the competition level among the students also increased and the competitiveness to win the race prevailed.

In forthcoming research, the project will be investigating whether the proposed approach has achieved the desired results or not. This will be done by comparing the results of students who engaged with the social visualization tool with other groups who did not.

REFERENCES

[1] Al-Nasser, A. S., 2015. Problems of English language acquisition in Saudi Arabia: An exploratory-cum-remedial study. *Theory and Practice in Language Studies*, *5*(8), p.1612.

[2] ELI Faculty Handbook 2015/2016. (2016). 1st ed. (ebook) Jeddah: King Abdulaziz University English Language Institute, p.13. Available at: http://eli.kau.edu.sa/Files/126/Files/150753_Faculty%20Handbook%20Sep2015%20.pdf (Accessed 9 Oct. 2017).

[3] Kiryakova, G., Angelova, N. and Yordanova, L., 2014. Gamification in education. Proceedings of 9th International Balkan Education and Science Conference.

[4] Hsiao, I. H., Bakalov, F., Brusilovsky, P. and König-Ries, B., 2011, July. Open social student modeling: visualizing student models with parallel introspectiveviews. In *International Conference on User Modeling, Adaptation, and Personalization* (pp. 171-182). Springer, Berlin, Heidelberg.

[5] de Sousa Borges, S., Durelli, V. H., Reis, H. M. and Isotani, S., 2014, March. A systematic mapping on gamification applied to education. In Proceedings of the 29th Annual ACM Symposium on Applied Computing (pp. 216-222). ACM.

[6] Vonderwell, S. K. and Boboc, M., 2013. Promoting formative assessment in online teaching and learning. *TechTrends*, *57*(4), pp.22-27.

[7] Mitrovic, A. and Martin, B., 2007. Evaluating the effect of open student models on self-assessment. *International Journal of Artificial Intelligence in Education*, *17*(2), pp.121-144.

[8] Brusilovsky, P., Somyürek, S., Guerra, J., Hosseini, R. and Zadorozhny, V., 2015, June. The value of social: Comparing open student modeling and open social student modeling. In *International Conference on User Modeling, Adaptation, and Personalization* (pp. 44-55). Springer, Cham.

[9] Brusilovsky, P., Somyürek, S., Guerra, J., Hosseini, R., Zadorozhny, V. and Durlach, P. J., 2016. Open social student modeling for personalized learning. *IEEE Transactions on Emerging Topics in Computing*, *4*(3), pp.450-461.

[10] Hsiao, I. H., Guerra, J., Parra, D., Bakalov, F., König-Ries, B. and Brusilovsky, P., 2012, May. Comparative social visualization for personalized e-learning. In *Proceedings of the International Working Conference on Advanced Visual Interfaces* (pp. 303-307). ACM.

[11] Fouh, E., Akbar, M. and Shaffer, C.A., 2012. The role of visualization in computer science education. *Computers in the Schools*, *29*(1-2), pp.95-117.

[12] Hsiao, I. H. and Brusilovsky, P., 2017. Guiding and motivating students through open social student modeling: lessons learned. *Teachers College Record*, *119*(3), pp.1-42.

[13] Dicheva, D., Dichev, C., Agre, G. and Angelova, G., 2015. Gamification in education: A systematic mapping study. Journal of Educational Technology & Society, 18(3).

[14] Burke, B. (2014). Gamify: How gamification motivates people to do extraordinary things: Bibliomotion, Incorporated.

[15] Reiners, T., & Wood, L. (2014). Gamification in education and business: Springer International Publishing.

[16] Sandusky, S., 2015. Gamification in education.

[17] Waris, M., Meer, F. I. and Alam, M., 2017. Gamification in education.

[18] Ibanez, M.-B., Di-Serio, A., & Delgado-Kloos, C. (2014). Gamification for engaging computer science students in learning activities: A case study. Learning Technologies, IEEE Transactions on, 7(3), 291-301.

[19] Kuo, M.-S., & Chuang, T.-Y. (2016). How gamification motivates visits and engagement for online academic dissemination – An empirical study. Computers in Human Behavior, 55, Part A, 16-27. doi: http://dx.doi.org/10.1016/j.chb.2015.08.025.

[20] Domínguez, A., Saenz-de-Navarrete, J., de-Marcos, L., Fernández-Sanz, L., Pagés, C., & Martínez-Herráiz, J.-J. (2013). Gamifying learning experiences: Practical implications and outcomes. Computers & Education, 63, 380-392. doi: http://dx.doi.org/10.1016/j.compedu.2012.12.020.

[21] Caponetto, I., Earp, J. and Ott, M., 2014, October. Gamification and education: A literature review. In European Conference on Games Based Learning (Vol. 1, p. 50). Academic Conferences International Limited.

[22] Carini, R. M., Kuh, G. D., & Klein, S. P. (2006). Student Engagement and Student Learning: Testing the Linkages*. Research in Higher Education, 47(1), 1-32. doi: 10.1007/s11162-005-8150-9.

[23] Caton, H., & Greenhill, D. (2014). Rewards and penalties: A gamification approach for increasing attendance and engagement in an undergraduate computing module. International Journal of Game-Based Learning (IJGBL), 4(3), 1-12.

[24] Leaning, M. (2015). A study of the use of games and gamification to enhance student engagement, experience and achievement on a theory-based course of an undergraduate media degree. Journal of Media Practice, 16(2), 155-170. doi: 10.1080/14682753.2015.1041807.

[25] Cheong, C., Filippou, J., & Cheong, F. (2014). Towards the gamification of learning: Investigating student perceptions of game elements. Journal of Information Systems Education, 25(3), 233.

[26] Laskowski, M. and Borys, M., 2016. The student, the professor and the player: usage for gamification and serious games in academic education–a survey. In 8th International Conference on Education and New Learning Technologies (EDULEARN 2016), Barcelona, Spain (pp. 2933-2941).

[27] Huynh, D., Zuo, L. and Iida, H., 2016, December. Analyzing Gamification of "Duolingo" with Focus on Its Course Structure. In International Conference on Games and Learning Alliance (pp. 268-277). Springer, Cham.