

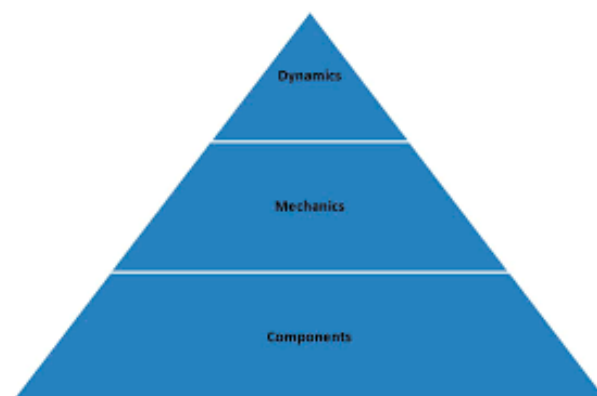
# 1. Abstract

**Abstract:** Engineering Education needs to be approached in different, innovative ways to meet the needs of society, learners, and education providers. This ranges from new educational programs and innovative pedagogies in individual classrooms, to online and immersive learning, to micro-credentials and modularity along with how to enable rapid adaptation for reskilling and upskilling, to entirely new pathways of restructuring education. Gamification is the application of game elements and digital game design techniques to non-game problems, such as learning challenges. It is about using game-based mechanics, aesthetics, and game thinking to enhance users' engagement, motivate action, and support learning. The first step in the process of designing a gamification activity is to think like a game designer. Any process can be gamified when the following requirements are covered: (i) the gamified activity is easy to learn, (ii) user progress can be measured, (iii) continuous feedback is provided to users. Gameful learning is a pedagogical approach that takes inspiration from how good games function and applies that to the design of learning environments. Gameful design operates in a self-deterministic framework where we want to apply what self-determination theory says about how intrinsic motivation works to build motivating classroom experiences. Gameful pedagogy goes farther building game elements into the design of the course, such as building up points from zero, user choice, immediate feedback, learning from failure, and transparency. The world of education has changed. And for all the trials and challenges of managing education during a pandemic, we have also learned a few things that can make our teaching and learning experiences even better in the future. A learning management system-LMS can provide personalized courses to every learner. There are many LMS systems on the market that are free for learners to use. For example, many of the learning activities in Moodle are designed to allow students to control common content, such as forums, wikis, glossaries, databases, messaging and so on. We focus on another LMS entitled Skooler. Skooler introduced the mConnect app, which gives the nearly 200 million Moodle users at more than 150,000 educational institutions worldwide the ability to use Moodle and Teams together in one seamless workspace with a single sign on. Skooler is a modern Learning Management System for K 12 schools that use Microsoft Office 365. It is seamlessly integrated with familiar Microsoft apps like Word, Excel, PowerPoint, OneNote, and Microsoft Teams. Skooler's intuitive tools help to connect teachers, students, and parents to achieve strong educational results. All of us are potential teachers as well as learners in a true collaborative environment and we learn particularly well from the act of creating or expressing something for others. The philosophical stream of constructivism should be applied to distance learning. The theory of constructivism is defined as the construction of new knowledge, which is based on the learner's previous experiences. Knowledge is therefore based on experience.

## 2. Description of the project

Gamification is the integration of game mechanics into a non-game environment (Deterding, 2012). This practice takes advantage of the features that make a game fun, to enhance the engagement of the user (Triantafyllou & Georgiadis, 2022a). Therefore, depending on whether the user of a gamified application participates in the learning process, his/her experience is enhanced. A key feature of the game's strategy is reward. This particular technique is applied to gamified projects through goals and rewards (Triantafyllou & Georgiadis, 2022b; Triantafyllou & Sapounidis, 2023). Each time a user completes a goal, the reward could be to earn a badge. Such reward examples are illustrated by point counting, badges, progress bars, and even virtual coins. This technique significantly encourages the involvement of the user, as it meets his/her internal need for recognition of his/her effort and increases his/her degree of loyalty. Gamification is a technology used in both teaching and assessment. The gamification of learning aims to increase the student's involvement with the learning material (Seaborn & Fels, 2015), as well as to increase the degree of "student engagement", while in the long term it is able to instill behaviors that will favor the acquisition of knowledge and correct social interactions (Furdu, I., Tomozei, C., & Köse, 2017).

According to Kevin Werbach (2012), the three basic features of a gamified software system are the dynamics, mechanics and components as shown in the form of a pyramid structure (see Figure 1). The dynamics constitute the basis of the game. The mechanics are the processes involved in the development of the game. Game mechanics can be categorized in the following form: (i) behaviour mechanics with focus on human behaviour and the human psychology, (ii) feedback mechanics with emphasis on the cycle feedback of gameplay, (iii) progression mechanics that constitute a set of important skills that users should develop. The components are the specific dynamics and mechanics applied to the software system such as badges, points, avatars, leaderboards, virtual goods, etc. The most well-known and used components are badges, points and leaderboards (Werbach, 2012). These components are applied to a non-game context and the gamified system is developed with main aim to enhance motivation of users to participate in the learning process and complete successfully the pre-designed set of learning tasks.



**Figure 1.** Pyramid of gamified features (Werbach, 2012).

Motivation is acknowledged to be one of the most important predictors of learners' performance in learning. Self-Determination is a theory of human motivation developed by psychologists Edward Deci and Richard Ryan. The key point of this theory is to examine what motivates a person to act. According to this theory each learner has three basic needs and only when these needs are satisfied the individual can have a better performance in learning. These needs are: (a) autonomy, (b) competence and (c) belongingness. The need of autonomy is the need to experience behavior as voluntary and give learners autonomy choosing the content they want to study (Niemic & Ryan, 2009). The need of competence is the need to experience behaviors as effectively enacted (Niemic & Ryan, 2009). The need of belongingness is learners' need to have meaningful relationships and interactions with other peers (Baumeister & Leary, 1995).

Skooler is also a set of tools within Office 365 that turns it into a full learning portal for all K-12 schools and school districts. Using Skooler, teachers can work with education-relevant elements like assignments, assessment, quizzes, absence, and grade books related to their students (see Figure 2). Students can follow their homework and perform other educational activities using known Office 365 applications like Word, OneNote and Teams ("Skooler Learning Tools", n.d.). Skooler introduced the

mConnect app, which gives the nearly 200 million Moodle users at more than 150,000 educational institutions worldwide the ability to use Moodle and Teams together in one seamless workspace with a single sign-on. Skooler's intuitive tools help connect teachers, students, and parents to achieve strong educational results.

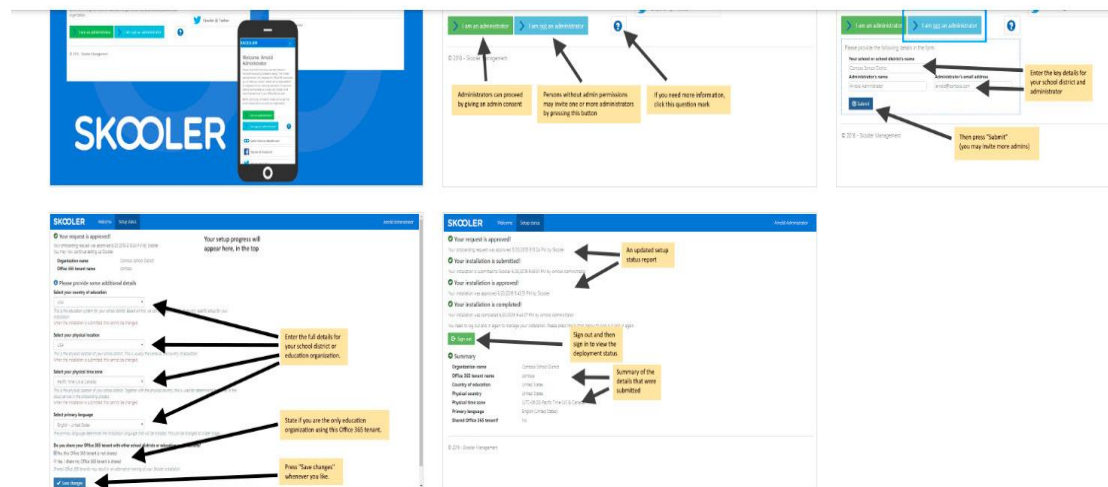


Figure 2. Skooler.

The traditional approach where teaching is the same for all individuals has become an obsolete concept. It seems that personalized learning is the new pathway to achieving excellence. The unprecedented changes that education experienced during the pandemic (COVID-19) raised questions about what teaching should look like and what curricula should look like. Personalized learning and its potential to transform education is a topic of great interest and has a lot to offer for the good of education in the future. Gamification refers to adding game elements to a course such as leaderboards, badges, trophies, and achievements, without making underlying changes to the design of the course. Gamification can open new pathways in personalized learning with many positive learning outcomes. Gameful pedagogy goes farther building game elements into the design of the course, such as building up points from zero, user choice, immediate feedback, learning from failure, and transparency.

## References

- [1]"Moodle Using Learning Communities to Create an Open Source Course Management System
- [2] Rogers, Patricia L. (31 January 2009). *The Encyclopedia of Distance Learning*, Vol 1 ISBN 9781605661995
- [3] Horvat, Ana; Dobrota M.; Krsmanovic M.; & Cudanov, M. (2015)."Student perception of Moodle learning management system a satisfaction and significance analysis" *Interactive Learning Environments*. 23(4): 515-527 doi: 10.1080/10494820.2013.788033
- [4] Krassa Anna (4 October 2013). *Gamified Moodle Course in a Corporate Environment* (2nd Moodle Research Conference (MRC 2013). Sousse, Tunisia pp 84-93. ISBN 978-618-80889-0-0
- [5] Hernandez Serrano J., Choi I., Jonassen D.H. (2000) *Integrating Constructivism and Learning Technologies*. In: Spector J. M., Anderson T.M. (eds) *Integrated and Holistic Perspectives on Learning, Instruction and Technology* Springer, Dordrecht. [https://doi.org/10.1007/0-306-47584-7\\_7](https://doi.org/10.1007/0-306-47584-7_7)
- [6] Moller L. (1998). *Designing communities of learners for asynchronous distance education* *Educational Technology Research and Development* 6(4)115-122
- [7] Source: <https://docs.moodle.org/39/en/Pedagogy>
- [8] Liakopoulou, M. (2011). *Teachers' Pedagogical Competence as a Prerequisite for Entering the Profession* *European Journal Of Education*, 46(4), 474-488 doi: 10.1111 /j.1465-3435.2011.01495.x
- [9] Niemiec, C. P., & Ryan, R. M. (2009). *Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. Theory and research in Education*, 7(2), 133-144.

- [10] Baumeister, R. F., & Leary, M. R. (2017). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Interpersonal development*, 57-89.
- [11] Source <https://elearningindustry.com/gamification-trends-2019-tips-ideas-packed>
- [12] Songer, R. W., & Miyata, K. (2014, October). A playful affordances model for gameful learning. In *Proceedings of the Second International Conference on Technological Ecosystems for Enhancing Multiculturality* (pp. 205-213).
- [13] Clark, D. B., Tanner-Smith, E., Hostetler, A., Fradkin, A., & Polikov, V. (2018). Substantial integration of typical educational games into extended curricula. *Journal of the Learning Sciences*, 27(2), 265-318.
- [14] Jonassen, D. H. (2002). *Learning to Solve Problems with Technology: With Portfolio Planner, Making Professional... Portfolios Work for You and Linking Technology and*. Prentice Hall.
- [15] Kasim, N. N. M., & Khalid, F. (2016). Choosing the right learning management system (LMS) for the higher education institution context: A systematic review. *International Journal of Emerging Technologies in Learning*, 11(6).
- [16] Dykman, C. A., & Davis, C. K. (2008). Online education forum-part three: A quality online educational experience. *Journal of Information Systems Education*, 19(3), 281.
- [17] Minnesota Online High School and Minnesota Department of Education, 2019 Retrieved from <https://careerwise.minnstate.edu/education/successonline.html>
- [18] Introducing Classroom 2019 Retrieved Dec 1 2019 from <https://edu.google.com/intl/el/workspace-for-education/classroom/>
- [19] Wood, S. L. (2010). Technology for teaching and learning: Moodle as a tool for higher education. *International journal of teaching and learning in higher education*, 22(3), 299-307.
- [20] Skooler (n.d.) Retrieved from <https://skooler.com/>
- [21] Triantafyllou, S. A., & Georgiadis, C. K. (2022). Gamification Design Patterns for user engagement. *Informatics in Education*, 21(4), 655-674.
- [22] Triantafyllou, S. A., & Saponidis, T. (2023, March). Game-based Learning approach and Serious Games to learn while you play. In *2023 IEEE World Engineering Education Conference (EDUNINE)* (pp. 1-6). IEEE.
- [23] Triantafyllou, S., & Georgiadis, C. K. (2022). Gamification of MOOCs and security awareness in corporate training.
- [24] Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *International Journal of human-computer studies*, 74, 14-31.
- [25] Werbach, K., Hunter, D., & Dixon, W. (2012). *For the win: How game thinking can revolutionize your business* (Vol. 1). Philadelphia: Wharton digital press.

### 3. Innovation of the Project

The traditional approach where teaching is the same for all individuals has become an obsolete concept. It seems that personalized learning is the new pathway to achieving excellence. The unprecedented changes that education experienced during the pandemic (COVID-19) raised questions about what teaching should look like and what curricula should look like. Personalized learning and its potential to transform education is a topic of great interest and has lot to offer for the good of education in the future. Gamification refers to adding game elements to a course such as leaderboards, badges, trophies, and achievements, without making underlying changes to the design of the course. Gamification can open new pathways in personalized learning with many positive learning outcomes. Gameful pedagogy goes farther building game elements into the design of the course, such as building up points from zero, user choice, immediate feedback, learning from failure, and transparency.

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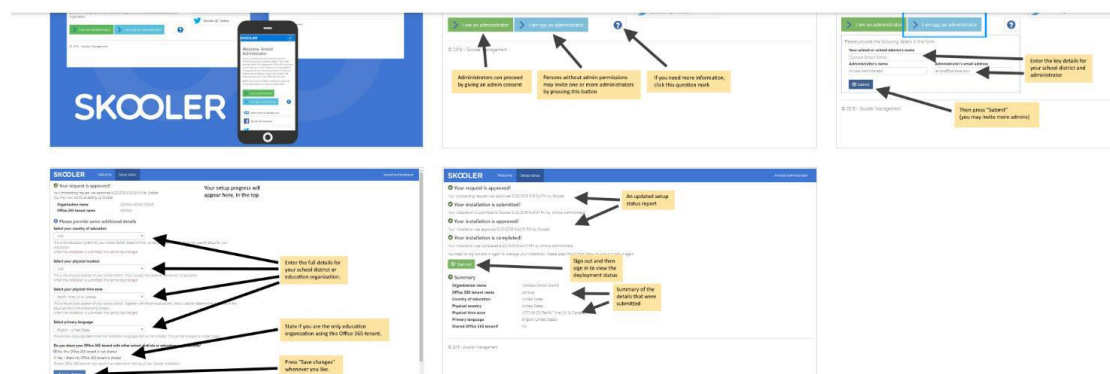


Fig.1 Skooler screenshot

## References

- [1]"Moodle Using Learning Communities to Create an Open Source Course Management System
- [2] Rogers, Patricia L. (31 January 2009). *The Encyclopedia of Distance Learning*, Vol 1 ISBN 9781605661995
- [3] Horvat, Ana; Dobrota M.; Krsmanovic M.; & Cudanov, M. (2015)."Student perception of Moodle learning management system a satisfaction and significance analysis" *Interactive Learning Environments*. 23(4): 515-527 doi: 10.1080/10494820.2013.788033
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- [24] Seaborn, K., & Fels, D. I. (2015). *Gamification in theory and action: A survey. International Journal of human-computer studies*, 74, 14-31.
- [25] Furdu, I., Tomozei, C., & Kose, U. (2017). *Pros and Cons Gamification and Gaming in Classroom. BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 8 (2): 56-62.

## 4. Description of how this project can be implemented in day-to-day life

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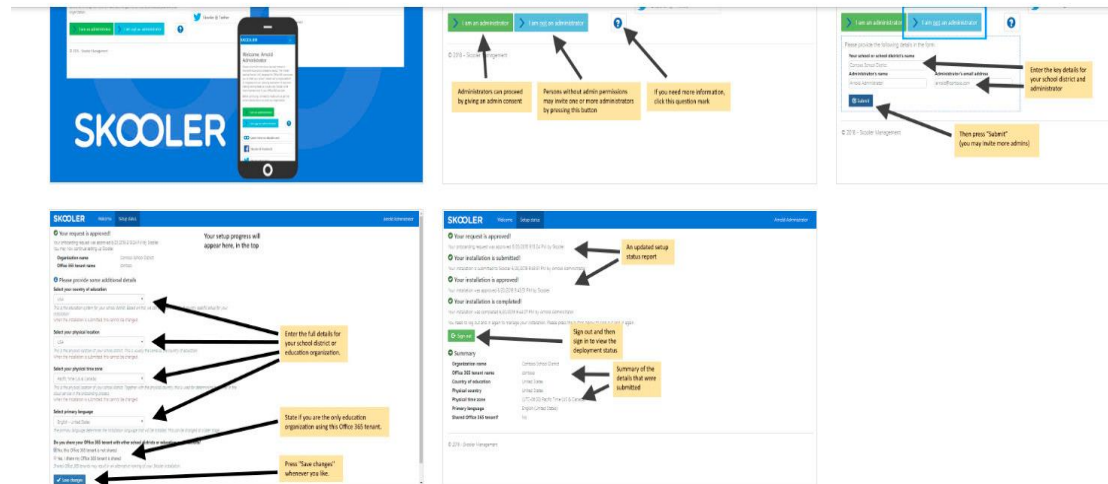


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