International Journal of Advanced Engineering and Management Research

Vol. 10, No. 01; 2025

ISSN: 2456-3676

The Training Program: "Student-centred and Gamified Learning. Exploiting Dilemma – Dibl"

Tountas Dimitrios[1]

[1]Gymnasium of Monemvasia "Giannis Ritsos"

M. Palaiologoy 30, Monemvasia Lakonias, Greece

doi.org/10.51505/ijaemr.2025.1003 URL: http://dx.doi.org/10.51505/ijaemr.2025.1003

Received: Dec 23, 2024 Accepted: Jan 01, 2025 Online Published: Jan 19, 2025

Abstract

Within the framework of the Erasmus+ program "Gamified Introduction to Gamification", (2021-2-EL01-KA210-SCH-000050330), a series of twelve (12) training actions were carried out. These actions were implemented in three parallel cycles, each lasting one week, during the period from February 20 to March 17, 2023 in various areas of the Peloponnese Region. The purpose of this presentation is to present the theoretical background, material and procedures of the training. The objective of the training activities, as formulated by the trainers of the program, was to familiarize themselves with and utilize the principles of student-centered learning and gamification, as well as the utilization of dilemma, through the dibl platform, in the educational process. The deliverables, on behalf of the trainees, were the design, implementation and evaluation of educational scenarios in which the above learning processes were integrated, depending on the specialty and the subject of teaching of each participant.

Keywords: Learner-centered learning, gamification, dilemma

1. Introduction

On May 30, 2022, took place the official launch of the Small Scale Partnership entitled: GIG-Gamificated Introduction to Gamification (2021-2-EL01-KA210-SCH-000050330), within the framework of the implementation of the Erasmus+ KA210 project. The planned duration of the partnership extended until May 29, 2024. This partnership consisted of 29 participants - partners (schools and Directorates of Education of the Peloponnese Region with the assistance of two partners from the European Union) among which is the General Lyceum of Molaoni "Thodoris Kallifatidis", a school of service, at that time, of the writer. The partnership's goal was threefold: familiarization with student-centered teaching methods, creative use of the game, and application of the principles of dilemma-based learning through the digital application dibl within the context of each subject. To implement the partnership's goal, two cycles of training activities were carried out: a weekly training of twelve trainers in November 2022 under the supervision and guidance of the "Europass Teachers Academy" organization and a series of twelve corresponding weekly trainings in February - March 2023 under the responsibility of the twelve

Vol. 10, No. 01; 2025

ISSN: 2456-3676

individuals who were trained in November 2022. The title of the training seminars of the second cycle was "Student-centered and gamified learning. Utilization of the Dilemma - dibl".

2. Clarification of concepts – theoretical background

2.1 Student-centered learning

In place of the current, adult-centered, hierarchical structure where students are the recipients of a predetermined set of knowledge, a proposal has been submitted to redesign the school education model with students at the center. Student-Centered Learning, as an educational process, takes into account students' interests, learning styles, cultural identities, life experiences and personal challenges (Kaput & Education Evolving, 2018). Its main concern, beyond the achievement of various types of goals (cognitive, emotional, attitudinal, skills) is to respond to the unique needs of students.

A multitude of research efforts through empirical studies and meta-analyses have documented the benefits for students from the use of student-centered teaching methods at the level of Primary, Secondary and Tertiary education students. Lee & Branch (2018), highlighted, in the context of student-centered learning, the importance of students' prior knowledge as well as its role in achieving learning objectives. Agustini et al. (2021), argued that the implementation of the stages of student-centered learning models provides constructive learning elements: activation of existing knowledge, acquisition of new knowledge, understanding of knowledge (through hypothesis formulation, exchange, revision and development of concepts), practice of knowledge and skills (application of knowledge). Finally, Bechter et al. (2019), believe that their research findings demonstrated that the use of learner-centered teaching strategies has the potential to motivate the student and strengthen mechanisms for pursuing positive outcomes (e.g., increased need satisfaction).

Integrating active learner-centered learning strategies during lessons can be a challenge. Several studies have described different strategies, including those that are easy to implement, that can be used to create a more student-centered approach in learning classroom (Allen, & Tanner, 2005 · Michael, 2006 · Tanner, 2013). Specifically, simple strategies that can be used with minimal preparation and still lead to meaningful "student-centered" classrooms include encouraging all students to write down their answers to a question that is posed, keeping records, Think – Pair – Share activities, using personal response systems, creating another version of the story. In addition, students can be asked to watch videos or read specific material before teaching (flipped classroom) and then engage in various activities that utilize the information, either individually or in groups (e.g., assessment quizzes). A simple suggestion that allows for the creation of an active student-centered classroom, and indeed with a minimal amount of additional work, is to present to students a problem – a topic at the beginning of the lesson that they would normally have to answer once the teaching is over. In this way, the teacher's usual lecture could serve as feedback for students and allow the construction of personal mental models and representations of the material, thus maximizing learning (Posner et al., 1982).

Vol. 10, No. 01; 2025

ISSN: 2456-3676

2.2 Gamicification

Gamification in the context of learning has received increased attention and interest in recent years for the promised benefits, by its proponents, for student motivation and learning in general. Gamification is related to the use of game design elements in non-game environments (Deterding et al., 2011). The term "games" or "serious games" refers to a system, digital or non-digital, in which players engage in an artificial conflict, defined by rules, that leads to a quantifiable outcome (Salen & Zimmerman, 2004). Gamified learning approaches do not design games nor are they used to replace an educational process, but focus on modifying an already existing learning process, in a real environment, with the aim of creating a revised version of this process that users experience as a game (Landers, 2014 · Landers et al., 2018). Based on the above conceptualization, Hamari et al. (2014), distinguish that gamification consists of three main parts: the implemented motivational activities, the resulting psychological effects and further behavioral effects. At the same time, Landers (2014) in his paper lists four components (educational content, behaviors and attitudes, game characteristics and learning outcomes), suggesting that educational content directly affects learning outcomes and student behavior.

In this context, and based on the findings of the recent review by Zeybek & Saygı (2023), it is possible to argue that gamification is used for various educational purposes, at many levels of learning, in various environments and in a wide variety of learning fields. Based on behavioral assumptions, gamification utilizes stimuli and external rewards and directly affects the extrinsic motivation of learners (Zuckerman & Gal-Oz, 2014). Leaderboards, points, rankings, competitions, and leveling are the most common game elements depending on the learning area, and are regularly used for gamification in order to cultivate a creative, competitive environment. (Hamari et al., 2014 · Kalogiannakis et al., 2021).

Modern research, despite a few objections (e.g. Klabbers, 2018 · Toda et al., 2017), seems to have accepted the benefits of implementing gamified learning processes. Thus, according to Chow et al. (2011), through gamification, students can learn in an exciting and fun way while increasing their understanding of the subject. At the same time, Krath et al. (2021), argue that gamification has the potential to clearly illustrate goals, push learners through guided pathways, provide immediate feedback, enhance good performance, and simplify content into smaller, more manageable goals. In an analysis of 32 qualitative studies with student subjects Bai et al. (2020), reveal that students enjoy gamification because it enhances enthusiasm, provides feedback on performance, satisfies their needs for recognition, and promotes goal setting. Thus, it seems well documented both the overall positive contribution of Gamification and its ability to adequately manage educational problems (Zeybek & Saygı, 2023).

2.3 Dilemma-based learning

Dilemma-Based Learning (DBL), based on Kohlberg's (1969) theory of moral development, began as a method of thinking that focuses on the use of dilemmas to improve an individual's moral reasoning ability (Wood et al., 2007). A dilemma, whether moral or not, can be defined as

Vol. 10, No. 01; 2025

ISSN: 2456-3676

an internal dialogue about a confusion between two propositions in a situation (Shapira-Lishchinsky, 2010). These two propositions contain unpleasant outcomes, often equivalent, but also a valid argument from two equivalent options (Harding, 1985). Therefore, the seriousness of the issues under consideration is determined by subjective factors of the individual facing the conflict.

Dilemma-based learning, as an educational approach, focuses on utilizing dilemmas to improve students' reasoning skills. In the classroom, dilemmas are used to facilitate group discussions and help students make logical decisions. Of paramount importance is the assumption that dilemmas can have multiple solutions (Caruana, 2021). Exploring the limits of autonomous rational thinking, cultivating mature decision-making and problem-solving skills are the primary goals of dilemmas. Moreover, problems that are applied to real-world situations, promoting cognitive stimulation and enriching learning experiences. Dilemma-based learning combines pedagogical concepts such as cooperative learning, the ethic of care, and self-regulation. According to Settelmaier (2003), dilemma stories can be presented in various formats, including role-playing, a summary of problematic situations, films and storytelling.

Dilemma-based learning has gradually been integrated, beyond Ethics lessons, into other teaching subjects such as Religious Studies, History, Languages and Personal, Social and Career Development (Wood et al., 2007). A typical example is the subject of Chemistry, in which topics such as salt hydrolysis, organic chemistry, environmental chemistry, carbonic acid in soft drinks, detergents, preservatives and seawater have been approached through dilemmas (for an rerview see Winarti et al., 2021). Going a step further, Rahmawati et al. (2022), argued that the use of dilemmas in the subject of Chemistry can empower secondary school students not only in their deep knowledge of the subject, but also in the cultivation of interdisciplinary skills for solving local environmental problems.

2.4 The dibl digital application

The dibl digital application has been developed by Serious Games Interactive, a software company based in Denmark. It is one of the partners of the Erasmus+ partnership, which is responsible for the design, configuration and ensuring the smooth operation of the Dibl platform. Currently, this application is not available to the general public and is used exclusively by the trainers and trainees of the partnership's training actions to support the design and implementation of teaching scenarios based on the dilemma, within the framework of this specific program.

2.5 The role of the teacher

The above-mentioned educational approaches create the need for modification - differentiation of the teacher's role compared to the one that was established, at least, until relatively recently. Thus, teachers need to examine the needs of students, as a group and as individuals, and encourage them to actively participate in the learning process (Emaliana, 2017). A new, student-

Vol. 10, No. 01; 2025

ISSN: 2456-3676

centered - facilitating, role is reserved for the teacher. Teachers now function, according to Donnelly & Fitzmaurice (2005), as subject advisors for students, coordinating resources and facilitating the learning process. Their focus is not simply on solving problems but, above all, on developing critical and creative thinking skills. Teachers should, with probing questions, create an open learning environment in which students are encouraged to provide creative and adequately reasoned solutions. Group discussions and respect for different perspectives are effective ways to explore different opinions and solutions (Caruana, 2021). A key concern, according to Flores-Aguilar et al. (2023), is the mobilization of learners.

3. Seminar series: "student-centered and gamified learning. Exploitation of dilemma – dibl»

3.1 Implementation

From February 20 to March 17, 2023, three cycles of twelve training programs, each lasting one week, were held in various areas of the Peloponnese region, under the title "Student-centered and gamified learning. Utilization of dilemma - dibl". As can be deduced from the title of the seminars, their goal was threefold: familiarizing participating teachers with the principles of student-centered learning and gamification, while introducing them to dilemma-based learning and the utilization of the dibl platform. These goals were achieved through activities of both a digital and non-digital nature. Practical application of the above knowledge and deliverable material by the participants was the design, implementation and evaluation of teaching scenarios related to subjects and thematic units of their specialty.

To achieve the program's goals, a series of modern educational methods were utilized. The main concern of the trainers was the cooperation of each department's members at the individual group level and at the plenary level. In order to do so both modern training and utilization of collaborative tools for distance learning (e.g. Padlet) xere used. The activities were governed by experientiality and an effort was made to document the experiences of the participants, in accordance with the principles of adult education. This was necessary given that what was required for them was a change in the way of approaching teaching subjects and the support of more student-centered and gamified teaching scenarios. On a daily basis, there were relaxation and de-stressing activities, dialogue activities and opportunities for expression through targeted and appropriate mobilization, as well as activities to evaluate the daily program. The use of extensive presentations and lectures was avoided and limited only to the clarification of necessary concepts and theoretical material.

The planning, implementing and evaluating the training program was the responsibility of the twelve trainers under the coordination and guidance of Mr. Kelefiotis, member of PEKES Peloponnese and coordinator of the Erasmus+ program. The structure and content of the seminar was guided by the corresponding training action in English by the Europass Teachers Academy in November 2022. The cooperation of the seminar leaders resulted in the necessary modifications and the development of the daily program of the seminar on a single basis and under a common, in principle, program. The seminar lasted thirty (30) hours and was held daily,

Vol. 10, No. 01; 2025

ISSN: 2456-3676

between 09:00 a.m. and 2:00 p.m. Due to the strong presence of the digital element, as will be presented in detail below, there was a need to utilize computer labs in order to have the appropriate logistical infrastructure. The structure of the program, which follows, and without differing particularly from the other programs, is related to the educational seminar that was implemented at the Molaion High School "Thodoris Kallifatidis", in Molaioi, Laconia, during the period 20-24 February 2023.

During the first day and after the arrival of the trainees, two activities to get to know each other and "breaking the ice" were held. The first concerned the self-presentation of each member of the group. The second was the "Human Bingo" activity. The participants had a card with various personality traits in their hands and had to look for the person or people who met these criteria and present them to the plenary. Then, the fears, capabilities and expectations of the trainees from their participation in the seminar were recorded in a playful way. Information was provided about the collaborative space for posting educational material (Padlet) and the creation of a user group on Viber for faster communication between us began. The entry questionnaire, which was part of the evaluation of the program, was completed. Then, the structure of the program was presented to the trainees and a presentation and discussion of the basic principles of the gamified and student-centered approach to teaching subjects was held. Shortly before the closing of the day and its evaluation, the trainees were introduced to the digital application “Learning designer”, which would be the tool for writing educational scenarios.

During the second day, and after the relevant recapitulation of the previous day's experiences, a scenario was implemented on the dibl platform with the aim of a first acquaintance with both the dilemma in teaching and the environment of the platform itself. Then, a presentation of the principles of dilemma-based learning was made with parallel discussions on the issues raised. Most of the day was dedicated to the experience approach and engagement with strategies and tools of student-centered and playful learning. Thus, the "Save the last word" technique was presented through the online application "Answergarden", with the aim of searching on the part of the participants the motivation that made one or another participant submit a specific word to the question: "What word comes to mind when you hear the word freedom?". The trainees then engaged in the "Fishbowl debate" technique. The question was whether "school kills creativity" or not and the participants had to discuss it initially at the level of an inner circle group with the other observers, and then at the plenary level. They also got acquainted with perhaps the most classic tool of playful learning, the online application Kahoot. There they answered a quiz that had been created for the purposes of the seminar and experienced, experientially, the possibilities provided by this specific application for creating quizzes in an intensely playful environment. They then competed in a "Debate" under the title "Game Fighters vs. Game Lovers", presenting arguments for or against the use of gamification during teaching. Before the evaluation of the day, they engaged in the "Think–Pair–Share" technique with the aim of approaching it from the inside on a practical level to the question: "Should a school participate in the Erasmus program or not?" There they thought, initially alone, then discussed in pairs and finally discussed in plenary on the above topic.

Vol. 10, No. 01; 2025

ISSN: 2456-3676

On the third day, after the plenary session presented student-centered actions that the trainees themselves had implemented in their classroom, there was a discussion about the prevailing climate and the way in which the students experienced the specific applications. The rest of the day was dedicated to the admittedly demanding task of learning how to use the dibl platform. The trainer had already invited and registered users on the platform and presented the management environment, the way it works and the various features of the platform (capturing a dilemma, sharing a dilemma with students, formulating closed and open-ended questions, recording "scores", creating groups). The trainees were then asked to start preparing a first dibl scenario. For this reason, they had already been guided the previous day to start thinking about how they could utilize the dilemma in a thematic unit of their subject.

The fourth day was dedicated entirely to the design of the student-centered lesson scenario while simultaneously becoming familiar with the use of the dibl platform. The trainees, either in groups or in plenary, exchanged views on the scenarios they were thinking of implementing, the strategies they were going to incorporate and, more generally, on ways of structuring a scenario based on the objectives of this program. The main concern, of course, was the adequate understanding of how the dibl platform works by everyone, as the utilization of this specific platform, being one of the deliverables of the training, was going to be included in the final scenario.

The last day was dedicated to the presentation of some of the scenarios that had already been prepared, albeit in a preliminary form, and feedback on the practices that were followed. The exit questionnaire was completed and the trainees evaluated the seminar they attended with a relevant questionnaire via the Google Forms application.

It should be noted here that, in general, the trainer-trainee collaboration had begun one week before the start of each seminar, in a remote introduction-information meeting. At the same time, two more remote meetings were held: The first two weeks after the end of the seminar with the aim of informing each other and providing feedback on the final scenarios that had been submitted, and one just before the end of the school year, with the aim of exchanging views arising from the implementation of the scenarios and their evaluation by the teachers and students themselves.

From the study of the quantitative data of the training program in its entirety is recorded the participation of 177 Primary and Secondary Education teachers, of which 113 were members of the pedagogical teams of the Erasmus+ program partners. At the same time, a corresponding number of teaching scenarios were designed, implemented and evaluated which combine principles, at a theoretical level, and activities, at a practical level, of student-centered learning, gamification and dilemma-based learning while, of course, utilizing the dibl platform.

Vol. 10, No. 01; 2025

ISSN: 2456-3676

3.2 Evaluation - conclusions

For the overall evaluation of the training program were used the entry and exit questionnaires, the seminar evaluation form and the evaluation rubrics designed by the trainees in the context of the implementation of the scenarios and completed by both the trainees themselves and the students involved. From the study of the entry and exit questionnaires, it seems that a remarkable improvement is recorded in the knowledge and skills of the trainees on issues related to student-centered learning, gamification and dilemma-based learning. From the program evaluation form, a positive image of the trainees is observed both for the content and the design and implementation of the training activities. Despite any initial difficulties in handling the dibl platform, it is ultimately recorded that the trainees made adequate use of it and that the technical problems were rather small-scale and completely manageable. Also, the fruitful and creative combination of digital and non-digital tools within the framework of the seminar in general is recorded. Perhaps the most important criterion for the evaluation of the training program was the opinions of the teachers and students themselves, which were recorded after the implementation of the teaching scenarios. The teachers' pleasant mood is observed due to their engagement with innovative practices that serve the goals of each subject. They experienced the new facilitating-guiding role of the modern teacher, who coordinates the curriculum taking into account the identities and experiences of the students and utilizes the available resources in an open creative learning environment with an emphasis on the cultivation of critical thinking. At the same time, they noted a change in the climate in the classroom and a broader mobilization of the students, resulting in their more active participation in the educational process. And the students themselves, for their part, in the self-assessment rubrics they completed, expressed their enthusiasm for participating in activities that were different and more fascinating than those they had experienced so far during their previous school years.

Based on the above data, it can be argued that the opinion of those benefiting from the training program “Student-centered and gamified learning. Exploiting the dilemma – dibl” is positive. This observation demonstrates the smooth achievement of the program’s objectives and the success of its implementation. It seems to leave behind, as a legacy, innovative practices and modern educational procedures in the service of goal-setting in various primary and secondary education subjects.

References

Agustini, K., Wahyuni, D. S., Mertayasa, I. N. E., Wedhanti, N. K., & Sukrawarpala, W. (2021). Student-centered learning models and learning outcomes: Meta-analysis and effect sizes on the students’ thesis. *Journal of Physics. Conference Series*, *1810*(1), 12049. https://doi.org/10.1088/1742-6596/1810/1/012049.

Allen, D., & Tanner, K. (2005). Infusing active learning into the large-enrollment biology class: Seven strategies, from the simple to complex. *Cell Biology Education*, *4*(4), 262-268. https://doi.org/10.1187/cbe.05-08-0113.

Bai, S., Hew, K. F., & Huang, B. (2020). Does gamification improve student learning outcome?

evidence from a meta-analysis and synthesis of qualitative data in educational contexts. *Educational Research Review, 30*, 100322. https://doi.org/10.1016/j.edurev.2020.100322.

Bechter, B. E., Dimmock, J. A., & Jackson, B. (2019). A cluster-randomized controlled trial to improve student experiences in physical education: Results of a student-centered learning intervention with high school teachers. *Psychology of Sport and Exercise, 45*, 101553. https://doi.org/10.1016/j.psychsport.2019.101553.

Caruana, N. (2021). *The use of moral dilemmas in the Ethics education curriculum* (Master's thesis, University of Malta).

Chow, A. F., Woodford, K. C., & Maes, J. (2011). Deal or No Deal: using games to improve student learning, retention and decision-making. *International journal of mathematical education in science and technology, 42*(2), 259-264. https://doi.org/10.1080/0020739X.2010.519796.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: defining "gamification". In A. Lugmayr (Ed.), *Proceedings of the 15th International Academic Mindtrek Conference: Envisioning Future Media Environments* (pp. 9–15). New York: ACM. https://doi.org/10.1145/2181037.2181040.

Donnelly, R. & Fitzmaurice, M. (2005). Collaborative project-based learning and problem-based learning in higher education: A consideration of tutor and student roles in learner-focused strategies. O'Neill, S. Moore & B. McMullin (Eds.), *Emerging Issues in the Practice of University Learning and Teaching* (pp. 87-98). Dublin: AISHE/HEA.

Emaliana, I. (2017). Teacher-centered or student-centered learning approach to promote learning?. *Jurnal Sosial Humaniora (JSH), 10*(2), 59-70. https://doi.org/10.12962/j24433527.v10i2.2161.

Flores-Aguilar, G., Prat-Grau, M., Fernández-Gavira, J., & Muñoz-Llerena, A. (2023). "I learned more because I became more involved": Teacher's and students' voice on gamification in physical education teacher education. *International Journal of Environmental Research and Public Health, 20*(4), 3038. https://doi.org/10.3390/ijerph20043038.

Hamari, J., Koivisto, J., Sarsa, H. (2014). Does gamification Work? A literature review of empirical studies on gamification. In: *Proceedings of 47th Hawaii international conference on system sciences.* IEEE, Waikoloa, pp. 1530–1605.

Harding, C. (ed.) (1985). *Moral Dilemmas and Ethical Reasoning*. Transaction Publishers.

Kalogiannakis, M., Papadakis, S., & Zourmpakis, A. (2021). Gamification in science education. A systematic review of the literature. *Education Sciences, 11*(1), 22. https://doi.org/10.3390/educsci11010022.

Kaput, K., & Education Evolving. (2018). *Evidence for student-centered learning.* Education Evolving.

Klabbers, J. H. (2018). On the architecture of game science. *Simulation & Gaming*, *49*(3), 207–245. https://doi.org/10.1177/1046878118762534.

Kohlberg, L. (1969). Stage and sequence: The cognitive-developmental approach to socialization. In D. A. Goslin (Eds.), *Handbook of socialization theory and research* (pp. 347–480). Rand McNally.

Krath, J., Schürmann, L., & von Korflesch, H. F. O. (2021). Revealing the theoretical basis of gamification: A systematic review and analysis of theory in research on gamification, serious games and game-based learning. *Computers in Human Behavior, 125*, 106963. https://doi.org/10.1016/j.chb.2021.106963.

Landers, R. N. (2014). Developing a theory of gamified learning: linking serious games and gamification of learning. *Simulation & Gaming, 45*(6), 752–768. https://doi.org/10.1177/1046878114563660.

Landers, R. N., Auer, E. M., Collmus, A. B., & Armstrong, M. B. (2018). Gamification science, its history and future: definitions and a research agenda. *Simulation & Gaming, 49*(3), 315–337. https://doi.org/10.1177/1046878118774385.

Lee, S. J., & Branch, R. M. (2018). Students' beliefs about teaching and learning and their perceptions of student-centred learning environments. *Innovations in Education and Teaching International, 55*(5), 602-610. https://doi.org/10.1080/14703297.2017.1285716.

Michael, J. (2006). Where's the evidence that active learning works? *Advances in Physiology Education, 30*(4), 159-167. https://doi.org/10.1152/advan.00053.2006.

Posner, G. J., Strike, K. A., Hewson, P. W., & Gertzog, W. A. (1982). Accommodation of a scientific conception: Toward a theory of conceptual change. *Science Education (Salem, Mass.), 66*(2), 211-227. https://doi.org/10.1002/sce.3730660207.

Rahmawati, Y., Taylor, E., Taylor, P. C., Ridwan, A., & Mardiah, A. (2022). Students' engagement in education as sustainability: Implementing an ethical dilemma-STEAM teaching model in chemistry learning. *Sustainability (Basel, Switzerland), 14*(6), 3554. https://doi.org/10.3390/su14063554.

Salen, K., & Zimmerman, E. (2004). *Rules of play: Game design fundamentals*. Cambridge, MA: MIT Press.

Settelmaier, E, (2003). *Transforming the culture of teaching and learning in science: The promise of moral dilemma stories*. Unpublished PhD thesis, Curtin University of Technology, Perth. Australia.

Shapira-Lishchinsky, O. (2010). *Teachers' critical incidents: Ethical dilemmas in teaching practice. Teaching and Teacher Education*. Elsevier LTD. doi:10.1016/j.tate.2010.11.003.

Tanner, K. D. (2013). Structure matters: Twenty-one teaching strategies to promote student engagement and cultivate classroom equity. *CBE Life Sciences Education, 12*(3), 322-331. https://doi.org/10.1187/cbe.13-06-0115.

Toda, A. M., Valle, P. H. D., & Isotani, S. (2018). The dark side of gamification: An overview of negative effects of gamification in education. In A. I. Cristea, I. I. Bittencourt, & F. Lima (Eds.), *Higher education for all. From challenges to novel technology-enhanced solutions* (pp. 143–156). Cham: Springer.

Winarti, A., Nahraniah, & Iriani, R. (2021). Validity of learning devices of buffer solution material based on dilemma stories to increase students' sustainability awareness. *Journal of Physics. Conference Series, 1832*(1), 12028. https://doi.org/10.1088/1742-6596/1832/1/012028.

Wood, P., Hymer, B., & Michel, D. (2007). *Dilemma-based Learning in the Humanities Integrating social, emotional and thinking skills*. London: Chris Kington Publishing at

Vol. 10, No. 01; 2025

ISSN: 2456-3676

Optimus Professional Publishing Limited.

Zeybek, N., & Saygı, E. (2023). *Gamification in education: Why, where, when, and how?—A systematic review.* SAGE Publications. https://doi.org/10.1177/15554120231158625

Zuckerman, O., & Gal-Oz, A. (2014). Deconstructing gamification: evaluating the effectiveness of continuous measurement, virtual rewards, and social comparison for promoting physical activity. *Personal and Ubiquitous Computing, 18*(7), 1705-1719. https://doi.org/10.1007/s00779-014-0783-2.