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Gamification Pedagogy Trigger Design for Creative Experiences in Metaverse Class Room

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ABSTRACT

The aim of this study is to design a creative process for learners. The design focuses on a pedagogy for course activities based on principles from gamification research that foregrounds the relationship between instructional practices and game-based course design for learning. The research is divided into two phases: Trigger with learner psychology and the creative experiences during learning. The research aims to shape the relationship between gamification elements and pedagogical design. The design framework will inform the creative process in the Metaverse classroom. The framework identifies critical features of the creative process that emerge throughout the learning process. Creativity will be measured by examining domain-relevant and creativity-related skills and task motivation during learning in the Metaverse environment. The research approach applies survey and observation techniques to examine the extent to which people are engaged in creative processes during their participation in the Metaverse classroom. The pedagogical design background focuses on the approach that enhances the player's interaction with the interactive elements and provides useful insights into the learner's skills and engagement. Engagement can be improved through the use of triggering gamification elements. The results show how gamification pedagogy enhances the creative experience process in the Metaverse environment. These guidelines can be used in the pedagogical design process to better promote creative learning activities. An important contribution to the research is the ability to design instructional activities that promote creative thinking through engaging interactions with technology.

KEYWORDS: Gamification, Pedagogy, Trigger Design, Creative Experiences, Metaverse in Classroom, Creative process

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1. INTRODUCTION

The aim of this study is to design a creative process for learners. The design focuses on a pedagogy for course activities based on principles from gamification research that foregrounds the relationship between instructional practices and game-based course design for learning. The research is divided into two phases: Trigger with learner psychology and the creative experiences during learning. The research aims to shape the relationship between gamification elements and pedagogical design. The design framework will inform the creative process in the Metaverse classroom. The framework identifies critical features of the creative process that emerge throughout the learning process. Creativity will be measured by examining domain-relevant and creativity-related skills and task motivation during learning in the Metaverse environment. The research approach applies survey and observation techniques to examine the extent to which people are engaged in creative processes during their participation in the Metaverse classroom. The pedagogical design background focuses on the approach that enhances the player's interaction with the interactive elements and provides useful insights into the learner's skills and engagement. Engagement can be improved through the use of triggering gamification elements. The results show how gamification pedagogy enhances the creative experience process in the Metaverse environment. These guidelines can be used in the pedagogical design process to better promote creative learning activities. An important contribution to the research is the ability to design instructional activities that promote creative thinking through engaging interactions with technology.

2. BACKGROUND

The background of a study is the first section of the paper and establishes the Metaverse context. It contains the rationale, the main pedagogical context. The background forms the signifier of the gamification elements that impact through the learning outcome. The outcome focuses on the trigger in learning. The next section deals with the creative process through the learner's experience.

2.1 Metaverse

Metaverse is a combination of the prefix "meta", implying transcendence, and the word "universe", describing a parallel or virtual environment connected to the physical world (Tlili et al., 2022). Metaverse became a buzzword. Many educators and researchers have begun to create various future plans and implementation scenarios for their learning practices. The metaverse is still emerging, but many key components have already taken shape and are revolutionizing everything from e-commerce to media and entertainment to education. The notion is relatively new, however, and there is a need to explore the impact of the creative process on the metaverse, which is where this study comes in. Individuals with high digital literacy who must have technological expertise to manage and learn in the digital environment. One of the benefits of the Metaverse is that students can participate virtually in the classroom and receive elements that occur in the real classroom. Students in the Metaverse can interact with teachers and communicate with their classmates through their avatars (Tlili et al., 2022). This environment could create an immersive learning opportunity that promotes students' learning motivation and creative process.

The impact of the Metaverse in education

From a pedagogical perspective, the design of the Metaverse can provide students with compelling digital resources and allow them to interact with academic information and have interesting experiences (Díaz, 2020). The Metaverse will facilitate the integration of practices in virtual environments, where students and faculty can interact face-to-face as in a virtual classroom, into the educational experience. In the short term, however, the Metaverse is: augmented reality should enhance - not replace - the human experience. Digital technology should not compete with physical reality because most people do not enjoy prolonged experiences in virtual worlds. The metaverse should enhance the human experience, not replace it (Sanglier, 2022). Therefore, the metaverse can perform realistic and immersive experiments that can be realized with low effort and cost (Augenstein, 2022).

2.2 Pedagogy

Pedagogy Context

The term 'pedagogy" suggests that the term is derived from the ancient Greek word 'paidagogos," meaning slave who leads children to school (Knowles, 1990). Others find that the common definition of pedagogy as 'the art or science of teaching' is at odds with their preferred emphasis on classroom learning (Beetham & Sharpe, 2007). Pedagogy, design is a term that bridges theory and practice. Design is a highly valued activity in the new information environment and a discipline that has come into its own in the digital age. The impact that the new information technologies have had on what is considered to be valuable knowledge.

Pedagogy Trigger Design

Pedagogy is the design of the processes of learning activities. The following is a comparative overview of the pedagogical focus (Luke et al., 2004). In applying these ideas to curriculum practice over the past decade, the ideas have been somewhat condensed and translated into the immediately recognizable "knowledge processes": experiencing, understanding, analyzing, and applying (Kalantzis & Bill, 2010).

- Experience is a process of learning through immersion in the real, everyday things of the world: personal experience and engagement. Experience is taken for granted in the lifeworld, and the resulting learning is usually unconscious, incidental, tacit, accidental, and deeply rooted in the lifeworld (Kalantzis & Bill, 2010).
- Conceptualizing involves the development of abstract, generalizing concepts and the theoretical synthesis of those concepts. Learners use categorizing terms that reduce the ambiguities of natural language and assemble them into mental models typical of academic disciplines (Kalantzis & Bill, 2010).

- Analyzing is a process that involves the study of cause and effect, structure and function, elements and their relationships. This activity requires logical thinking in the form of explanations and arguments (Kalantzis & Bill, 2010).
- Apply is a knowledge process in which learners actively engage with the human and natural world and learn by applying experiential, conceptual, or critical knowledge by acting on what they know about the world in the case study and learning something new from the experience of doing it (Kalantzis & Bill, 2010).

Accordingly, the study examined which game elements trigger which mechanisms (e.g., scoring, leveling, and ranking). In addition, the elements may influence the creative trigger in learning. The research background shows the concept of educational design and gamification concepts. This study explores the relationship between gamification elements and game-based engagement, which can stimulate learners to engage in creative process experiences in the metaverse classroom.

2.3 Gamification

Gamification Elements

Gamification is defined as the use of game elements and mechanisms in non-game contexts (Hamari et al., 2014). Gamification can also be used in other contexts, such as learning and educational activities (Dweck, 2009). Common techniques include rewards, leaderboards, likes and dislikes, transparency, and measurement (Seaborn & Fels, 2015). As a behaviour-based reward system, gamification can encourage people to experience a creative process. Gamification can create a powerful experience that promotes both motivation and engagement. Gamification can be used to increase motivation through intrinsic rewards and feedback. The activity concept may require the implementation of gamification, suggesting an educational trigger design.

Gamification Pedagogy Trigger

Integrating gamification into the classroom can be a powerful experience that promotes both motivation and engagement. The recent trend of "gamification" applications relies on the complexity of a well-designed and balanced game reduced to its simplest components such as badges, levels, points, and leaderboards (Muntean, 2011) to develop both a technical toolkit and a set of best practices for implementing successful gamification experiences in an educational context (McGinnis, 2008). Gamification can be used to increase motivation through intrinsic rewards and feedback lessons. Feedback activities can promote the experience of creative processes. The concept of activities may require the implementation of gamification, which is referred to as user-centered design. The use of game concepts to facilitate learning and development are the commonly outdated notions of accumulating knowledge in ideas that challenge the limits of learners' abilities and capacities. Gamification of learning and development can support learners on their path to mastery. With careful planning, gamification can help learners develop their skills, take risks, and fail in a safe context (Simpson & Jenkins, 2015). Examples of learning and training domains where gamification concepts have been used with great success include health and safety training and leadership development (e.g., Deloitte Leadership Academy) (Simpson & Jenkins, 2015). Game mechanics can trigger and reinforce competencies in situational awareness (Kuindersma et al., 2017). Pedagogy will shape the trigger in terms of learning. Gamification can be used in curriculum practice as a knowledge process: Experiencing, conceptualizing, analyzing, and applying through gamification elements. The pedagogical activity that attracts learners' experiences is promoted through goals, rewards, competition, and teamwork. In terms of conceptualizing, the study illustrates the influence of learners to categorize things and define those concepts through rules, rewards, and teamwork. Learners make generalizations using concepts and connect concepts in concept maps or theories, promoted by rules and challenges (Inchamnan et al., 2022). In addition, learners influence analysis of logical relationships, cause and effect, structure, and function through rules, challenges, and teamwork. Learners evaluate their own and others' perspectives, interests, and motivations through rules and challenges. In terms of appropriate learning, learners can apply what they have learned to real-world situations and test its validity through goals, rewards, challenges, and

teamwork. Challenges can encourage learners to make generalizations based on concepts and connect concepts in concept maps or theories. In addition, learners innovatively and creatively engage with the world or transfer what they have learned to a different context by participating in competitions and challenge mechanisms (Inchamnan et al., 2022). These concepts could be applied in the metaverse classroom. The creative process of the learners is fostered by the experiences.

2.4 Learner Experiences

User Experiences

User experience is not about the inner learning processes. User experience is about how it affects the outside, where a person comes into contact with it. Any user experience effort is aimed at improving efficiency. This is done primarily in two ways: helping people work faster and helping them make fewer mistakes (Book experience). The design of the learning experience will prepare these two main ways. This research is mainly concerned with tasks, with how streamlined the steps in a process are, and with how people think about doing them. Creating an information-rich user experience is about enabling people to find, absorb, and make sense of the information in the classroom (Book experience).

Trigger and Experiences Learner Outcome

Experience is a process of learning through immersion in the real, everyday things of the world: personal experience and engagement. Experience is taken for granted in the lifeworld – and the resulting learning is usually unconscious, incidental, tacit, accidental, and deeply rooted in the lifeworld (Cope & Kalantzis, 2015). Conceptualizing involves the development of abstract, generalizing concepts and the theoretical synthesis of those concepts. Learners use categorizing terms that reduce the ambiguities of natural language and assemble them into mental models typical of academic disciplines (Cope & Kalantzis, 2015). Analyzing is a process that involves the study of cause and effect, structure and function, elements and their relationships. This activity requires logical thinking in the form of explanations and arguments (Cope & Kalantzis, 2015). Apply is a knowledge process in which learners actively engage with the human and natural world and learn by applying experiential, conceptual, or critical knowledge – by responding to what they know about the world in the case study and learning something new from the experiences they have in the process (Cope & Kalantzis, 2015). The trigger of the experience will drive their engagement. Motivation and engagement represent passion and emotional involvement in learning activities. Engagement enables meaningful learning, which includes the quality of students′ efforts, interaction with students, and their immersive experiences (Davis, 1989). Classroom activities can enhance learners′ experiences, which is referred to as immersive engagement. Engagement influences learner acceptance. Behavior use is about how often or for what purposes the behavior is used, while behavior adoption is about how extensively the behavior is used. The constructs of motivation are important for educators to determine the impact on student learning and outcomes (Davis, 1989).

2.5 Creativity in Virtual Classroom

This section analyzes how gamification elements can enhance students′ creative abilities. The expectation of the application was to apply the pedagogical design in the virtual classroom.

Creative Process

The creative process is the result of a sustained and complex mental effort over an extended period of time (Santanen et al., 2002). The creative process consists of a step-by-step sequence of mental activities that play out like a game. It includes problem identification, goal setting, and the application of heuristic tasks (campbell, 1960; Getzels & Csikszentmihalyi, 1976) during classroom activities. Learners set goals and solve problems during tasks. Creative problem solving is constructed within a specific set of goals and pathways and considering the problem conditions (Wang, 2008). In order to understand the creative process, the criteria related to the creative activities must be clearly formulated and easily translated into assessment. The developed method focuses on the component framework of creativity assessment, which includes three main components: domain-related skills, creativity-related skills, and task motivation (Amabile, 1983). This study focuses on the thinking processes involved in creative activities and is measured using these three main components. Based on the review,

creative processes embody specific elements (e.g., goal setting, testing a response) that constitute the components of creative output. A component framework (Amabile, 1996) that considers these elements of the creative process can be summarized as follows:

- Motivation and sensitivity to problems.
- The process of seeking appropriate solutions, discrepancies, and knowledge gaps to drive the creative problem-solving process.
- The process of brainstorming (divergent thinking).
- The process of idea validation (convergent thinking)

Creativity is measured by examining domain-relevant and creativity-related skills and task motivation during virtual classroom learning. The research approach applies elicitation and observation techniques to examine the extent to which participants are engaged in creative processes while participating in the classroom. In summary, three components influence creative processes. Task motivation influences the quantity of ideas. Expertise plays an important role in developing an acceptable solution. Creativity-related skills influence the quality of ideas produced. The three components are critical characteristics of a creative process in relation to problem solving (Inchamnan et al., 2014). The purpose of this study was to determine whether the use of different factors influences creative outcomes and whether there are differential effects on the cognitive process in the metaverse classroom.

Creative Process in Virtual Environment

The factors that influence creativity are not only focused on the individual level, but also on team-related elements (Reiter-Palmon, 2018). In class, a task can be prepared for teamwork and goal setting. While many factors can influence creative problem solving (e.g., leadership, personality traits, motivation, goals, etc.), cognitions have emerged as an important facet of both individual and team creativities in creative problem solving (Bower, 2006). Core processes that occur before or after idea generation, such as problem identification and construction, and idea evaluation and selection, have received much less attention, especially at the team level (Reiter-Palmon, 2018). In virtual classrooms, learners can take advantage of many opportunities through the use of media to improve the quality of student learning. In addition, teaching in a virtual classroom provides a valuable opportunity to abstract those aspects of pedagogy that are necessary in any educational context. Comparing successful teaching practices in a virtual environment to those of virtual face-to-face classrooms. The environment allows teachers to see the difference between the important aspects of educational delivery and the contextual strategies used to implement those aspects (Reiter-Palmon et al, 2008).

3. METHODOLODY

In this research, the method of creative measurement is divided into two parts. The first part aims to determine the relationship between students' competence and learning outcomes during classroom activities. Learning motivation is measured with a questionnaire that asks, among other things, how proud students are of themselves and how their community recognizes their outstanding achievements.

The next step focuses on the characteristics of the creative processes that can occur during an activity. Achieving this goal will require a comprehensive review of the literature on creativity and the assessment of creative processes, as well as the application of this knowledge in a virtual context. Adapting existing research in this new area allows for the measurement of creative activities in the metaverse classroom. This research includes an activity study in which players are assessed using established creativity criteria to determine the level of creative activity.

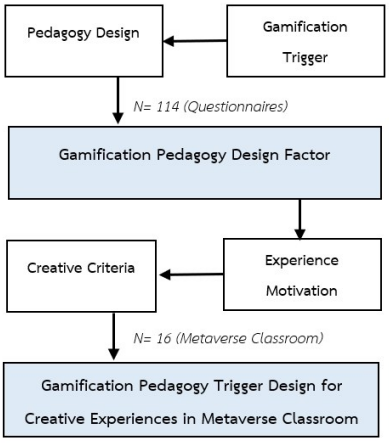

Figure 1 The Assessment method

3.1 Research question

Specifically, this study answers the following research questions (RQ):

- RQ1: What factors play a role in engaging learners in pedagogical processes during classroom activities?
- RQ2: How do specific instructional activities facilitate learner engagement in various components of the creative process during the learning experience?

3.2 Effect of batch frying

This study combines quantitative and qualitative synthesis approaches to review studies published in the literature on metaverse, gamification, and creative processes in education. In this study, a structured questionnaire was developed to be answered by learners for an empirical investigation of the factors that influence learning outcomes and pedagogical design. Individual items of the questionnaire related to motivation were rated 1 (not at all important) and 5 (extremely important) on a 5-point Likert scale in RQ1 and a 7-point Likert scale in RQ2. The research design assessed learners' knowledge processes. The experiential measurement was designed as a process based on learners' action experiences: Building on the learning resources of the everyday and familiar, prior knowledge, social background, personal interests and perspectives, and individual motivation. The questionnaire reflects the familiar (Cope & Kalantzi, 2015; Kalantzi & Cope, 2010).

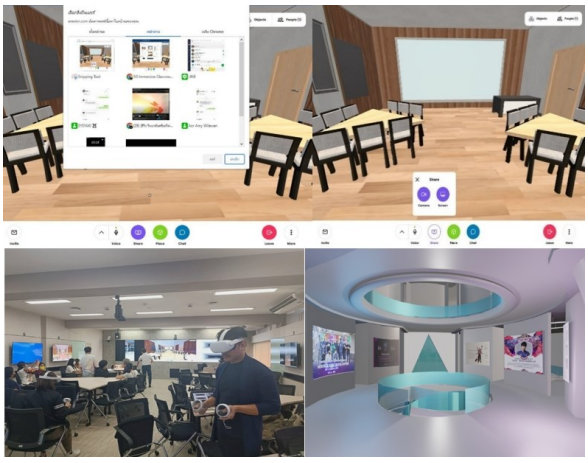

Figure 2 ANEXT: Metaverse Classroom

RQ1: What factors play a role in engaging learners in pedagogical processes during classroom activities? This question focuses on the extent to which the factors of the learning activities promote the learning outcome (GPA). Using the results obtained in answering the first research question, the types of motivation used in learning these activities are examined. The research will allow for an evaluation of the extent to which specific instructional experiences are enhanced through the use of gamification elements.

RQ2: How do specific instructional activities facilitate learner engagement in various components of the creative process during the learning experience? This question focuses on specific classroom tasks that broaden the range of creative activities experienced. This question aims to understand how specific elements of pedagogical design (e.g., challenges, goals, and rules) influence creative behaviour. The relationship between creative components, pedagogical elements, and learner experiences will be analysed in the context of the virtual classroom. To investigate the creative process, participants self-assessed the questionnaire during learning.

This coding scheme was implemented based on the criteria developed for the analysis of the creative process (task motivation, domain-relevant ability, and creativity-relevant ability) (Inchamnan et al., 2012). The results of RQ1 were used to determine the extent to which the games promoted creativity and how the components of creativity were involved. Coding was based on elements identified as significant to the creative process (Ruscio et al., 1998).

Participations RQ1

To develop the factor scale, data were collected from 114 undergraduate and graduate students enrolled at Dhurakij Pundit University in the 2022 semester. The average percentage of female students is 51.8%. The major subjects of the students are engineering, science, business and others, 45.6%, 43.9% and 8.8%, respectively. The participants self-assessed their performance at the end of the semester.

Participations RQ2

For the development of the creativity scale, data were collected from 16 undergraduate and graduate students enrolled in the University of Creative Design and Entertainment Technology, Dhurakij Pundit University. Overall, 50% of first-year students, 25% of third-year students, and 12.5% of second- and fourth-year students completed the developed scale and participated in the classroom virtual learning environment as part of a course. Participants self-evaluated their performance at the end of the semester during class (Figure 2).

4. RESULTS

4.1 Pedagogy Factor Results

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Experiencing1	49.6754	63.849	.666	.565	.905
Experiencing2	49.6228	65.476	.621	.497	.906
Conceptualizing1	49.4298	65.769	.616	.587	.907
Conceptualizing2	49.4825	64.252	.721	.599	.903
Analyzing1	49.5439	64.038	.748	.679	.902
Analyzing2	49.5088	65.172	.639	.542	.906
Applying1	49.5789	64.016	.709	.651	.903
Applying2	49.6316	63.633	.670	.588	.904
Rule	49.1667	66.246	.589	.687	.907
Objective	49.3772	63.405	.692	.696	.903
Reward	49.9386	61.952	.653	.529	.905
Challenge	49.6667	63.127	.656	.537	.905
Leaderboard	50.7807	65.624	.328	.303	.923
FunActivity	49.7544	63.231	.652	.522	.905

Figure 3 Cronbach's Alpha by Removing Items

This figure shows all the elements that identify the processes of educational learning activities. The results illustrate the correlation of the factors by Cronbach′s alpha. Cronbach′s alpha is a measure of internal consistency, i.e., how closely a group of items is related. Cronbach′s alpha can be written as a function of the number of test items and the average intercorrelation between items. The alpha (Figure 3) for the pedagogy factors is .92, indicating that 14 items have relatively high internal consistency. The results show that deleting Rule would result in a small improvement in Cronbach′s alpha (α= .907). All items have item-total correlation values greater than .2 (Figure 3). Analysis of the study data revealed acceptable reliability for the 14 pedagogy factors used in the study. All pedagogy factors are significantly associated with gamification elements. This is a factor used for the next area of learning outcomes.

Learning outcomes are influenced by the pedagogical factors shown in Figure 4. Learning outcomes can apply the gamification of these ideas to curriculum practice as a knowledge process: Experiencing, Conceptualizing, Analyzing, and Applying (factors in Figure 3) through gamification elements. The significant relationship shows (0.003) that GPA depends on how learners analyze the factor pedagogy during online instruction. The GPA target is also derived from the online teaching activities, gameplay, teamwork activities, analysis skills, rewards, and ranking activities.

4.2 Creative Process Criteria Results

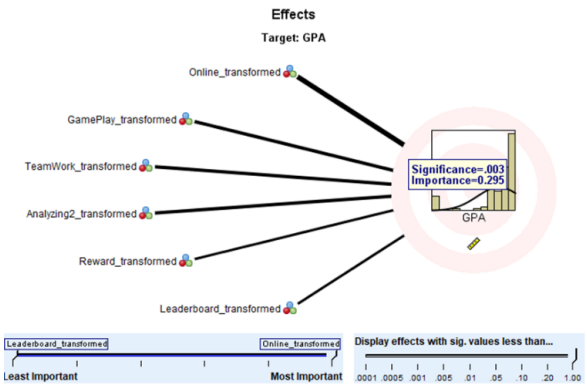

Figure 4 Pedagogy Factor and learning outcome

Mauchly′s Test of Sphericity tests the null hypothesis that the variances of the differences are equal. The result shows that Mauchly′s Test of Sphericity is statistically significant (p > 05) in task motivation and creativity-related skills between the on-site, hybrid, and online classrooms (Table 1.)

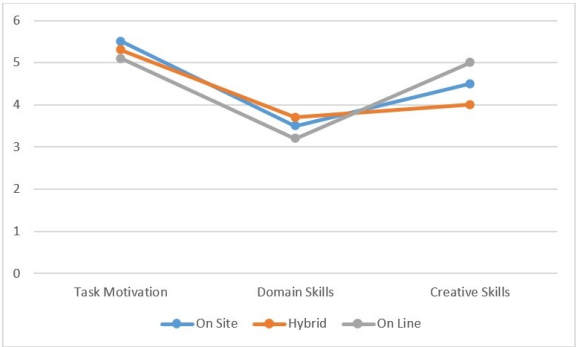

Figure 5 Creative Process

Table 1 Mauchly's Test of Sphericity

Within Subjects Effect	Measure	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
						Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Class	Task	.291	17.262	2	.000	.585	.605	.500
	Domain	.830	2.607	2	.272	.855	.954	.500
	Creativity	.564	8.012	2	.018	.696	.745	.500

Table 2 Pearson Chi-Square between factors [Applied from 16,26,32]

Creative Relevant Skill	Factor		Pearson Chi-Square Value	df	Asymptotic Significance (2-sided)
C11	Task Motivation				
The current problem that needs to be solved in the class requires more than one step. [wide focus]	Domain skill	B41	31.302[a]	20	.051
C12	Task Motivation	B41	34.349[a]	20	.024
The current problem in the class is future oriented. [wide focus]	Domain skill	B13	36.667[a]	20	.013
C13	Task Motivation	A61	32.556[a]	20	.038
Participant restates the problem presented by the class. [wide focus]	Domain skill	B12, B41	33.200[a], 37.714[a]	20, 25	.032, .049
C14	Task Motivation				
Participant is able to develop his/her own goals within the class. [wide focus]	Domain skill	B12, B16, B41	24.503[a], 25.829[a], 35.374[a]	12, 15, 15	.017, .040, .002
C15	Task Motivation	A91	16.652[a]	8	.034
Participant is performing actions not related to tasks/goals. [wide focus]	Domain skill	B16, B17	22.044[a], 23.467[a]	10, 10	.015, .009
C21	Task Motivation				
Participant transitions to a new topic area or action in the class. [Striving]	Domain skill	B16, B17, B31, B43	32.000[a], 33.010[a] ,37.467a ,21.973[a]	20, 20,16,12	.043, .034, .002, .038
C22	Task Motivation	A92	29.667[a]	16	.020
Participant questioned how to complete tasks in the class. [Striving]	Domain skill				
C23	Task Motivation	A92	31.600[a]	20	.048
Participant questions his/her current actions in the class. [Striving	Domain skill	B11	34.178[a]	20	.025
C25	Task Motivation	A22	44.413[a]	24	.007
Participant makes exclamations, as a positive or negative outburst. [Striving]	Domain skill				
C32	Task Motivation	A61, A91	33.244[a], 40.533[a]	20, 20	.032.004
Participant talks about the qualities of the materials, objects or attributes of the game world. [Concrete focus]	Domain skill	B11, B13	31.289[a], 45.333[a]	20, 25	.051, .008
C41	Task Motivation				
Participant describes action/tasks/goals in terms of analogies or metaphors. [Concept identification]	Domain skill	B12, B13, B31	32.427[a], 38.578[a], 37.511[a]	20, 25, 20	.039, .041, .010
C42	Task Motivation	A81	34.693[a]	20	.022
Participant had eureka-type moments in the class. [Concept identification]	Domain skill	B43	30.560[a]	15	.010

classroom. The on-site classroom may be more conducive to learner attention as a task motivator than other classrooms. However, the domain skills in creativity occur most frequently in the hybrid classroom. In the online classroom, the creativity-related skills are more prominent.

Table 2 illustrates the relationship between the creative criteria and the factors. Creative potential can be determined by examining the relationship between the skills required and the effect of intrinsic motivation within the activities. The factors relevant to creativity are the creative thinking component, including the ability to deviate from standard ideas, approaches, and solutions in problem solving. Individuals can gain experience in idea generation that can influence their own strategies for creative thinking processes (Amabile, 1996). Creativity-relevant skills are measured by the specific process factors of wide focus, concept identification, aspiration, and concrete focus (Ruscio et al., 1998). This leads to the following questions, which will be answered in this study. The results show that task motivation influences the creative process in terms of broad focus, striving, concept identification, and concrete focus. Task motivation influences the number of ideas in the classroom. In addition, expertise plays an important role in developing an acceptable solution. Engaging in playful activities or imagination can have a positive effect that influences active engagement with creativity-related processes. The results show that domain knowledge enhances the process through wide focus, concept identification, striving, and concrete focus.

5. CONCLUSION

The conclusion is based on the research question. RQ1: What factors play a role in engaging learners in pedagogical processes during classroom activities? The results illustrate the immediately identifiable "knowledge processes": experiencing, understanding, analyzing, and applying that influence learner engagement. The pedagogy factors show that all items (14 items) have relatively high internal consistency between the pedagogy factors (Experiencing, Understanding, Analyzing, and Applying) and the gamification elements by rule. Game Objective, Reward System, Challenge, Ranking, and Fun Factor. Question 2: How do specific instructional activities facilitate learner engagement in various components of the creative process during the learning experience? Results suggest that the effects of skill-based creative processes influence feelings of positive experiences. Results suggest that creative activities may influence learners' experiences of creative potential in the metaverse classroom. The effects of high task motivation and domain competence through instruction and gamification activities. However, task motivation influences the number of ideas in the traditional classroom. Results suggest that face-to-face activities stimulate learners more than online activities. In addition, the hybrid design for real-world experiences as a real-world affected.

6. DISCUSSION AND FUTURE RESEARCH

In class, a task can be prepared for teamwork and goal setting. While many factors can influence creative problem solving. Core processes that occur before or after idea generation, such as problem identification and construction and idea evaluation and selection, have received much less attention. The pedagogical approach focuses on analyzing the impact on learning outcomes. The pedagogical element promotes learning outcomes through reward and assessment activities. In this study, ideas for methods to measure learning outcomes are developed. The method should measure the pedagogical elements of experiencing, conceptualizing, analyzing, and applying. The inclusion of the gamification element can promote the learning outcome. The trigger can influence the creative process. The element and process are used to design the instructional activity.

This study will identify the triggering elements that influence creative skills during virtual classroom activities. The conceptual framework will help the educational system. The metaverse classroom can foster creative skills through a broad focus, identification of concepts, ambitions, and concrete tasks. Learners prefer

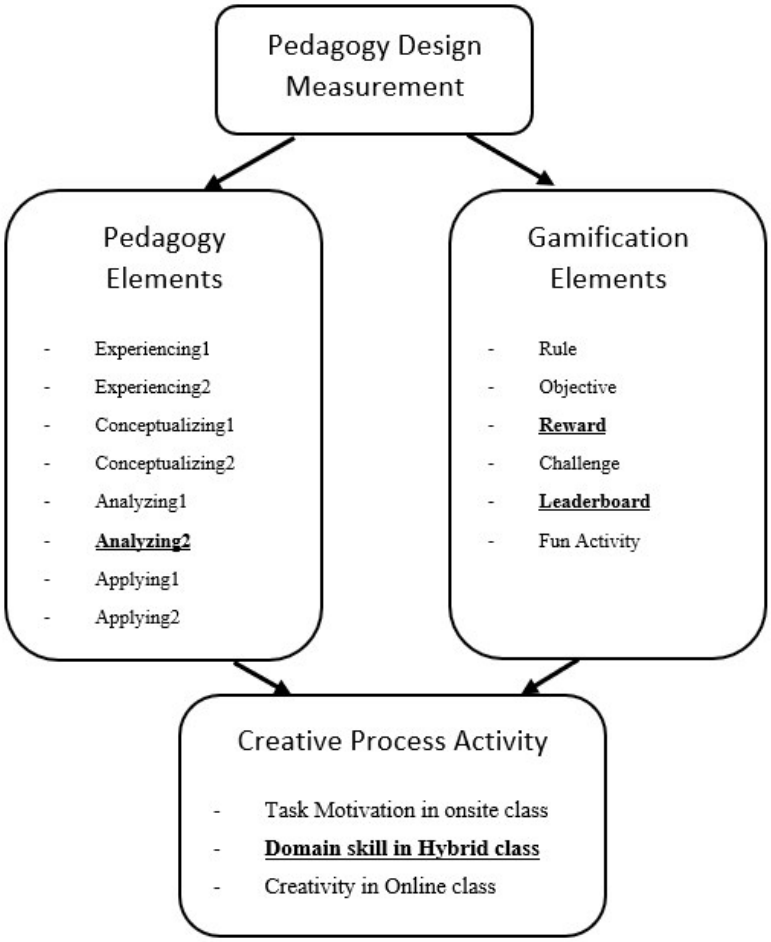

Figure 6 Gamification Pedagogy Trigger Design for Creative Experiences in Metaverse Classroom

and engage in the task by using gamification elements. The reward system will influence motivation. Figure 6 shows the conceptual framework for learners to design instructional activities. The framework aims to promote learning outcomes and design activities during instruction by using new technologies such as the hybrid (metaverse), online, and traditional classrooms. This study shows that analyzing can dominate the creative process. Future research will find other pedagogical triggers that promote creativity. Future work will examine creativity in virtual classrooms in other contexts, such as business or marketing courses. This will require a larger data set. Classroom activities will teach broad skills such as problem solving, reasoning, and other experiential skills. Deconstructing gamification elements will help educational designers foster creative thinking skills in people.

REFERENCES

Amabile, T. M. (1983). The social psychology of creativity: A componential conceptualization. *Journal of personality and social psychology*, *45*(2), 357.

Amabile, T. M. (Singer-songwriter). (1996). *Creativity in Context*. Westview Press Inc.

Augenstein, D., & Morschheuser, B. (2022). Understanding human factors in the metaverse—An autonomous driving experiment. In *Proc. European Conf. on Information Systems, Research in Progress*.

Beetham, H., & Sharpe, R. (2007). *An introduction to rethinking pedagogy for a digital age*. In Rethinking pedagogy for a digital age (pp. 21-30). Routledge.

Book experience

Bower, Matt. (2006). Virtual classroom pedagogy. *ACM Sigcse Bulletin*, *38*, 148-152.

Campbell, D. T. (1960). Blind variation and selective retentions in creative thought as in other knowledge processes. *Psychological review*, *67*(6), 380.

Contreras, G. S., González, A. H., Fernández, M. I. S., Martínez, C. B., Cepa, J., & Escobar, Z. (2022). The importance of the application of the metaverse in education. *Modern Applied Science*, *16*(3), 1-34.

Cope, B., & Kalantzis, M. (2015). The things you do to know: An introduction to the pedagogy of multiliteracies. *In A pedagogy of multiliteracies* (pp. 1-36). Palgrave Macmillan, London.

Cope, B., & Kalantzis, M. (2015). The things you do to know: An introduction to the pedagogy of multiliteracies. In *A pedagogy of multiliteracies* (pp. 1-36). Palgrave Macmillan, London.

Davis, F. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, 13*(3), 319-340. https://doi.org/10.2307/249008. 10

Díaz, J. E. M. (2020). Virtual world as a complement to hybrid and mobile learning. *International Journal of Emerging Technologies in Learning (iJET), 15* (22), 267-274. https://doi.org/10.3991/ijet.v15i22.14393

Dweck, C. S. (2009). Mindsets: Developing talent through a growth mindset. *Olympic Coach, 21*(1), 4-7.

Getzels, J. W., & Csikszentmihalyi, M. (1976). *The creative vision: A longitudinal study of problem finding in art*. Wiley New York.

Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does Gamification Work?--A Literature Review of Empirical Studies on Gamification [Paper presentation]. HICSS.

Inchamnan, W., Wyeth, P., Johnson, D., & Conroy, D. (2012). A method for measuring the creative potential of computer games. In *Entertainment Computing-ICEC 2012: 11th International Conference, ICEC 2012, Bremen, Germany. Proceedings 11* (pp. 270-283). Springer Berlin Heidelberg.

Inchamnan, W., Wyeth, P., & Johnson, D. (2014). Design for creative activity: A framework for analyzing the creative potential of computer games. In *Entertainment Computing-ICEC 2014: 13th International Conference, ICEC 2014, Sydney, Australia, October 1-3, 2014. Proceedings 13* (pp. 19-26). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-662-45212-7_3

Inchamnan, W., Yampray, K., Niranatlamphong, W., & Imsombut, A. (2022, November). The Pedagogy Gamification Design for Fun Engagement. In *2022 6th International Conference on Information Technology (InCIT)* (pp. 39-44). IEEE.

Kalantzis, M., & Cope, B. (2010). The teacher as designer: Pedagogy in the new media age. *E-learning and Digital Media*, 7(3), 200-222.

Knowles, M.S. (1990). *The Adult Learner: A Neglected Species* (4th ed.). Houston, TX: Gulf Publishing.

Kuindersma, E., van der Pal, J., van den Herik, J., & Plaat, A. (2017). Building a game to build competencies. In *Games and Learning Alliance: 6th International Conference, GALA 2017* (pp. 14-24). Springer International Publishing.

Luke, A., Cazden, C. B., Lin, A., & Freebody, P. (2004). The Singapore classroom coding scheme: Technical report. *National Institute of Education, Center for Research on Pedagogy and Practice, Singapore*.

Muntean, C. I. (2011). Raising engagement in e-learning through gamification. In the *Proc. 6th international conference on virtual learning ICVL*.

McGinnis, T., Bustard, D. W., Black, M., & Charles, D. (2008). Enhancing e-learning engagement using design patterns from computer games. In *First International Conference on Advances in Computer-Human Interaction* (pp. 124-130). IEEE.

Reiter-Palmon, R., Herman, A. E., & Yammarino, F. J. (2008). Creativity and cognitive processes: Multi-level linkages between individual and team cognition. In *Multi-level issues in creativity and innovation* (Vol. 7, pp. 203-267). Emerald Group Publishing Limited.

Reiter-Palmon, R. (2018). Creative cognition at the individual and team levels: What happens before and after idea generation. *The nature of human creativity*, 186-207.

Ruscio, J., Whitney, D. M. & Amabile, T. M. (1998). Looking inside the fishbowl of creativity: Verbal and behavioral predictors of creative performance. *Creativity Research Journal, 11*, 243-263

Santanen, E. L., Briggs, R. O., & de Devreede, G.-J. (2002). Toward an understanding of creative solution generation. In *Proceedings of the 35th Annual Hawaii International Conference on System Sciences (pp. 2899-2908). IEEE.*

Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *International Journal of human-computer studies*, *74*, 14-31.

Simpson, P., & Jenkins, P. (2015). *Gamification and Human Resources: an overview*. (pp. 1-6). Brighton: Brighton Business School.

Tlili, A., Huang, R., Shehata, B., Liu, D., Zhao, J., Metwally, A. H. S., Wang H., Denden, M., Bozkurt, A., Lee, L. K., Beyoglu, D., Altinat, F., Sharma, R. C., Altinay, Z., Li, Z. S., Liu, J. H., Ahmad, F., Hu, Y., Salha, S., Abed, M., & Burgos, D. (2022). Is Metaverse in education a blessing or a curse: a combined content and bibliometric analysis. *Smart Learning Environments*, *9*, 1-31. https://doi.org/10.1186/s40561-022-00205-x.

Wang, Y. (2008). On cognitive foundations of creativity and the cognitive process of creation. In *2008 7th IEEE International Conference on Cognitive Informatics* (pp. 104-113). IEEE.