

# **HISTORICAL ANALYSIS OF INTERACTIVE GAMIFICATION RESEARCH: A LITERATURE REVIEW WITH KUHN AND LAKATOS' APPROACHES**

**Feri Hidayatullah Firmansyah**

School of Electrical Engineering and Informatics, Institut Teknologi  
Bandung

Email: [33222301@mahasiswa.itb.ac.id](mailto:33222301@mahasiswa.itb.ac.id)

**Yusep Rosmansyah**

School of Electrical Engineering and Informatics, Institut Teknologi  
Bandung

**Dimitri Mahayana**

School of Electrical Engineering and Informatics, Institut Teknologi  
Bandung

## **Abstrak**

*Artikel tinjauan literatur ini memberikan analisis tentang perkembangan sejarah dan kerangka teoritis yang diajukan oleh para filsuf terkenal seperti Thomas Kuhn dan Imre Lakatos di bidang penelitian gamifikasi interaktif. Dengan memeriksa kontribusi dan perspektif tokoh-tokoh berpengaruh ini, penulis bertujuan untuk meningkatkan pemahaman kita tentang evolusi gamification sebagai area penelitian. Ulasan ini berfungsi sebagai sumber berharga bagi individu yang tertarik untuk menggali lebih dalam konsep gamifikasi dalam penelitian interaktif. Selain itu, artikel ini menawarkan kumpulan referensi yang dapat dieksplorasi sebagai bagian dari tahap awal penelitian di bidang gamification. Dengan mempelajari karya-karya cendekiawan berpengaruh seperti Thomas Kuhn dan Imre Lakatos, para peneliti dapat memperoleh wawasan berharga tentang evolusi dan dasar-dasar teoritis penelitian gamifikasi. Konsep Kuhn tentang pergeseran paradigma dan ide-ide Lakatos pada program penelitian memberikan para peneliti dengan kerangka kerja untuk memahami perkembangan ide dan teori dalam lapangan*

**Kata kunci:** Analisis historis, Thomas Kuhn, Imre Lakatos, Gamifikasi.

### *Abstract*

This literature review provides an analysis of the historical development and theoretical frameworks put forth by notable philosophers such as Thomas Kuhn and Imre Lakatos in the field of interactive gamification research. By examining the contributions and perspectives of these influential figures, the authors aimed to enhance our understanding of the evolution of gamification as a research area. This review serves as a valuable resource for individuals interested in delving deeper into the concept of gamification in interactive research. Furthermore, it offers a collection of references that can be explored in the initial stages of gamification research. By studying the works of influential philosophers such as Thomas Kuhn and Imre Lakatos, researchers can gain valuable insights into the evolution of gamification research and its theoretical underpinnings.. Kuhn's concept of paradigm shifts and Lakatos's ideas on research programs provide researchers with a framework to understand the progression of ideas and theories within the field.

**Keywords:** *Historical analysis, Thomas Kuhn, Imre Lakatos, Gamification.*

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## INTRODUCTION

The field of interactive gamification research has witnessed significant advancements over the years in a variety of domains, such as education (Fiş Erümit & Karakuş Yılmaz, 2022; Paraskeva, Mysirlaki, & Papagianni, 2010), health (Kanat, Siloju, Raghu, & Vinze, 2013), and marketing (Krishen, Dwivedi, Bindu, & Kumar, 2021; Olsson, Hogberg, Wastlund, & Gustafsson, 2016). To gain a deeper understanding of the historical context and theoretical underpinnings of this field, it is essential to examine the works of influential philosophers such as Thomas Kuhn (Kuhn, 2012) and Imre Lakatos (Lakatos, 1978). This literature review aims to analyze their contributions and perspectives on interactive gamification research. By exploring the historical development and theoretical

frameworks proposed by Kuhn and Lakatos, we can enhance our understanding of the evolution of gamification as a research area.

Thomas Kuhn's seminal work (Kuhn, 2012), "The Structure of Scientific Revolutions," provides a valuable lens for analyzing the historical development of interactive gamification research. Kuhn introduced the concept of scientific paradigms, suggesting that scientific progress occurs through paradigm shifts. Applying this framework to gamification, we can identify key paradigm shifts that have shaped the field over time. Kuhn's insights allow us to appreciate the transformative nature of research and the emergence of novel ideas and approaches within interactive gamification. In addition to Kuhn, Imre Lakatos' *Methodology of Scientific Research Programmes* offers valuable insights (see Hacking, 1979), including into the historical analysis of interactive gamification research. Lakatos introduced the concept of research programs, which he argued have a dynamic and evolving nature. By examining the progress of gamification research programs, we can identify the core principles and theories that have influenced the field. Lakatos's ideas shed light on how interactive gamification research has evolved through the process of continuous refinement and introduction of new methodologies.

Kuhn's and Lakatos' perspectives also shed light on the debates and controversies surrounding interactive gamification research. Kuhn's concept of scientific revolutions (Kuhn, 2012) suggests that paradigm shifts are often accompanied by resistance and disagreement among researchers. Similarly, Lakatos's notion of research programs acknowledges that different approaches and theories of gamification can compete for dominance. This study focuses on the analysis of ten papers that discuss interactive gamification, aiming to gain a comprehensive understanding of the core concepts and contributions presented in these papers. The primary objective was to enhance our understanding of the evolution of gamification as a distinct research area. This review aims to be a valuable resource for individuals interested in gaining deeper insights into the concept of gamification in interactive

research. Additionally, it provides a collection of references that can serve as a starting point for researchers venturing into the field of gamification.

The problem with this research is the lack of research on interactive gamification, so with the collection of several selected articles, the analysis of Kuhn and Lakatos is expected to provide benefits for the author to further research on interactive gamification. The findings of this study will provide valuable insights for researchers investigating the nature of gamification and its potential impact on student and educator engagement. The historical analysis by Kuhn and Lakatos provides a solid foundation for understanding the development of interactive gamification research. Their frameworks enable us to explore the evolution of paradigms, dynamics of research programs, and controversies that have shaped the field. By considering these contributions, researchers can gain a broader perspective on the historical context of interactive gamification, inspiring future investigations and advancements in this exciting area. Building on the ideas of Kuhn and Lakatos, researchers can continue to push the boundaries of interactive gamification and drive further innovation in theory and practice.

### **1. The Change In Science Is Revolutionary**

Mahayana (2022) asserts that Kuhn presents a challenge to conventional beliefs regarding the progression of scientific knowledge. During Kuhn's era, the prevailing perspective suggested that scientific development took place incrementally, with each new discovery building upon previous ones. According to this view, today's science would be an accumulation of knowledge from the preceding months or years. However, Kuhn's book proposes a contrasting notion, asserting that scientific progress occurs through revolutionary rather than cumulative means. The perspectives and positions held by physicists underwent a complete reversal after the era of relativity, diverging sharply from the views

upheld by classical physicists. Classical mechanics, for instance, adheres to the principle of energy conservation, stating that energy cannot be created, destroyed, or transformed. In contrast, relativistic mechanics introduced the concept of mass as rest energy, allowing the interpretation of energy as another form of mass.

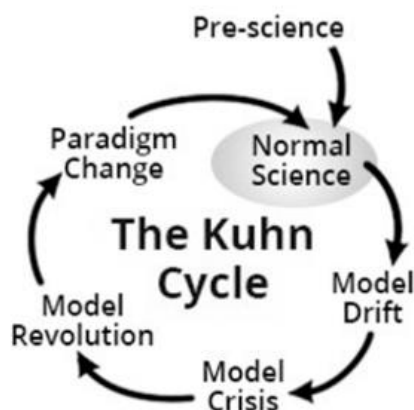


Fig 1. Thomas Kuhn Cycle (Kuhn, 2012)

In the realm of chemistry, the law of conservation of mass dictates that the total mass before and after a reaction remains unchanged (Sterner, Small, & Hood, 2011). This stands in contrast to relativistic mechanics, which acknowledges that mass can be converted into energy during reactions, particularly in chain reactions. Experimental data have revealed the limitations of classical mechanics and have provided evidence supporting the reliability of relativistic mechanics in specific cases (Band & Avishai, 2013). However, subsequent experiments and observations emerged that contradicted these findings. This explanation highlights the cumulative nature of classical mechanics' contributions to science, but Thomas Kuhn demonstrated that scientific transformations could occur revolutionarily during certain critical junctures (Mahayana, 2022).

Normal science, as conceptualized by Thomas Kuhn in his influential work "The Structure of Scientific Revolutions," refers to

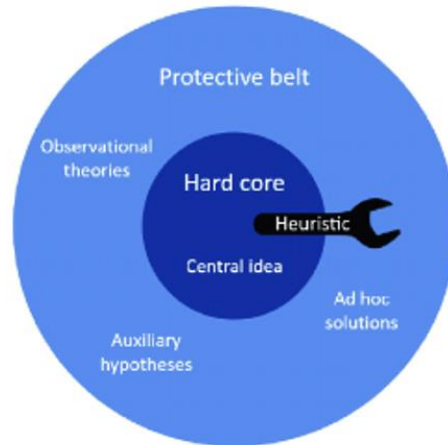
the routine activities conducted by scientists within an established paradigm or theoretical framework (Kuhn, 2012). Referring to figure 1, it involves the day-to-day work of formulating theories, making observations, and conducting experiments based on the accepted principles and assumptions of a particular scientific discipline. In this phase, scientists operate under a shared set of beliefs, methodologies, and values, working to refine and extend existing theories rather than challenge the fundamental assumptions of their field. Normal science is characterized by a cumulative process of knowledge accumulation in which incremental advancements are made within the existing scientific framework (Childers & Hentzi, 1995; Kuhn, 2012). However, Kuhn emphasized that normal science is not stagnant, but rather a vital component of the scientific process, providing stability and continuity until a paradigm shift occurs, leading to a scientific revolution (Mahayana, 2022).

## **2. Scientific Research Programs By Imre Lakatos**

In his work, Lakatos et al. (1979) introduced the concept of scientific research programs, which refers to a collection of related theories within a specific scientific field. These programs provide a framework for organizing and evaluating scientific knowledge. A research program consists of two essential components: the hard core and the protective belt. The hard core represents the central assumptions or fundamental principles that are considered essential and foundational to the program. These core assumptions are upheld by researchers and remain unfalsified, meaning that they have not been disproven or contradicted by empirical evidence. On the other hand, the protective belt consists of additional assumptions that surround the hard core. Unlike the core, these assumptions are open to falsification, which means that they can be tested and potentially proven wrong through empirical observations or experiments.

The protective belt serves as a buffer or defense mechanism for the core assumptions, allowing for adjustments or modifications to

be made without directly challenging the core. Within a research program, there is an interplay between theories. This is guided by a negative heuristic, which directs scientists to focus on testing and potentially falsifying the assumptions in the protective belt rather than directly challenging the hard core.



**Fig 2.** Research Programmes by Lakatos (Jorritsma, 2021)

The negative heuristic helps maintain the integrity and stability of the core assumptions while allowing for exploration and refinement within the protective belt (Rossetter, 2022). Additionally, there is a positive heuristic, which serves as a guide for constructing and modifying the protective belt. It provides researchers with principles and guidelines for developing new theories or modifying existing ones within the protective belt. This allows for the evolution and growth of the research program over time as new evidence and insights emerge. Overall, Lakatos' framework of scientific research programs offers a nuanced perspective on how scientific knowledge develops and evolves (Mahayana, 2022). It recognizes the importance of both core assumptions and openness to falsification in advancing scientific understanding within specific research programs.

## DISCUSSION

This study aims to enhance the understanding and significance of the selected primary references for future research on interactive gamification. Ten papers, aligned with the systematic literature review approach utilized in prior studies, have been carefully chosen. The subsequent overview provides a concise summary of these papers, highlighting their relevance to the field of gamification research.

**Table 1.** Review of relevant articles

Code	Authors	Title	Summary
R1	(Ahmad et al., 2020)	The Impact of Gamification on Learning Outcomes of Computer Science Majors	This article discusses the use of gamification in education and its impact on learning motivation, learning outcomes, and student satisfaction.
R2	(Rodrigues & Paulo, 2022)	Are They Learning or Playing? Moderator Conditions of Gamification's Success in Programming Classrooms	This article discusses the effectiveness of using gamification design in learning programming.
R3	(Hamari & Koivisto, 2014)	Measuring flow in gamification: Dispositional Flow Scale-2	This article explores the experience of flow in the context of sports gamification.
R4	(Fiş Erümit & Karakuş Yılmaz, 2022)	Gamification Design in Education: What Might Give a Sense of Play and Learning?	This article discusses the use of oyunlaştırma in learning and how the mixed-methods approach can provide a more complete picture of the effectiveness of its use.
R5	(Bitrián, Buil, & Catalán, 2020)	Flow and business simulation games: A typology of students	This article examines the use of business simulation games as a pedagogical tool to motivate and engage



Code	Authors	Title	Summary
			students in learning experiences.
R6	(Buil, Catalán, & Martínez, 2019)	Encouraging intrinsic motivation in management training: The use of business simulation games	This article discusses how to use self-determination theory to increase intrinsic motivation in management training through the use of business simulation games.
R7	(Danka, 2020)	Motivation by gamification: Adapting motivational tools of massively multiplayer online role-playing games (MMORPGs) for peer-to-peer assessment in connectivist massive open online courses (cMOOCs)	This article examines the use of motivational tools from online massively multiplayer role-playing games (MMORPGs) to increase motivation and engagement in cMOOCs.
R8	(de la Peña Esteban, Lara Torralbo, Lizcano Casas, & Burgos García, 2020)	Web gamification with problem simulators for teaching engineering	This article discusses the use of information and communication technology in increasing student motivation in solving problems in the Engineering department.
R9	(Dindar, Ren, & Järvenoja, 2021)	An experimental study on the effects of gamified cooperation and competition on English vocabulary learning	This article discusses an experimental study conducted regarding the effect of gamification in learning English vocabulary.

Code	Authors	Title	Summary
R10	(Dustman, King-Keller, & Marquez, 2021)	Development of Gamified, Interactive, Low-Cost, Flexible Virtual Microbiology Labs That Promote Higher-Order Thinking during Pandemic Instruction	This article discusses the development of an affordable, interactive and game-based virtual microbiology laboratory to improve higher-order thinking skills during distance learning due to the COVID-19 pandemic.

The article will employ a historical approach—pioneered by Kuhn and Imre Lakatos—to examine the content. This analysis aims to offer insights into the progression and transformation of the subjects discussed within the article. By utilizing Kuhn and Lakatos' historical framework, the study aims to comprehend shifts in paradigms and intellectual perspectives within the pertinent fields.

### 1. Historical Analysis by Thomas Kuhn

As explained in the first chapter, this article aims to deepen the main reference that the author will later use as a source of study in examining the criteria and types of interactive games using gamification. herefore, this article will deepen the findings of articles referenced using Kuhn's historical analysis method. The first article (Ahmad et al., 2020) on Thomas Kuhn's historical analysis in the field of research journals demonstrated that the use of gamification in education is part of the evolving nature of scientific knowledge over time. Initially, traditional approaches in education were predominantly used, but new ideas emerged, such as the use of technology and more interactive learning methods like gamification. The article falls within the realm of normal science as research is conducted to test preexisting hypotheses and employs established methods within the research field. However, it can also be seen as **the early stage of a new paradigm in education**, namely, the use of gamification as a learning method.

The second article (Rodrigues & Paulo, 2022) on Thomas Kuhn's historical analysis in the field of research journals indicates that the use of gamification in the context of education is a relatively new and evolving topic. Previously, research primarily focused on the use of technology in learning, and gamification has only recently gained increasing popularity as a subject of study. Therefore, this article can be categorized as **an early stage of normal science**, where researchers are exploring and investigating the potential of gamification in education. Then the third article (Hamari & Koivisto, 2014) reveals that the field of sports gamification is still in the developmental stage and has not reached a strong consensus among researchers. The article belongs to the stage of research that is **still in the exploration and concept development phase**, as there is a limited amount of research conducted in this field. This suggests that the field of sports gamification is relatively new, and ongoing efforts are being made to understand its potential and implications further.

The historical analysis in the fourth research article (Fiş Erümit & Karakuş Yılmaz, 2022) shows that the use of gamification in education is developing a new paradigm. Previously, more traditional and serious approaches to learning were dominant in education. However, with the emergence of studies demonstrating the effectiveness of gamification in education, this new paradigm is beginning to be accepted and adopted by experts and educational practitioners. This article falls within **the realm of normal science research**, as it discusses the development and application of previously established concepts in the field of gamification in education. The article does not attempt to replace or revolutionize existing paradigms, but rather expands our understanding of how gamification can be effectively used in the context of learning. The historical analysis by Thomas Kuhn in the next research article (Bitrián et al., 2020) indicates that research on the use of business simulation games as pedagogical tools to motivate and engage students in learning experiences is **in the stage of normal science**. This is because the research is still focused on the development of

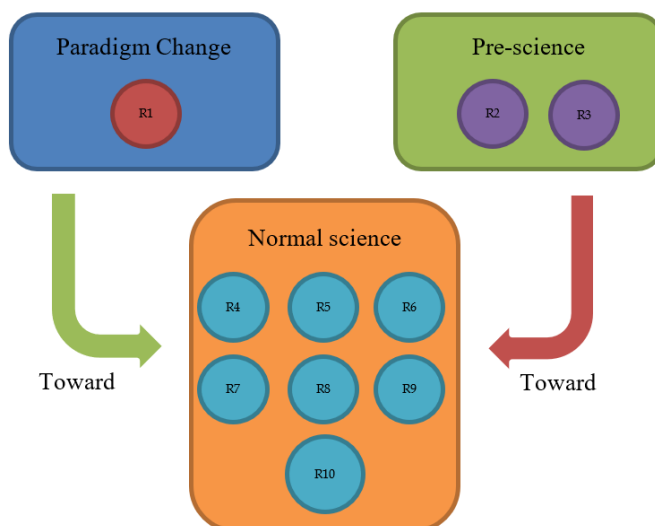
flow theory and its application in the context of business simulation games as well as on exploring the relationship between flow and students' learning outcomes. This article contributes to the ongoing development and refinement of theories and practices related to the use of business simulation games in education, adding to the existing body of knowledge in the field.

The next historical analysis by Thomas Kuhn in the research article (Buil et al., 2019) shows that this article is a new contribution to the literature on intrinsic motivation in business simulation games. This article introduces a conceptual framework based on self-determination theory to understand the factors that promote players' intrinsic motivation. Therefore, this article can be categorized as a **stage of normal science**, where research is conducted to develop and deepen the understanding of a specific topic. By building upon existing theories and proposing a new framework, this article expands the knowledge and advances the understanding of intrinsic motivation in the context of business simulation games.

Furthermore, Thomas Kuhn's framework of historical analysis can be applied in the next article (Danka, 2020). The author discusses the development of MOOCs and cMOOCs as alternatives to traditional distance learning. The article falls under the category of **normal science**, as the author introduces new ideas about the use of gamification in online education but does not significantly disrupt existing paradigms. Thomas Kuhn's historical analysis in the field of research in the next journal article (de la Peña Esteban et al., 2020) shows that, previously, information and communication technology has been used in education but has not been widely used in solving problems in the Engineering department. This article is a new breakthrough in the use of information and communication technology to increase student motivation in solving problems in the Engineering department. This article belongs to **normal science** because the author used an established and generally accepted method to develop an online board game with a case study simulator. However, this article can also be categorized as the initial

stage of a new paradigm owing to the innovative use of information and communication technology.

A historical analysis in the field of research in the ninth journal article (Dindar et al., 2021) showed that gamification in education is a relatively new and evolving topic. The article discusses an experimental study conducted in 2021, which indicates that research on gamification is still in the **normal science stage**, where scientists work to expand our understanding of a specific topic by gathering empirical data and testing hypotheses. However, this article also highlights the importance of considering the psychological processes that mediate the relationship between game mechanisms and their outcomes as well as exploring the untapped potential of collaborative gamification. This indicates that research on gamification is still in its early stages of development and has not yet reached a scientific consensus.



**Fig 3.** Summary of research reference historical analysis by Kuhn

Finally, the historical analysis inspired by Thomas Kuhn in the field of research in a journal article (Dustman et al., 2021) demonstrates that prior to the COVID-19 pandemic, microbiology laboratories had long been utilizing the same teaching methods. However, the COVID-19 pandemic compelled educators to seek

new ways of providing students with realistic laboratory experiences. This led to the development of affordable, interactive, and game-based virtual microbiology laboratories. The article falls within the realm of **normal science**, as it expands upon existing teaching methods by incorporating new technologies. However, due to the urgent need for educators to find new approaches during the COVID-19 pandemic, this article can also be regarded as a new research endeavor. From all the findings and historical analysis of Thomas Kuhn, here is a summary of the previous explanation.

## 2. Lakatos Analysis

This stage is also important to reveal the extent to which the referenced research has been researched. The depth of research is used to determine how far this article has been done. Hence, the author knows from the referenced references and what stages can be continued from the referenced research. Lakatos's analysis also helps authors understand writing patterns to be able to lead to normal science and social science, which later research on gamification can be utilized in the development of media platforms, especially for education and for other purposes related to gamification. The first article (Ahmad et al., 2020) indicates that the journal article falls within the **protective belt**, as its findings are supported by empirical data and relevant sources of knowledge, making it widely accepted by the academic community as an accurate representation of the field's reality. However, the article can also be categorized as part of the protecting belt, since further research is still needed to test new hypotheses and develop new paradigms in education. The journal article belongs to **progressive science**, as its findings provide practical benefits for students and contribute to improving the quality of education in higher institutions. Additionally, this study opens up opportunities for further development in the use of gamification as a learning method.

Lakatos' analysis of the second article (Rodrigues & Paulo, 2022) indicated that the journal article falls within the **protection belt**. This is because the article expands our understanding of the use of gamification in the context of learning and provides practical recommendations for developers to design effective gamification systems. The article not only confirms previous findings regarding the benefits of gamification in learning but also contributes new insights by clarifying the factors that influence the effectiveness of gamification design. In terms of whether the article belongs to progressive science or degenerating science, it can be said that it falls under **progressive science**. This article offers new and valuable contributions to the fields of education and technology by providing fresh insights into the use of gamification in learning contexts and practical recommendations for developers to design effective gamification systems. This study is also based on empirical research conducted using appropriate methods and valid data, ensuring that its findings are reliable and useful for the advancement of the field.

The third article (Hamari & Koivisto, 2014) in Lakatos' analysis, the journal article is located within the **protecting belt** because it is still in the concept development stage and has not yet reached a strong consensus among researchers. This article belongs to **progressive science** because it makes a new contribution to the literature on sports gamification by examining the relationship between flow experience and participation in the context of sports gamification and provides practical implications for developers of sports applications and games to increase user participation and engagement in sports activities through gamification efforts. However, it should be noted that this article still needs more research to substantiate the resulting findings and test the generalizability of the findings. Therefore, this article can also be categorized as science degeneration if there are no continued efforts to test the findings or if the findings cannot be replicated by other researchers.

Lakatos' analysis also indicates in the fourth article (Fiş Erümit & Karakuş Yılmaz, 2022) that the journal article falls within the

**protecting belt** because it utilizes previously developed research methodologies to test the effectiveness of gamification in instructional design. However, the article also aims to expand our understanding of how gamification can be effectively utilized in the context of learning. The journal article belongs to **progressive science**, as it discusses the development of new concepts and methods to enhance the effectiveness of learning through gamification. This study also seeks to test and broaden our understanding of how gamification can be effectively employed in the context of learning. Therefore, this article can be considered a positive and ongoing contribution to the advancement of knowledge in the field of gamification in education. In Lakatos' subsequent analysis, the journal article (Bitrián et al., 2020) lies within the **core belt**, as this study seeks to test and develop flow theory in the context of the game simulation business. However, this article can also be considered a protective belt because the author does not try to replace or reject existing theories, but rather tries to expand our understanding of how flow theory can be applied to educational contexts. Whether the article is a progressive science or a degenerating science depends on the perspective used. From Lakatos's perspective, this article is a **progressive science** because the author seeks to test and develop existing theories. However, from Kuhn's perspective, this article may not yet be **significant enough to be considered progressive or degenerative** because it is still in the normal stage of science and has not yet reached a paradigm revolution.

According to Lakatos' analysis, the journal (Buil et al., 2019) falls within the **core belt** as it provides a new contribution to the development of self-determination theory and its application to business simulation games. However, since the research is limited to a specific topic, it can be considered a degenerating science. Overall, the journal article represents a new contribution to the literature on intrinsic motivation in business simulation games and can be categorized as a normal science with a position in the core belt. However, because the research is limited to a specific topic, it



can be said that the article falls into the **degenerating science** phase. Furthermore, in Lakatos's analysis, the seventh article (Danka, 2020) lies within the **core belt** because the author used proven scientific methods to test his hypothesis about the use of gamification in online education. However, as the authors are still looking for more effective ways to increase the completion rate of cMOOCs, this article can be categorized as progressive science. Overall, this article is an example of **normal science** and **progressive science** because the author introduces new ideas and uses time-tested scientific methods to test his hypotheses.

With Lakatos' analysis, de la Peña Esteban et al. (2020) indicate that the journal article falls within the **core belt** as the author employs well-established and widely accepted methods to develop an online board game with case study simulations. However, the article can also be classified as part of a protecting belt because its application is limited to specific courses. The article belongs to **progressive science** as its innovative use paves the way for further advancements in the field of Engineering education. Furthermore, in Lakatos' analysis of Dindar et al. (2021), the journal article lies within the **protecting belt** because it addresses a new topic that has yet to be fully explored.

This article also includes **progressive science** because it makes a new contributes to our understanding of the use of gamification in English vocabulary learning. However, this article can also be categorized as a degenerating science if there is no significant progress in future research or if new findings cannot be generated from this research. Moreover last but not least, in Lakatos's analysis, Lakatos' analysis of Dustman et al. (2021) shows that the journal article lies within the **protecting belt** because it uses new technology to develop pre-existing learning methods. This article belongs to **progressive science** because it develops better and more effective learning methods than ever before.

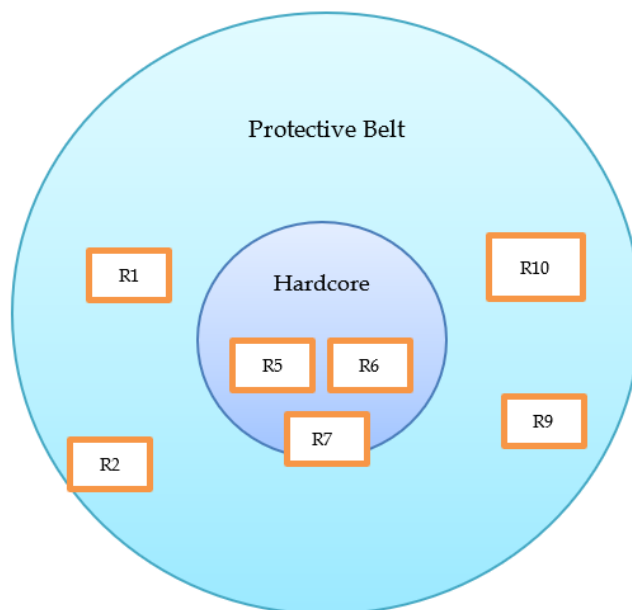


Fig 4. Summary of references, Lakatos' analysis

### 3. **Ontology, Epistemology, Axiology and Research Paradigms**

After reviewing the ten articles referenced, the author also analyzes this section to explore the methods, theoretical bases, and axiology that have been used. The results of ontology analysis found that there are four types broadly speaking, namely realism (Ahmad et al., 2020; Bitrián et al., 2020; Danka, 2020; de la Peña Esteban et al., 2020; Dindar et al., 2021; Dustman et al., 2021; Rodrigues & Paulo, 2022), based on flow theory (Hamari & Koivisto, 2014), Self-determination Theory (Buil et al., 2019), and views on the use of learning methods and applications (Fiş Erümit & Karakuş Yılmaz, 2022). One of the realism ontology of the article by Bitrián et al. (2020), is based on the view that objective reality can be measured and observed through the scientific method. This research assumes that flow experiences can be objectively measured and analyzed, and using game simulation business as a pedagogical tool can affect students' learning experiences. This ontology also assumes a causal relationship between flow experience and student learning outcomes. The article's ontology is based on the view that flow

experiences can be an important factor in increasing user participation and engagement in gamified sports activities. This article assumes that flow experience is a psychological phenomenon that can be measured and observed through valid and reliable research instruments. In addition, this article also assumes that sports gamification can increase user participation and engagement in sports activities through efforts designed to improve the flow experience.

From an epistemology perspective, we found three main types in reference articles: positivism (Ahmad et al., 2020; Bitrián et al., 2020; de la Peña Esteban et al., 2020; Dindar et al., 2021; Hamari & Koivisto, 2014; Rodrigues & Paulo, 2022), the Qualitative Approach (Danka, 2020; Fiş Erümit & Karakuş Yılmaz, 2022), and the Quantitative Approach (Buil et al., 2019; Dustman et al., 2021). The epistemology of Ahmad et al. (2020) is positivism, that is, the view that knowledge can be obtained through empirical observation and systematic testing of hypotheses. This article is based on empirical research conducted by the authors to test hypotheses about the effectiveness of using gamification in education. The authors used scientific methods, such as surveys and experimental trials, to collect data and analyze their findings. In the epistemology of positivism, knowledge is regarded as objective and empirically verifiable. Danka (2020) is based on proven scientific methods to test hypotheses about the use of gamification in online education. The author used qualitative research with interviews and observations as a tool to collect data. This epistemology also includes the view that knowledge can be gained through empirical observations and data analysis.

The axiological analysis in this study found three main findings: scientific values (Ahmad et al., 2020; Buil et al., 2019), objectivity values (Bitrián et al., 2020; Danka, 2020; de la Peña Esteban et al., 2020; Dustman et al., 2021; Fiş Erümit & Karakuş Yılmaz, 2022; Hamari & Koivisto, 2014; Rodrigues & Paulo, 2022), and experimental (Dindar et al., 2021). The axiology of Danka, (2020) is based on values, such as inclusivity, participation, and

collaboration in online education. The authors suggest that the use of gamification could increase student participation in cMOOCs and allow students from different backgrounds to learn together inclusively. This axiology also includes the view that education should be directed towards larger goals, such as the empowerment of individuals and communities. Furthermore, the axiology by Dindar et al. (2021), emphasizes the importance of ethics in human research, including the ethical consent of research participants and the protection of their privacy. The article states that participants gave written consent before engaging in experimental studies, and the data collected was kept confidential. The axiology of this article also highlights the importance of transparency in reporting research results so that methods and findings can be verified by other scientists.

For the last analysis in this chapter, we found two main paradigms included in this literature review, there are constructivism (Ahmad et al., 2020; Bitrián et al., 2020; Buil et al., 2019; de la Peña Esteban et al., 2020; Dindar et al., 2021; Fiş Erümit & Karakuş Yılmaz, 2022; Hamari & Koivisto, 2014; Rodrigues & Paulo, 2022) and social constructivism (Danka, 2020; Dustman et al., 2021). In Dindar et al. (2021), the constructivist paradigm emphasizes that social reality is constructed through interactions between individuals and their environment, so students see learning as an active process of knowledge construction. Future research may broaden our understanding of how gamification is. Also, the research paradigm suitable for further research of the (Danka, 2020) is the paradigm of social constructivism. This paradigm emphasizes the importance of social interaction in the formation of knowledge and views learning as an active and constructive process. Future research can use a qualitative approach with a focus on student experience in using gamification in online learning. This research can involve interviews, observations, and content analysis to understand how students respond to the use of gamification in online learning. Last but not least, the constructivism paradigm found in Bitrián et al. (2020) assumes that

knowledge is built through interactions between individuals, the environment, and that subjective experience can influence a person's understanding of the world. In the context of this study, the constructivism paradigm can help researchers gain a better understanding of how students build their flow experience during the game simulation business.

## CONCLUSION

This literature review provides an analysis of the contributions and perspectives of influential philosophers, such as Thomas Kuhn and Imre Lakatos in interactive gamification research. By examining the historical development and theoretical frameworks proposed by these philosophers, this review enhances our understanding of the evolution of gamification as a research area. Overall, this review serves as a valuable resource for researchers interested in gaining a deeper understanding of gamification in interactive research.

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