Gamified interventions for refugee children in primary education: A scoping study

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Abstract

By the end of 2022, UNICEF reported a staggering figure of 45 million displaced children worldwide. A significant proportion of these children encounter obstacles in accessing and attaining quality education, particularly in the context of enriching learning opportunities in a second language. Gamification of learning is a design process that can augment an existing educational context by incorporating game elements. To grasp the nature and the full potential of gamification in language learning, a scoping study was applied to detect gamified interventions that were designed for refugee students aged 6-12 years old and implemented in various formal and informal environments. Research papers were selected and supplemented by web searches to trace online reports and relevant projects for refugees. In total, twenty-six (26) interventions were selected for the coding process. The findings were organized in a narrative synthesis of emerging learning practices that respond to several gamified perspectives relating to the needs and characteristics of the target population. The final section of the paper outlines lessons learned to inform practitioners on how to leverage gamification for future learning initiatives in various refugee settings.

Keywords

Gamification, language learning, refugee, primary education, scoping study

1. Introduction

Amidst the ongoing emergence of global crises (e.g. conflicts, natural disasters), an estimated 45 million children hailing from diverse cultural and linguistic backgrounds were displaced by the end of 2022 seeking refuge in neighboring countries like Turkey and Pakistan, as well as European nations, such as Germany [1]. As a result, schools are being transformed into multicultural environments with the commitment to uphold the right of an inclusive quality education for all children. Nevertheless, approximately half of all school-age refugee children either remain excluded from educational opportunities or face the imminent risk of discontinuing their academic pursuits at various stages [2]. This new reality mandates a pedagogical change to better serve these communities through innovative practices that provide new pathways to re-construct traditional forms of learning and teaching according to their needs.

In this regard, gamified learning approaches could be applied in education to augment or alter existing learning processes [3]. Gamification is defined as "the use of game design elements in non-game contexts" (p. 9) [4]. In the educational context, gamification is considered a design process that aims to enhance learning and instruction by incorporating game elements [3, 4]. Regarding refugee-related research, gamification is still an emerging theme with various applications and techniques interrelated to the "game" concept. Thus, extensive research in this area is necessary to understand the nature of this approach on the specific population and enable the implementation of appropriate gamified interventions aimed at refugee communities. Thus, the purpose of this research is to ascertain which gamified features can affect language learning for displaced students and identify the key research priorities in gamification to advance practice for children with a refugee biography.

2. Refugee education 2.0

While in wealthier countries enrollment levels have demonstrated a considerable improvement, around half of all school-age refugee children globally are estimated to be out of school [2]. Either living in a conflict-affected developing country or a developed country with fluctuating education enrollment, the refugee group represents a heterogeneous population with high capabilities that need to be harnessed.

Nevertheless, research is scarce regarding innovative practices for children affected by emergencies [5].

As a starting point, language barriers have been detected as the main hindrance to the integration of refugee children and the main reason for dropping out in the middle of the school year, regardless of the transit position refugee populations live in [5]. Thus, it is more concise to talk about an out-of-school group, almost "invisible" to the host country. A social presence practice that could be adjusted to the needs of students in the learning space, offline or online, is what might surpass the educational boundaries and offer a more sustainable solution. According to Castaño-Muñoz et al. [6], the use of technological applications can facilitate integration and language learning, providing collaborative opportunities and guided learning. Towards this direction, digital technologies have the practical advantage to incorporate different languages, a feature that can support students' need to interact and communicate, negotiate meaning as well as access academic content in their home language(s) [7]. Tauson and Stannard [8] critically reviewed Edtech projects in humanitarian settings, concluding that despite the lack of research evidence in the field, digital technologies can improve learning outcomes only if they are responsive to students' needs and contextually appropriate. Subsequently, several studies have harnessed the full potential of the digital era. Digital storytelling [9] and multilingual apps, like Scribjab [10], have been tested on school-age refugees. Likewise, virtual reality (VR) and augmented reality (AR) have been leveraged for refugee children in emergencies to increase their exposure and "presence" to the world [11].

Moreover, Game-Based Learning (GBL) is becoming a prominent research field with the advent of serious games in education. Pedagogically rich educational apps for refugee children have been released or are currently under development [12]. However, according to UNESCO [5], high-quality apps can assist Second Language Acquisition (SLA) only if they are integrated into a formal digital course as the main classroom ecology or if they serve as supplemented learning materials in an overall gamified approach. In the same vein, Hagerman's [13] critical review of literacy interventions showed that educational innovation has shifted to fixed interventions with gamified elements for young learners with a refugee background. However, he pointed out that greater gains may be expected from open interventions that gamify the context, emphasize peer-to-peer collaboration, recognize the dynamic role of the teacher, and include more opportunities for children to interact with diverse digital literacy practices.

It could be concluded that research projects of educational technology in displacement have started to emerge with an inclination toward GBL [14] as several digital applications have been developed, aiming at language learning in a gamified form [15]. If we consider the relative increase of the refugee transit zone, we can understand this approach as the only way to keep learning on the move. Nevertheless, our standpoint is that gamification as an open intervention is more beneficial for refugee students because the emphasis should be on the human aspect and the social connectedness, while gamified applications and platforms can be utilized as additional material in such context.

3. Gamification and the refugee population

Research on gamification of learning has increased steadily during the last decade [16, 17]. Recent meta-analyses have revealed positive effects on students' affective, motivational, and behavioral learning outcomes, affirming the efficacy of various gamification design elements [18, 19]. However, as it is indicated from literature, there is a dearth of studies that precisely identify the specific game elements or combinations thereof that exert influence on learning outcomes [17, 19].

Concerning pointification elements like points, badges, and leaderboards (PBL), which are considered the most prominent features of gamification, recent findings showed no discernible differences in affective or behavioral outcomes [18]. Literature suggests a shift in the focus of empirical gamification studies and practices beyond mere pointification. Various other game elements, including quests, levels, storyline, personalization, feedback, and collaboration, among others [16] could be operationalized in a gamified learning environment. However, the impact of some gamification design features, such as narrative/storytelling, and personalization, remains inconclusive and necessitates further empirical studies for a more comprehensive understanding of their potential impact [19, 20]. Consequently, the application of gamification in education currently lacks a conclusive evidence regarding the overall impact of gamification and, more specifically, the influence of different gamification design elements under varying conditions [17].

As gamification evolves towards a more advanced stage, there is a pressing need for rigorous research tailored to specific target groups and contexts. In the current study, gamification is defined as a design process that aims to change and improve existing instruction by incorporating game design elements [4]. It is important to note that while GBL and serious games are also utilized in educational settings, they differ substantially from gamification in terms of their inherent nature and primary focus. Serious games involve the creation and development of fully-fledged games expressly designed for educational or training purposes [4], whereas game-based learning serves as the overarching framework within which these serious games are applied [21]. Clarity in distinguishing these concepts is essential for a more precise understanding and application of gamification in various educational contexts.

In the field of SLA, the systematic literature review of Dehghanzadeh et al. [22] verified that gamified English as a Second Language (ESL) classes can deliver an engaging and lucid experience, and at the same time impact language learning. Nevertheless, there is a scarcity of studies focusing on language learning among the refugee population, with the majority of research concentrating on secondary education [9].

There is a lack of gamified interventions designed for children with refugee experience, tailored to specific educational levels and disciplines. It seems necessary to consider the effectiveness of gamification in various socio-cultural environments as that aspect is only superficially addressed in the current state of the literature [19, 23].

4. Methodology: the scoping study

In the present study, the nature of gamification in refugee education is examined as the field has not been reviewed on an excessive scale before. A scoping study methodology was employed to map gamified interventions produced for and/or with refugee students. In particular, a scoping study could provide in-depth coverage of emerging fields rather than assess the quality of pre-existing studies [24]. According to Levac et al. [25], a scoping study is defined as a process of synthesizing a range of evidence to convey the nature and full scope of a field. For this purpose, Arksey and O'Malley [24] provided the following step-by-step approach: 1) identifying the research question; 2) identifying relevant studies, in multiple ways; 3) study selection, inclusion and exclusion criteria; 4) charting the data; 5) collating, summarizing, and reporting the results; and 6) a consultation exercise, an optional step involving key stakeholders to inform and validate study findings, which is not included in the given study.

The scope of the study is to review existing research evidence and identify the game elements that need to be taken into account when designing a gamified intervention for language learning. Thus, the research questions are:

- RQ1. What types of gamified interventions were produced for and/or with refugee elementary students?
- RQ2. Which gamified features affect language learning?
- RQ3. What is the impact of those interventions on the specific population?

To answer the research questions, a search strategy was adopted that involved the utilization of different sources: a) electronic databases, b) reference lists, and c) hand-searching for web projects. Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (PRISMA) were utilized to identify primary studies on specific electronic databases.

4.1. Inclusion and exclusion criteria

Inclusion and Exclusion criteria were determined for the selection of relevant studies, which are summarized in Table 1. Interventions related to serious games or GBL were included only if gamification elements were present. Accordingly, interventions referring to Information and Communications Technology (ICT) innovations or digital tools, but not encapsulating a gamified aspect, were excluded during the screening process.

Furthermore, in order to become aware of the overall state of the research field we decided to include projects that were launched recently by various organizations without a documented quality assessment since that is not a remit of the scoping study. Moreover, articles published on non-specialized web pages, as well as doctoral theses, among others, were included. The research did not impose any restrictions on the geographical area of research, or the academic content (i.e., Language and Mathematics). This inclusive approach was adopted since studied material is typically delivered in the languages of host countries, necessitating an interdisciplinary perspective involving multiple disciplines collaboratively supporting language learning. Our priority was to exclude gamification studies referring to ESL in the SLA field that had no relevance to the refugee population. As Gürsoy and Ertaşoğlu [26] stated, if researchers tend to focus only on ESL, the invisibility of refugees in national educational policy agendas will be perpetuated.

Table 1
The inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
The intervention should be targeted at the refugee population	The aim of the intervention was not targeted to refugee populations
Bi/multilingual elementary students aged 6-12	Secondary and tertiary education studies
Formal and non-formal education	Studies that focus only on cultural awareness
The intervention should be based on or assisted by game elements	The study does not include game design elements
Grey literature	The study is not written in English or Greek

4.2. Study selection

Studies were selected from six electronic databases (BASE, Taylor and Francis Online, ERIC, Google Scholar, IEEExplore, and Semantic Scholar). Additionally, the search was extended to include web searches to ensure a thorough and inclusive exploration of the available literature. Several Boolean operators were employed to cover a large area of studies, as shown in Table 4 detailed in the Appendix. The search strategy prioritized a combination of keywords related to "gamification", "refugee", and "education". Regarding the keyword "refugee", "newcomer" was selected as an alternative, not "migrant", as the latter is not precisely connected to the refugee definition and background. Also, these terms were selected to reflect the dominant discourses that shape the literature on refugee education. The term "gamification" was approached through the use of two additional concepts: "serious games" and "game-based". This strategic choice aimed to ensure a more comprehensive coverage of relevant literature, particularly in cases where databases may have shown limited results or confusion across various concepts.

Broader concepts, which align with our research, were utilized, like "digital games" or "games" as in some cases evidence on "gamification" was nonexistent. Moreover, the keyword "second language" was preferred in several cases as an alternative to "refugee education". Given that our mapping targets young ages, the educational group was specified as "primary education".

The searches across the specified databases yielded a total of 1,320 articles. In the identification process, duplicates were removed, and 671 eligible records were retrieved, and subsequently, the full texts were examined to confirm adherence to inclusion criteria. The screening process started with the examination of all titles, excluding publications that were evidently ineligible (n= 484), such as those referring to secondary or tertiary education. Subsequently, we assessed the eligibility of the remaining publications (n=187) based on their abstracts. The final step involved retrieving and evaluating the full texts of the remaining publications (n= 69). However, after a thorough evaluation, only 19 studies were found to best align with the established inclusion criteria. Additionally, seven (7) more interventions were identified through exploration of various websites and scrutinizing the reference lists of the selected articles.

4.3. Charting the data

The data that were extracted from each selected research are displayed in Table 3 (i) Author(s), study location (ii) Gamified intervention (iii) Sample and Context (duration of the intervention) (iv) Game elements and (v) Research variables.

5. Results

In the first part of this section, quantitative data will be illustrated to review existing research evidence. Then, codes are extracted and arranged in themes following the research questions. To identify the features that need to be considered when designing a gamified intervention, a narrative synthesis is employed [27]. The review will attempt to simplify the area by creating sub-categories for key design features of gamification that impact language learning.

This scoping study generated 26 research materials from 16 countries published between 2012-2022. Data demonstrated an incremental number of publications after 2018, an expected increase due to the continuous movements of populations after the Syrian crisis. Focusing on the learner and the learning environment to ascertain which gamified features affect language learning in the case of displaced students, sixteen (16) interventions were applied to refugee-only selected classes, three (3) aimed at both refugee and indigenous populations, while four (4) applied in out-of-school populations. Moreover, two (2) projects presented designed platforms with gamified features. Regarding the learning setting, gamification was integrated into school-based interventions (n=14) as well as in informal settings (n=10) such as camps and NGOs (RQ1).

In respect to the types of gamified interventions produced for and/or with refugee elementary students, seven (7) interventions involved digital games (e.g. serious games and collaborative games); six (6) developed digital courses (e.g., Project Hope, Akelius, CWTL, GeiaXara), four (4) web-based platforms (e.g., Binogi, Classcraft PALM), one (1) involved the use of AR, two (2) included exergames. "Other" category (n=6) is referring to Mooc, OER, board games, toolkit, and digital tools (e.g., Kahoot and QR) (RQ1). Regarding game elements, the more frequent ones were levels/challenges (n=17), points (n=15), narrative/storytelling (n=14), feedback (n=13), collaboration (n=13), freedom of choice (n=10), and avatars (n=8). Furthermore, the impact of the included interventions on the specific population are traced on language learning (n=12) and social adjustment (n=9), psychosocial well-being (n=6) (RQ3). Also, engagement and motivation were investigated in most studies.

A qualitative narrative analysis of the gamified educational interventions is applied to answer the research questions and visualize how gamification might be best used in various educational contexts to improve designed interventions. Following the principles of qualitative data analysis, a set of shared codes was developed based on emerging themes found in the literature.

The codes included: Positive learning outcomes and motivation to learn; Social adjustment and Co-design; Multilingualism; Resilience and psychosocial well-being; Autonomy and self-paced learning; Blended approaches and the importance of teachers (Table 22).

Table 2
The number of codes that were applied to a set of studies

Codes	No.	Studies
Positive language outcomes and motivation to learn	12	[7]; [28]; [29]; [30]; [31]; [32]; [33]; [34]; [35]; [36]; [37]; [38]
Social adjustment and Co-design	9	[28]; [34]; [39]; [40]; [41]; [42]; [43]; [44]; [45]
Multilingualism	4	[7]; [33]; [34]; [46]
Resilience and psychosocial wellbeing	6	[31]; [33]; [34]; [37]; [47]; [48];
Autonomy and self-paced learning	7	[7]; [28]; [34]; [35]; [49]; [50]; [51]
Blended approaches and the importance of teachers	5	[28]; [31]; [48]; [49]; [52]

Table 3
Selected studies for data analysis retrieved from public databases and manual searching

Authors, Country	Gamified intervention	Sample-Context	Game elements	Research variables
[33] Jordan	Serious game: Antura and the Letters	Ages 5–10 N=649 Out-of-school children Summer camp	Narrative, avatar, points, feedback, collaboration, levels/challenges	Engagement Arabic literacy Psychosocial well-being
[48] Sudan and Lebanon	DGBL course: Can't Wait to Learn (CWTL)	Ages 7-9 N=221 Out-of-school children NGO	Narrative, feedback, points, freedom of choice, levels	Psychosocial well-being Motivation Attendance
[43] Netherlands	Collaborative digital game sessions	Ages 6–13 N=9 Integration school	Feedback, collaboration, score, challenges, avatars	Social integration
[31] Australia	Fantasy-based narrative	Ages 8-12 N=15 Formal education	Narrative	Language development Narrative development
[37] Turkey	Game-based curriculum-aligned intervention: Project Hope	Ages 9–14 N=147 NGO	Feedback	Language learning Attendance Hopelessness
[32] Germany	Exergame: HOPSCOTCH	Ages 6-9 Integration classroom	Levels, freedom of choice, collaboration, scoring system, avatar	Language acquisition Social integration
[34] Jordan	Serious game: Feed the monster	Ages 8-10 and 5-7 Out-of-school children Summer camp	Narrative, levels, points, feedback, avatar	Arabic literacy Psychosocial well-being
[7] Canada	Web-based multilingual learning platform: Binogi	Ages 10–11 N=77 Formal education	Narrative, feedback, points, avatar, levels, freedom of choice	Engagement Language acquisition
[30] Greece	Digital tools	Ages 7-8 Formal education Mixed Classroom	Collaboration-competition, points	Language learning Engagement
[35] Pakistan	Gamified educational game: Footsteps2Brilliance	Ages 5-8 N=253 Out-of-school children Camps-slums	Narrative, points, challenges	Literacy skills
[41] Canada	Serious game: New Beginning	9-12 years N=30 Formal education	Storytelling, levels, avatar, freedom of choice	Behavior change Social adjustment
[36] France	Gamified puzzle games	Unaccompanied minors	Narrative, freedom of choice, collaboration-competition	Learning outcomes

[51] USA	Gamified RPG MOOC platform	Ages 6-10 Out-of-school Children	Narrative, feedback, points, levels, freedom of choice	Game design Usability evaluation
[52] Greece	Web-based platform: Classcraft	Ages 8-12 N=11 Integration classroom	Narrative, PBL, challenges, collaboration-competition, avatars, freedom of choice, feedback	Language acquisition Behavior change
[42] Greece	Digital self-learning space	Ages 8–15 Camp and school-based setting	Digital storytelling, collaboration	Motivation Co-design process
[45] Netherlands	Collaborative exergame: Ice skating	Ages 7-12 N=58 Mixed group Formal education	Levels, collaboration, avatar	Intercultural interactions
[38] Germany	Digital game: Dinner Talk	School-age students	Points, feedback, collaboration-competition	Language learning
[40] Turkey	Gamified context Lend a Hand	Primary school students	Narrative, gamified environment (aesthetics)	Social inclusion
[50] USA	Gamified AR application	Ages 8-10 African–American students Formal education	Narrative, feedback, points, levels, collaboration	Engagement Learning outcomes Culturally relevant material
[39] Belgium, Finland	Serious games: CONNEXT	Young refugees and migrants	Challenges, collaboration, freedom of choice	Social inclusion Co-creation
[28] Greece	Digital course: Akelius	Ages 9–16 NGO	Levels, PBL, feedback	Language learning Attendance
[45] USA	Language program: Class Royal	Ages 6–12 Primary school	Levels, PBL, feedback	Affective outcomes
[49] Cyprus	Gamified language course: GeiaXara	Ages 6-12 Primary school Blended learning	Feedback, freedom of choice online games	Language learning
[47] Greece	AR board game	Age 9 Primary school	Interactive elements	Game design assessment
[46] Germany, Italy, Cyprus	PALM: VR corpus for language learning	Ages 6–15 online	Collaboration	Text production
[29] Norway	Gamified Reading campaign: Sommerles.no	Ages 9-11 Mixed groups Summer camp	Storytelling, digital and physical reward systems, levels	Motivation Attendance

5.1. Usage of gamified techniques in educational initiatives

Referring to RQ1, several types of gamified interventions were produced for and with refugee elementary students, as demonstrated by the scoping study, incorporating an array of technologies that can be harnessed in a gamified approach, like gamified platforms and courses, serious games, AR and VR, digital tools and exergames. Each gamified technique is presented in relation to the educational environment of application, as well as the interconnected students' needs, producing a blueprint of how to utilize them according to the educational environment.

Regarding formal education, multilingual platforms and digital tools can be an asset. Le Pichon et al. [7] developed a gamified web-based multilingual platform, namely Binogi, to support newcomer students in mathematics and promote learning by delivering academic content in students' home languages. The gamified content transfused a stress-free environment and generated a sense of autonomy in which heritage language(s) established their "space" into the classroom. Additionally, a gamified intervention took place in an integration classroom to engage students with a refugee background in the learning process and, attained learning goals [52]. The researchers utilized a management learning system (MLS), named Classcraft, with RPG features, and created a fantasy scenario with specific quests and guilds. Goula [30] gamified a lesson in a formal multicultural classroom using handy digital tools like Kahoot and QR codes. Dunn et al. [31] designed a fantasy-based scenario to frame drama lessons in a playful way for a multicultural classroom. By creating a language context that was enjoyable and culturally valuable, they achieved to accelerate language development and create opportunities for agency.

Moreover, an innovative practice is the amalgamation of exergames [32], and gamification. Breitbarth and colleagues [32] designed an exergame called HOPSCOTCH, examining whether it could be used as a teaching tool to support newcomer children in acquiring the German language. The game was implemented in an integration classroom and the installation with the sensors was freely accessible throughout the day. Interestingly, AR held a special place in the heart of a gamified context providing authentic learning environments, turning the table to a more engaging experience for learners [50]. An interesting paradigm comes from the work of Papadakis et al. [47], who created an AR board game to promote cultural awareness in a public school. The importance of this initiative was the endeavor to give voice to refugee students and the means to negotiate their cultural narratives and identities into the classroom promoting a new focus for cultural awareness games, not just for non-refugee people, but rather for intercultural interaction.

Moving on to nonformal education, Akelius [28], a digital course, was designed by UNICEF for school-age children, aiming to prevent dropping out and accelerate language learning through a blended approach. Can't Wait to Learn (CWTL) [48], a Digital Game-based Learning (DGBL) system, was designed for out-of-school children in humanitarian settings to enable basic Math education. The system deploys game mechanics to deliver high-quality, self-paced, and contextually appropriate educational content, from which children can access formal curriculum through sequenced mini-games and instructional videos. In the same vein, Antura and the Letters [33], and Feed the Monster [34] are two prominent digital games that support Arabic literacy skills for Syrian children living in camps through gamified features, like PBL, narration, and personalization. Moreover, a DGBL intervention for children living in slums and refugee settlements was developed in Pakistan to develop literacy skills [35]. Batzia and De Smet [36] designed a serious game to teach mathematics to unaccompanied minors, making visible the need of representing the specific group in literature. Though the game is designed for high-school-level mathematics, it can be adapted to less advanced levels. Berkling et al. [51] developed an innovative Role-Playing Game (RPG) connected to third-party edugames (OER), for out-of-school students, to deliver basic literacy skills. The designed Massive Open Online Course (MOOC) community hosted thousands of children, who had the opportunity to playfully access new learning content everywhere and at any time. Thus, Open Educational Recourses (OER) and Moocs can provide learners with an array of available digital tools that integrate multimodal features to enhance vocabulary and foster intercomprehension.

5.2. Game elements exerting impact in SLA for refugee students

Regarding RQ2, specific game elements promote language learning through engagement, motivation and social interaction. Furthermore, certain gamified features not only enhance the learning process but also reinforce feelings of joy and pleasure during the educational experience. This, in turn, may contribute to a reduction in emotional symptoms and potentially lead to more effective second language learning for displaced students. The elements of gamification that seem to have a positive impact on the study population are: narrative/storytelling, points and feedback, freedom of choice/personalization, challenges/levels and collaboration.

Narrative/storytelling: According to the data analysis, narrative was employed in 14 out of the 26 gamified interventions. In some interventions narrative was integrated into formal educational settings as a story or a fictional world to provide an engaging framework for problem-solving. In Batzia and De Smet [36], the classroom was adapted to respond to the game scenario creating a meaningful backdrop for the learning experience, affecting learners' performance over mathematical concepts. Bizota and Makri [52], utilized storytelling techniques and the avatar system incorporated in Classcraft to construct a blended learning fantasy scenario to assess applied grammar knowledge among refugee students. Through this approach, students actively participated in assessment and successfully completed the quests within a collaborative-competitive mode. On the other hand, serious games with embedded narrative context are employed to elicit curiosity and create a meaningful backdrop [29, 35, 51] for out-of-school students to keep learning. Thus, the incorporation of game fiction in refugee education demonstrates correlation with behavioral outcomes [17].

Freedom of choice/personalization: In some studies, the increased sense of control over learning played a decisive role in the success of the gamified system, as children had the freedom to choose their tasks and content [39]. In Le Pichon et al. [7], the most prominent feature was freedom of choice, as the web-platform, installed locally in the school, allowed refugee students to access content in their own

language, enhancing their learning autonomy and positive attitude towards learning. Refugee students felt empowered and increased their comprehension over content-related topics. Additionally, in CWTL project [48] for out-of-school populations, students particularly enjoyed the autonomy the game afforded, in terms of choosing characters within the game and being able to listen to instructions when they wanted. In this case, the children were able to manipulate and personalize the content to align with their needs and cultural features. Lastly, gamification holds the premise to support teachers, providing a pedagogical tool to personalize learning allowing children to learn at their own pace [37].

Challenges and levels: Challenges and a level system, the most distinctive elements of video games, were identified in 17 interventions. While, in most studies, these features were related to a sense of mastery and achievement [7, 35, 41, 44], a nuance was exhibited in two interventions [7, 51], in which the progression through levels resembled the formal curriculum of the host country for out-of-school students. Particularly, in Pynnönen et al. [35] the game provided automatically scaling learning content, which helped the children progress at their own pace. The adaptive nature of the game ensured that the children were appropriately challenged, preventing boredom or frustration, and maintaining their engagement.

Collaboration: Collaboration was determined as an important component of an effective gamified intervention for the group of children with a refugee background. A collaborative exergame [45] provided a platform for interaction that transcends language barriers, allowing students with a diverse linguistic background to communicate and connect through non-verbal means. In Breitbarth's [32] multicultural setting, students were given the choice to play together an exergame to complete language activities resulting in the development of new mixed social groups. Furthermore, an entertaining collaborative videogame was used as a mediation tool to bridge cultural differences between native and refugee students by promoting intercultural interaction through gameplay [44]. Moreover, collaboration together with competition proved strong incentives in learning the target language [30, 36, 38, 52]. In Goula [30] the results indicated that students in a multicultural classroom attained the language goal through interchangeable collaboration and competition episodes. This suggests that evoking social interactions through gamification, particularly through a combination of collaboration and competition, can positively impact behavioral learning outcomes [17].

PBL and feedback: According to data, points and feedback are combined in several gamified systems. Feedback was linked to a classroom management system, such as in the cases of GeiaXara [49] and Project Hope [37] or as a rewarding system in Hareide et al. [29], which affected their reading behavior. Moreover, for out-of-school populations, four serious games incorporated PBL and instant feedback to enhance students' motivation to keep learning without the support of a teacher [33-35, 48]. The data indicated that interactive features, like rewards and corrective feedback, can increase students' motivation, self-esteem, and engagement in the learning process [28, 33]. Notably, these improvements extended to literacy skills, with the gamified intervention even yielding literacy levels comparable to those of a control group. Regarding pointification elements in language learning, such as awards and points, the data demonstrated that it could be beneficial for out-of-school students' behavioral and motivational learning outcomes. Nevertheless, the positive impact of PBL in a gamified learning environment should not be attributed solely to PBL itself but rather seen as a result of a synergistic combination with other elements. [18].

5.3. Gamified approaches according to students' needs

Moving on to RQ3, the scoping study demonstrated that several types of gamified interventions exerted an impact on three areas of interest regarding student's needs, namely language learning, psychosocial wellbeing, and social adjustment. Following this perspective, four categories emerged that highlight how gamification can be applied to refugee education according to the three areas of interest: 1) Gamification and multilingualism, 2) Gamification and autonomous learning, 3) Gamification and co-design, and 4) Gamification and psychosocial well-being.

Gamification and multilingualism: Some interventions proposed the use of gamification along with multilingual features to harness first language(s) (L1) as a means to facilitate second language (L2) and invest on students' cultural capital. The results indicated that the integration of different languages in a gamified context is of particular relevance to the education of refugee students, a feature that can be exploited to allow students to access academic content in their home language. An illustrative example is found in Le Pichon et al. [7], where a gamified multilingual platform provided students with access to content in their native language. Students expressed appreciation for the gamified nature of the platform, as it rendered language learning more enjoyable and less stressful. This was achieved by allowing them to utilize their preferred languages, select from various content-topics, and dictate the pace of their learning. Last but not least, L1 should be capitalized as a resource for L2, as in the case of Antura and the Letters [33], and Feed the Monster [34] defending the interdependence of languages in SLA. An interesting part about these apps is that they promote L1 for Syrian refugees, developing a multilingual culture rather than an English-dominant narrative, bringing to the fore the interrelation between the host and heritage languages.

Gamification and psychosocial well-being: Six interventions attempted to support refugee children by promoting psychosocial well-being and resilience through a dynamic representation of themselves and by providing a caring and nurturing learning environment [37]. It is quite common that children that are exposed to crisis-affected settings can experience toxic stress, which in turn affects their learning ability [54].

A first attempt towards that direction was proposed at the EduApp4syria competition, where the two award-winning mobile applications Antura and the Letters [33], and Feed the Monster [34] were designed to nurture psychosocial wellbeing. In particular, Feed the Monster exhibited significant emotional effects as students immersed themselves in a storyline designed to nurture hope for a future self. The game follows the pedagogical framework of social-emotional learning to address psychosocial well-being by applying life skills and decision-making. Moreover, the CWTL digital course [48] yielded significant improvements in both literacy and psychological well-being among refugee students, as evidenced in a comparison with the state-provided education for out-of-school children. These positive outcomes were observed six months after the initiation of the program, involving a sample size of 221 participants. It's worth noting, however, that there were no significant differences between groups in terms of child-reported hope, and there was evidence of a significant negative intervention effect on child-reported self-esteem. It is essential to highlight though, that the psychometric properties of these measures were not deemed adequate. In the case of Dunn et al. [31], the initiative aimed at developing the resilience of newly arrived refugee children, focusing specifically on the role of language as a key aspect of resilience. Grounded in a playful and fantasy-infused narrative, the intervention revolves around a robot entering an English-speaking community but encountering difficulties in effective communication. Notably, the approach deliberately sidesteps responses typical of a deficit model or exclusive focus on challenges related to resettlement and resilience.

Gamification and co-design: Social adjustment emerged as a major area of interest for newcomer students, in tandem with a co-design process to foster integration and address the needs of the refugee group, making the language instruction more culturally appropriate. From the data, gamified serious games were preferred for a social adjustment agenda. Bani-taha [41] developed a computer-based serious game, called New Beginning, following a GBL approach for social adjustment and behavioral change. Through several co-design activities, the researchers evaluated the use of customized culturally inclusive games in addressing problems of social adjustment. To strengthen this approach, the researcher built a framework that focused on newcomer children and their needs, supporting the idea that co-design could enhance integration in a way that students produce inclusive games while interacting with the rest of the school community. Lastly, Alain [43] described a process of designing educational technology systems for and with war-affected displaced children. This involved collaboration by inviting groups of friends to enhance productivity and foster active participation. To sum up, the basis for a social adjustment agenda consists of three elements: 1) inclusion of cultural considerations in the game design; 2) co-design of educational technology systems with newcomer children; and 3) interactive features, such as collaboration.

Gamification and autonomous learning: A pattern is observed for out-of-school children, which relates to autonomous learning and its effect on the learner. It seems that open-source game platforms and serious games that do not expect a teacher to accompany the student's journey could be a possible solution for out-of-school students to attain educational perspectives [29, 51]. In Berkling et al [51], the MOOC platform utilizes a role-playing game (RPG) interface, which provides a storyline and quests for the children to progress through at their own pace. This flexibility caters to the diverse learning needs and preferences of the users. To attain the needs of refugees living in slums, the research of Pynnönen et al [35] employed gamification elements into a digital game, including rewards, challenges, and progress tracking, which motivated children to persist in playing and learning. For unaccompanied minors, the game design employed self-paced features, such as a culturally appropriate narrative with simplified language and interaction with NPC(s) to overcome language difficulties and ensure that the children can fully participate in the learning process. Besides, digital courses with a self-paced functionality can supplement formal settings to accelerate learning. However, even in these cases blended learning is preferred and instructed [33].

6. Conclusion

As it is inferred from the literature review, there has been a significant increase of gamified interventions over the last five years targeting children with a refugee background. The aim of the study was to review existing research evidence and then identify the game elements that need to be considered when designing a gamified intervention for refugee education tailored to the unique needs and educational context of the students.

It seems that several gamified technologies (RQ1) and game design elements (RQ2) have been employed to advance language learning for newcomer children. Gamified operational technologies vary across formal and informal settings. Most findings feature gamification as the perfect match for serious games by adding narrative elements, interactive features, PBL and corrective feedback. While not replacing formal schooling, a well-designed gamified serious games can be a cost-effective and scalable solution for providing education to out-of-school children. For refugees residing in camps, the findings suggest that gamified digital games and MOOCs can provide access to curriculum-aligned content knowledge through personalized features and game fiction to enhance behavioral learning outcomes as suggested by the literature [17].

Regarding formal education, contextual gamification can complement traditional teaching methods by incorporating collaborative interactions among learners, such as working together in teams or competing with others, can enhance motivation and performance. The effectiveness of gamification in formal settings can be influenced by the overall learning environment, encompassing factors such as the availability of culturally appropriate resources, feedback mechanisms, and opportunities for self-paced learning. Collaborative gamified technologies

(e.g. exergames, videogames, AR) can be installed into the classroom to encourage students from different cultural backgrounds to collaborate, communicate, breaking down language barriers and promoting intercultural interaction. In summary, different types of social interaction can affect positively behavioral learning outcomes [17].

With reference to the third research question, several interventions projected on gamification the need for a multilingual feature that can be adaptive to the linguistic needs of the learner. A model of multilingualism could be integrated into a gamified context smoothly, as it offers a stress-free setting and interactive options, such as the freedom to choose preferred linguistic features. Furthermore, gamification may also help refugee children to come to terms with their traumatic experiences; a factor that affects language learning [54]. In this direction, personalization of students' identities and culturally appropriate narratives were reported as prominent game elements that nurture resilience; yet the sense of joy is what make games enticing, especially for children who were cruelly displaced from their own "playgrounds". The study considered co-design practices as the radical element for an accelerated social adjustment agenda. Inviting students to participate in a series of workshops to negotiate their ideas of preferred learning practices, generates a sense of control over their environment and encourages social interaction. That investment can lead to culturally sensitive game elements tailored to the unique needs and context of refugees.

6.1. Limitations and future research

The analysis of collected data indicates the potential feasibility of employing gamification for tailoring educational interventions for refugee children with the aim of enhancing access to quality education across various contexts. However, there are several limitations present to this study.

One major constraint is the limited evidence supporting the development of gamified interventions for refugee children, primarily derived from non-peer-reviewed projects that were included. That illustrates that gamification studies in refugee education are an emerging field that requires further proliferation and rigorous assessment. Data demonstrated that gamification can be adapted to different contexts and needs depending on the demographic variance of the refugee group. This adaptability facilitates the generalization of results to specific educational settings; however, the limited sample size and the short-term nature of interventions in certain studies may compromise the robustness and significance of the evidence.

Additionally, certain studies have identified side effects of gamification studies, including reports of boredom, and frustration arising from challenging levels [35], negative effects on self-esteem [48] and technological barriers [42]. However, the challenge in analyzing and summarizing data arises from the lack of specific details in the majority of articles regarding the influence of individual game elements on learning outcomes and the subsequent effects on learners. Lastly, contextual factors play a significant role in influencing gamified interventions for refugee settings, especially in environments characterized by a lack of essential infrastructure and resources, such as in refugee camps. There is a scarcity of research and evidence concerning the effectiveness of digital education in low-resource environments. While in formal settings, the constraints of limited internet connectivity and access to devices, like computers or tablets, pose challenges to the implementation of digital learning programs.

Further research should be undertaken, including studies characterized by empirical rigor and extensive quantitative data, to reassess the effectiveness of incorporating specific game elements in refugee education. Moreover, there is a necessity to investigate the pedagogical scope of gamification, emphasizing the requirement for a human-centered design that is positioned to have a meaningful impact on refugee learners. Subsequent efforts should emphasize the importance of well-designed instructional content, concurrently addressing the absence of teacher guidance and tendencies towards traditional methods of teaching. Approaches to blended learning or integrating gamification into curricula could be points of interest for further research in refugee education.

Acknowledgements

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7. Appendix

Table 4
The Boolean keywords for each electronic database and the number of results

Database	Search Strings	Results
Eric	Gamification AND refugee	0
	"Digital games" AND refugee AND education	29
	Gamification AND	
	"second language"	113
BASE	Gamif* AND refugee	7
	"Digital games" AND refugee AND education	14
	"game-based" AND "refugee"	26
	"refugee" OR "refugee children" OR "newcomer" AND "gamification" OR "serious games" OR "digital games" OR "game-based"	110
Semantic Scholar	Gamification AND refugee AND "primary education"	235
Taylor and Francis	gamif* AND refugee	61
Online	(refugee OR "refugee children") AND ("digital technology" OR "digital games" OR "digital tools" OR "game-based") AND "education"	553
IEEE Xplore	Gamification AND refugee	0
	Games AND refugee	7
	Gamification AND "second language"	9
Google Scholar	"refugee children" AND gamification	156
Total		1.320