



The culture of play: How kahoot suggests a reconfiguration of participation and relationships in secondary mathematics classrooms

Tirivanhu Muchuweni ^{1*} , Zingiswa Jojo ¹ 

¹Rhodes University, SOUTH AFRICA

*Corresponding Author: tirivanhu.muchuweni@gmail.com

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ABSTRACT

Kahoot is widely used in secondary mathematics classrooms, yet most studies focus on engagement or quiz performance rather than cultural and relational outcomes. This review examines (a) how Kahoot suggests shifts in participation patterns and social interaction, and (b) how it suggests shifts in peer relationships and classroom cultural climate by shaping the social climate of mathematics learning. The study used a structured review approach that combined systematic study selection with narrative synthesis, guided by Sociocultural Theory. Across 30 empirical studies, the findings show that Kahoot supports broader participation by reducing reliance on individual volunteering and lowering response anxiety, particularly for students who are hesitant due to fear of making mistakes or low confidence. At the relational level, the studies indicate that Kahoot can support positive peer interaction, reduce mathematics anxiety, and contribute to a more inclusive classroom climate when used as a shared classroom activity. The review concludes that Kahoot may function as a cultural tool that mediates participation and peer interaction in secondary mathematics classrooms, without assuming uniform effects across all contexts.

Keywords: classroom culture, gamified response systems, kahoot, participation, sociocultural theory

INTRODUCTION

Gamified response systems, including Kahoot, are now widely used in secondary mathematics classrooms to increase participation, motivation, and real-time feedback (Göksün & Gürsoy, 2019; Wang & Tahir, 2020). Licorish et al. (2018, p. 12) report that “Kahoot! gave students more opportunities to engage with the lecturer, peers and lecture content by providing a fun platform on which to engage.” In this way, Kahoot functions as a fast-paced question-response system that turns mathematics practice into a social and interactive experience (Licorish et al., 2018; Plump & LaRosa, 2017). Research shows that these systems encourage active responding, create shared excitement, and make mathematical tasks feel more approachable for diverse students (Bawa, 2019; Figguccio & Johnston, 2022). Instead of traditional individual answering, students respond together, see one another’s progress, and experience the classroom as a shared space for learning (Reynolds et al., 2021; Youssef, 2022). In sociocultural terms, Kahoot can be understood as a cultural tool that mediates how participation and interaction are organised during classroom activity. This creates a form of “play culture” that blends mathematics content with social interaction, cooperation, and shared attention during Kahoot sessions (Licorish et al., 2018; Plump & LaRosa, 2017). Studies by Alt (2023), Martín-Sómer et al. (2021), Özdemir (2025) and Tandiono (2024) show that gamified environments can shape how students view mathematics by increasing willingness to participate and reducing anxiety around making mistakes. At the same time, these effects may differ across students and classrooms and should not be assumed to occur in the same way for everyone.

In secondary mathematics settings, the cultural and relational effects of Kahoot have received less attention than its motivational benefits (Donkin & Rasmussen, 2021; Hu, 2024). Most existing studies focus on engagement, quiz performance, or student enjoyment (Özdemir, 2025; Tandiono, 2024). However, gamified participation also can influence how students relate to one another, how they communicate, and how they take up space in the classroom (Johnson, 2023; Pascu, 2024). Mathematics learning is deeply social, shaped by norms of talk, shared problem-solving, and collective expectations (Boaler & Staples, 2008; Gillies, 2016). Kahoot can reshape classroom norms by promoting rapid feedback, public visibility of responses, team collaboration, and playful competition (Cahyani et al., 2022; Litaly et al., 2022). These features can influence peer relationships, perceptions of belonging, and the overall culture of the mathematics classroom. Despite this, few studies clearly explain how these

features change participation patterns and peer interaction in mathematics classrooms, leaving an important gap in understanding Kahoot's cultural role.

A recent study by Muchuweni et al. (2025) indicates that gamified assessment tools can change the emotional tone of mathematics lessons and support more inclusive participation patterns. In particular, Kahoot's design supports low-risk response sharing, encourages peer support during difficult questions, and promotes positive interaction around correctness and errors (Curto Prieto et al., 2019). From a sociocultural perspective, learning occurs through participation in shared activities, shaped by the norms and tools available (Rogoff, 2003; Vygotsky, 1978). This means that Kahoot is not only an instructional tool; it is a cultural artifact that may restructure classroom routines, communication patterns, and relationships over time. However, a key problem remains. Much of the existing research reports positive outcomes without clearly explaining how participation and relationships are organised during mathematics learning, or under what classroom conditions these changes take place. This makes it difficult to understand Kahoot as a classroom practice rather than simply a motivational tool.

In this paper, reconfiguration refers to reported changes in how classroom activity is organised during mathematics lessons, including who participates and when, how students interact, and what is valued during the lesson, such as speed, accuracy, or explanation (Rogoff, 2003; Vygotsky, 1978). In practical terms, reconfiguration is identified in the reviewed studies when Kahoot changes participation routines, patterns of interaction, and descriptions of classroom climate, including anxiety, belonging, and peer support. As schools increasingly integrate technology into mathematics instruction (Cullen et al., 2020; Hoyles, 2018), it is important to understand how Kahoot influences not only test scores, but also social and cultural dimensions of learning. This study therefore examines how Kahoot suggests a reconfiguration of participation and peer relationships in secondary mathematics classrooms, without assuming that these effects are the same for all students, and with attention to the specific nature of mathematics learning.

Problem Statement

Most research on Kahoot in secondary mathematics education emphasises engagement and performance outcomes, rather than examining how the platform shapes classroom culture, participation, and peer relationships (Göksün & Gürsoy, 2019; Özdemir, 2025; Tandiono, 2024; Wang & Tahir, 2020). As a result, changes in communication norms, peer support, emotional safety, and students' sense of belonging during gameplay remain underexplored (Alt, 2023; Licorish et al., 2018). Mathematics learning is deeply influenced by social norms, shared expectations, and relational dynamics (Boaler & Staples, 2008; Gillies, 2016). Without attention to these dimensions, Kahoot risks being used mainly as an entertainment or assessment tool (Ismail & Mohammad, 2017; Plump & LaRosa, 2017), limiting educators' ability to design learning environments that support participation, reduce anxiety, and strengthen positive peer relationships (Martín-Sómer et al., 2021; Muchuweni et al., 2025). When cultural dimensions are ignored, students who are often silent, anxious, or marginalised may continue to experience restricted opportunities to participate in mathematics learning (Carey et al., 2016; Suárez-Pellicioni et al., 2016). Understanding Kahoot's cultural influence is therefore necessary to guide its meaningful and equitable use in secondary mathematics classrooms.

Rationale

Rather than focusing only on engagement or performance outcomes, this review is grounded in the understanding that mathematics learning is shaped not only by participation levels but also by classroom culture, including how students interact, support one another, and negotiate shared expectations for learning (Boaler & Staples, 2008; Gillies, 2016). Kahoot changes the social environment by introducing collective decision-making, shared pacing, playful competition, and public visibility of responses. These features may influence students' sense of belonging, willingness to participate, and relationships with peers. Understanding these cultural effects can help teachers use Kahoot intentionally to strengthen collaboration, reduce anxiety, and build inclusive learning environments (Martín-Sómer et al., 2021; Muchuweni et al., 2025). Despite its widespread use, little research directly examines how Kahoot may influence participation norms and peer interactions in mathematics classrooms. Rather than focusing only on outcomes, this review synthesises evidence on how studies describe changes in participation and relationships during Kahoot-based mathematics activities. By focusing on how studies describe reconfiguration rather than outcomes alone, this review aims to explain how participation and relationships are structured during Kahoot-based mathematics activities. This paper therefore seeks to answer the following questions:

RQ1 How does Kahoot suggest a reconfiguration of participation patterns and social interaction in secondary mathematics classrooms?

RQ2 How does Kahoot suggest a reconfiguration of peer relationships and the cultural climate of mathematics learning environments?

LITERATURE REVIEW

Research (Alt, 2023; Wang & Tahir, 2020) on digital gamified learning indicates that Kahoot can influence student participation and interaction during lessons, but existing studies tend to prioritise motivation or performance over cultural or relational outcomes. In mathematics education, participation and interaction are shaped by shared norms, expectations, and the social roles that students adopt while learning (Boaler & Staples, 2008). Because Kahoot is used as a whole-class activity with fast, visible feedback, it may reorganise how students take turns, respond to content, and support each other. Recent studies (Hellberg, 2023; Wichaidit & Wichaidit, 2024) suggest that deeper game-thinking, rather than surface-level gamification, is necessary to meaningfully shift how students experience learning activities. This literature review synthesises studies that examine how Kahoot shapes participation and social interaction, as well as how it influences peer relationships and the broader cultural climate of

mathematics classrooms. However, several studies report that increased participation does not always translate into sustained engagement or conceptual understanding, particularly when speed or competition dominates Kahoot use, highlighting limits and mixed effects in literature.

Participation Patterns and Social Interaction

Licorish et al. (2018) and Martín-Sómer et al. (2021) consistently report that Kahoot increases active responding, especially in classrooms where students are normally quiet or hesitant. The platform's fast response cycle and shared pacing lead to more frequent contributions than traditional question and answer routines (Plump & LaRosa, 2017). In mathematics classrooms, this increased contribution is linked to reduced reluctance to attempt challenging items because responses are submitted simultaneously, reducing the spotlight effect (Göksün & Gürsoy, 2019). Kahoot's structure therefore modifies the participation pattern from selective volunteering to whole group engagement. These findings suggest that although collective participation increases opportunities for many students, it does not automatically guarantee equal involvement for all. This pattern is consistent with broader gamification research showing that well-designed gamified environments can support wider participation, yet uneven engagement may persist when design elements do not intentionally address inclusion (Hellberg, 2023).

Kahoot also influences the quality of social interaction (Reynolds et al., 2021). Studies by Özdemir (2025) and Tandiono (2024) show more peer discussion just before and after questions, as students negotiate answers or react collectively to correctness feedback. This shared interaction creates a temporary social rhythm in which students coordinate their thinking and monitor each other's reactions. Research in mathematics pedagogy, including Cullen et al. (2020) and Hoyles (2018), highlights that such collective engagement can support sense making and reduce feelings of isolation during problem solving. Supporting this pattern, Mochuwani et al. (2025) report that "features like real-time feedback, avatars, and competitive elements create an interactive environment that encourages participation in learning activities" (p. 107). These findings collectively indicate that Kahoot can reshape both the frequency and the social character of participation by creating shared moments of thinking and response.

Peer Relationships and the Cultural Climate

Figuccio and Johnston (2022) and Licorish et al. (2018) indicate that Kahoot can influence peer relationships by creating low-risk, shared learning experiences that promote positive social interactions. Because the activity is collective and fast moving, students often respond as part of a group rhythm, which can strengthen feelings of connection and reduce the pressure to perform individually (Mat Husin & Azmuddin, 2022; Kohnke & Moorhouse, 2022). In mathematics classrooms, this collective experience is important because many students feel anxious about making mistakes publicly (Ashcraft, 2002; Ramirez et al., 2018). Kahoot's immediate feedback and playful atmosphere can ease this tension and support a more trusting environment.

Alt (2023) and Chan et al. (2023) also suggest that Kahoot can contribute to a more inclusive classroom climate by creating opportunities for students who rarely participate to feel involved and valued. Public scoreboards, team modes, and shared reactions can reinforce positive peer recognition when used carefully. The social visibility embedded in Kahoot encourages students to notice each other's progress, celebrate improvements, and offer support after errors. These forms of interaction can strengthen relational ties and contribute to a culture where mathematical effort is shared rather than individualised. Insights from classroom culture research (Gillies, 2016) and studies on learning community development in STEM contexts (Nair & Kareem, 2025) show that positive norms can enhance belonging and persistence in mathematics. The literature therefore suggests that Kahoot has the potential to influence relational dynamics by supporting connection, emotional safety, and collective engagement.

Theoretical Framework: Sociocultural Theory

This study uses Sociocultural Theory, proposed by Lev Vygotsky in 1978, to explain how Kahoot may influence participation and relationships in secondary mathematics classrooms. Sociocultural Theory views learning as a social process shaped by interaction, shared activities, and cultural norms (Rogoff, 2003; Vygotsky, 1978). In this perspective, students develop understanding through participation in meaningful group practices where tools, language, and social expectations guide how they engage. According to Sociocultural Theory, learning may be understood not only an individual cognitive process but also a collective experience influenced by how students communicate, coordinate actions, and use cultural tools to support thinking. This framework recognises that participation opportunities may not be distributed evenly for all students, but the theory highlights the importance of examining the social conditions that shape engagement.

Kahoot functions as a mediating tool that organises social participation during mathematics lessons (Reynolds et al., 2021). The platform structures how students respond to questions, view feedback, and observe each other's actions in real time (Plump & LaRosa, 2017). These shared routines create opportunities for joint attention, peer scaffolding, and collective responses (Tandiono, 2024). Sociocultural Theory helps explain how these features can influence students' willingness to participate and how new norms, like celebrating improvement, reacting together to correctness feedback, or discussing answers between rounds, become part of the classroom's cultural practices (Licorish et al., 2018). When students participate in repeated gamified activities, the patterns of communication and interaction embedded in the tool can gradually shape the culture of the mathematics classroom (Mochuwani et al., 2025). This perspective allows the analysis to focus on how Kahoot structures participation possibilities rather than assuming uniform effects for all students. **Figure 1** illustrates how Kahoot functions as a mediating tool within a sociocultural learning environment, shaping participation and peer interaction in the mathematics classroom.

Sociocultural Theory is also useful for understanding how Kahoot may influence peer relationships and the classroom climate. Sociocultural perspectives emphasise that relationships form through shared activity, mutual engagement, and common goals (Boaler & Staples, 2008). The social visibility and collaborative elements of Kahoot, expressed through team modes and whole-class participation, create conditions for supportive interaction and collective identity (Figuccio & Johnston, 2022; Mat Husin & Azmuddin, 2022). These shared experiences may foster belonging, emotional safety, and positive norms around mathematical

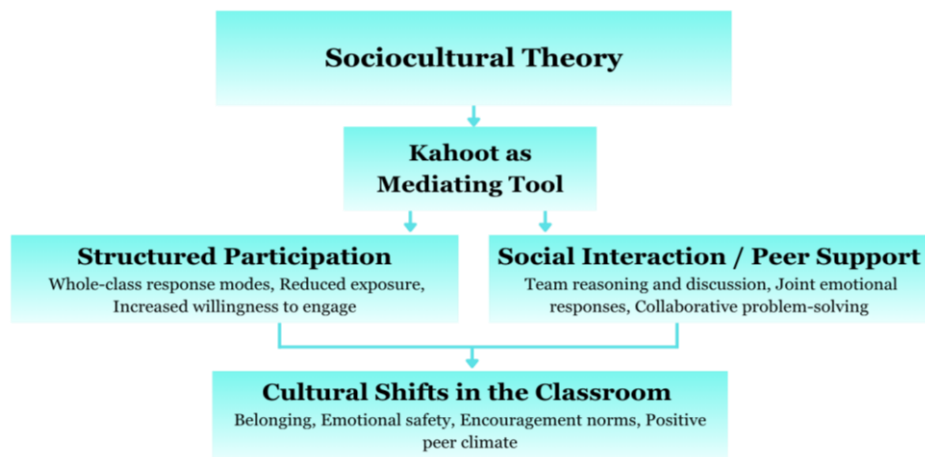


Figure 1. Kahoot-mediated participation and peer interaction (Source: Authors' own illustration)

Table 1. Participation and interaction features in Kahoot-based lessons

Participation patterns	Discussion patterns	Interaction features
Whole-class responding with simultaneous answers	Short bursts of peer talk before and after questions	Shared emotional reactions to correctness and errors (Licorish et al., 2018; Plump & LaRosa, 2017; Wang & Tahir, 2020)
Increased willingness to attempt mathematics items	Negotiation of reasoning steps during Team Mode	Public visibility of responses that normalises participation (Alt, 2023; Bawa, 2019; Curto Prieto et al., 2019)
Greater engagement among usually quiet students	Quick comparisons of symbolic expressions and answer choices	Collective pacing that reduces individual pressure (Göksün & Gürsoy, 2019; Martín-Sómer et al., 2021)
More consistent involvement across the class	Clarifying procedures for each mathematical problem	Immediate feedback prompting joint attention (Figuccio & Johnston, 2022; Özdemir, 2025)
Reduced fear of mistakes due to shared responding	Explaining steps in algebraic equations	Supportive peer cues and spontaneous encouragement (Ashcraft, 2002; Muchuweni et al., 2025; Ramirez et al., 2018)

Table 2. Peer relationships and classroom climate in Kahoot lessons

Peer relationship patterns	Emotional and social climate features	Collaborative mathematics behaviours
Increased peer encouragement and supportive talk	Reduced anxiety due to shared correctness and errors	Joint checking of algebraic steps (Ashcraft, 2002; Curto Prieto et al., 2019; Ramirez et al., 2018)
Stronger sense of connection through shared reactions	Playful atmosphere that lowers emotional risk	Collaborative verification of expressions (Licorish et al., 2018; Martín-Sómer et al., 2021; Plump & LaRosa, 2017)
More positive interactions during team mode	Greater willingness to participate in mathematics	Collective celebration of progress in game modes such as submarine and treasure trove (Alt, 2023; Göksün & Gürsoy, 2019)
Trust-building through repeated shared activities	Inclusive climate where more students feel noticed	Peer explanation during team-based reasoning activities (Boaler & Staples, 2008; Gillies, 2016; Muchuweni et al., 2025)
Increased recognition of classmates' effort	Reduced social pressure linked to public responses	Group discussion and strategic thinking in shared-goal game modes (Figuccio & Johnston, 2022; Pascu, 2024)

effort (Alt, 2023; Chan et al., 2023). By grounding the review in Sociocultural Theory, this paper analyses Kahoot not only as a digital quiz tool but as a cultural mediator that may transform participation structures, interaction patterns, and the relational study and illustrates how Kahoot mediates participation and peer interaction within a sociocultural learning environment.

Sociocultural analytical approach

In this review, Sociocultural Theory was used to guide how studies were analysed and interpreted, not only as background theory. The analysis focused on how Kahoot supports shared activity, shapes participation, and influences classroom norms during mathematics lessons. While earlier studies caution that Kahoot can be reduced to entertainment or surface-level assessment if used only for speed and points (Ismail & Mohammad, 2017; Plump & LaRosa, 2017), this review did not treat all Kahoot use as culturally meaningful by default. The analysis focused on what Kahoot mediated in practice, as reported in the studies. This included changes in participation routines, handling of correctness and feedback, peer talk during play, and classroom norms around mistakes, recognition, and emotional safety. Studies that reported only enjoyment or quiz scores were not interpreted as evidence of cultural change. Kahoot was discussed as a cultural tool only when its features shaped participation, peer interaction, or classroom norms during mathematics lessons. Participation was analysed by examining who participates, when participation occurs, and how participation is shared across the class. This supported the identification of patterns such as whole-class responding, reduced reliance on volunteering, and more collective participation, which are summarised in **Table 1**. Classroom norms were analysed by focusing on expectations around correctness, recognition, and emotional responses. Shared feedback, visible responses, and team-based modes were interpreted in relation to peer interaction and classroom climate, informing the synthesis presented in **Table 2**. This approach ensured that patterns were identified across multiple studies rather than treated as isolated observations, and that Sociocultural Theory directly structured the analysis.

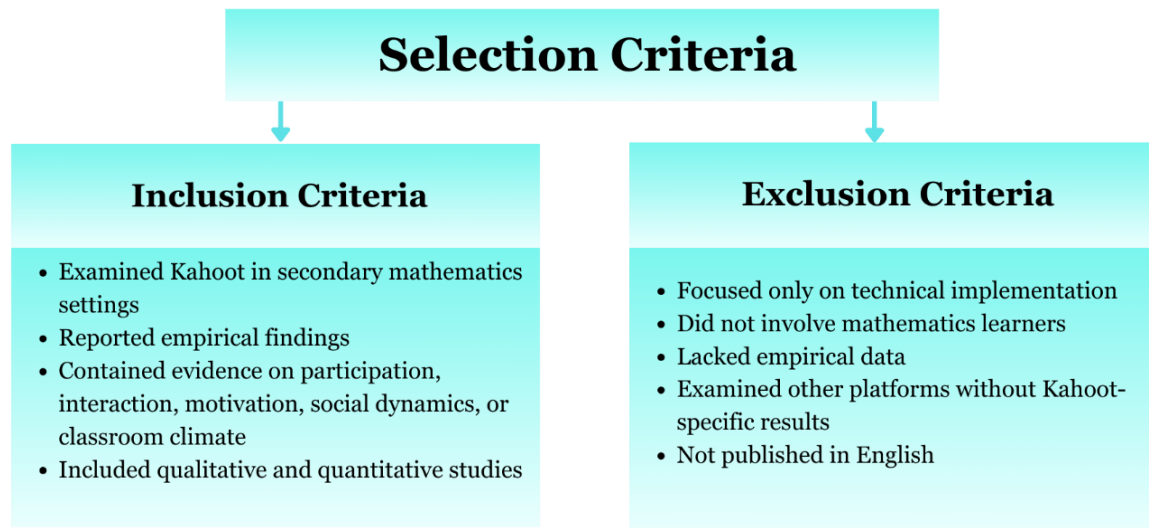


Figure 2. Inclusion and exclusion criteria for the systematic review (Source: Authors' own illustration)

METHODOLOGY

This study used a structured review approach that combined systematic study selection with narrative synthesis. A mixed approach allows researchers to integrate interpretive insights from narrative synthesis with structured procedures from systematic analysis, which is appropriate when the literature includes varied research designs, outcomes, and contexts (Snyder, 2019; Xiao & Watson, 2019). This approach is commonly used in educational technology research, where cultural, motivational, and relational outcomes are often examined through both qualitative and quantitative studies (Wang & Tahir, 2020). In this review, the narrative component was used to interpret how Kahoot influences participation and classroom culture through a sociocultural lens, while the descriptive systematic component followed PRISMA 2020 guidelines to ensure transparency in identifying, screening, and selecting studies (Page et al., 2021). This approach was chosen because cultural and relational outcomes are often described across different methodologies, and a flexible but systematic process was needed to include both quantitative and qualitative findings from mathematics classrooms (Özdemir, 2025; Tandiono, 2024). Because most studies were short-term and often perception-based, this review treats reconfiguration as an interpretive pattern in the literature, not as proof of permanent structural change.

A structured literature search was conducted across three major databases: ERIC, ScienceDirect, and SpringerLink. These databases were selected because they are widely used in educational technology and mathematics education research. The search covered studies published between 2018 and 2025, reflecting the period during which Kahoot became widely adopted in secondary mathematics classrooms. Searches were conducted in March 2025. Boolean operators were used to combine keywords related to Kahoot, mathematics education, and classroom culture. An example search string was: (“Kahoot” OR “Kahoot!”) AND (gamif* OR “gamified response system*” OR “student response system*”) AND (math* OR mathematic* OR algebra) AND (participant* OR interact* OR “peer relationship*” OR “classroom culture”). Equivalent search combinations were adapted to fit the syntax of each database.

Studies were included when they examined secondary mathematics settings or in closely related educational contexts where mathematics learning and classroom interaction were clearly described, reported empirical findings, and provided evidence related to participation, interaction, motivation, social dynamics, or classroom climate. Some studies conducted in higher education or general STEM contexts were included only when they reported mathematics-specific activities or participation structures that were directly relevant to secondary mathematics classrooms. These studies were used to support interpretation, not to redefine the study’s focus. Both qualitative and quantitative studies were considered to allow for a comprehensive understanding of cultural and relational outcomes. Studies were excluded if they focused only on technical implementation, did not involve mathematics learners, lacked empirical data, examined other platforms without reporting Kahoot-specific findings, or were not written in English. These inclusion and exclusion criteria guided the selection process and are summarised in **Figure 2**, which shows how studies were filtered before detailed analysis.

The PRISMA process followed four stages:

- 1) Identification,
- 2) Screening,
- 3) Eligibility, and
- 4) Final inclusion.

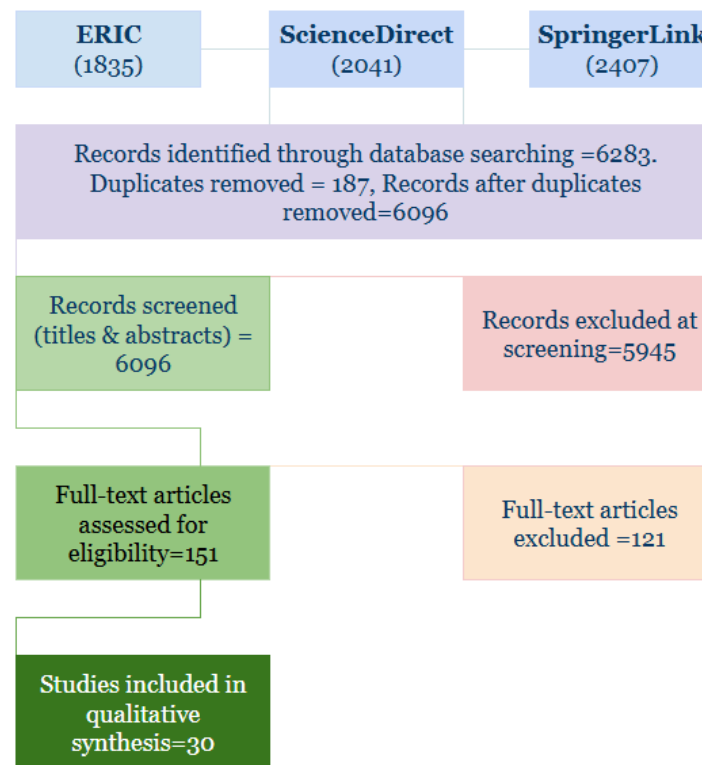


Figure 3. PRISMA flow diagram for selecting studies on Kahoot and classroom culture (Source: Authors' own illustration)

The initial search identified a larger pool of records across the three databases, after which duplicate records were removed. Titles and abstracts were screened for relevance, and full texts were then assessed against the inclusion and exclusion criteria. Studies were excluded if they did not address participation patterns, peer interaction, or classroom culture within mathematics learning contexts. When studies came from non-secondary settings, they were retained only if their findings could be meaningfully interpreted in relation to secondary mathematics classroom practice. This process resulted in 30 studies that formed the final evidence base for the review. The full selection process and numerical details are documented in the PRISMA flow diagram shown in **Figure 3**.

After the final set of studies was identified, a data extraction process was applied to support clear and transparent analysis. From each included study, the following information was recorded: Author and year, country and school context, educational level, mathematics topic (when reported), Kahoot implementation mode (individual, team, or mixed), study design and sample size, and reported findings related to:

- (a) Participation and social interaction and
- (b) Peer relationships and classroom climate.

This extracted information formed the basis for the synthesis presented in **Tables 1** and **2**.

Evidence synthesis followed a structured process linked to the research questions. First, extracted findings were grouped into two outcome areas:

- (1) Participation and social interaction and
- (2) Peer relationships and classroom climate.

Second, patterns were identified by comparing similar findings across studies. A pattern was retained when it appeared in more than one study and was supported by clear evidence. Sociocultural Theory guided interpretation by focusing on changes in participation rules, division of labour, and shared classroom norms.

To strengthen trustworthiness, light quality screening was applied rather than a formal scoring tool. These checks focused on clarity of research aims, suitability of research design, transparency of analysis, and relevance to the review questions. Studies that lacked clear methods or reported only general perceptions without classroom evidence were treated cautiously during synthesis. In addition, a second coding check was conducted on a small set of studies to confirm consistency in coding, and any differences were discussed and resolved. This PRISMA-guided approach provided a clear and traceable process for study selection while allowing the review to capture cultural and relational insights central to participation and peer relationships in mathematics classrooms. By combining systematic procedures with narrative interpretation, the methodology supported a balanced and transparent synthesis of evidence aligned with the sociocultural focus of the study.



Figure 4. Kahoot game modes that shape participation and classroom culture (Source: Screenshot from Kahoot game platform)

RESULTS

The analysis of the 30 included studies revealed two main areas of influence: changes in participation and interaction patterns, and shifts in peer relationships and the broader cultural climate of mathematics classrooms. These results show how Kahoot suggests shifts in classroom participation and social relationships, positioning it as both a learning tool and a cultural mediator in secondary mathematics settings.

Findings on Participation Patterns and Social Interaction

Studies (Licorish et al., 2018; Martín-Sómer et al., 2021) consistently reported that Kahoot increased the frequency and visibility of participation in mathematics classrooms. Students who usually remained quiet during traditional instruction were more willing to respond when using Kahoot because the format allowed everyone to answer at the same time, which reduced the pressure of individual volunteering (Licorish et al., 2018; Martín-Sómer et al., 2021). The combination of simultaneous responses, quick feedback, and collective pacing encouraged broader involvement and helped students attempt more challenging questions without fear of embarrassment (Göksün & Gürsoy, 2019; Özdemir, 2025). These patterns match recent studies showing that participation improves when gamified activities are designed with deeper “game-thinking,” not just surface-level rewards (Hellberg, 2023; Wichaidit & Wichaidit, 2024).

Kahoot’s game modes supported this shift. Classic mode allowed individual responding to algebraic items such as $2^{x+1} = 16$, while accuracy mode slowed the pace and required careful work on expressions like $\sqrt{25} + 3$. Team mode encouraged discussion as groups negotiated answers to linear equations like $3x - 7 = 11$. In more playful modes, for instance, submarine and treasure trove, students revisited multiple variations of items involving slope, exponents, or integer operations, which increased repeated engagement and reduced hesitation. **Figure 4** shows the Kahoot game modes that shaped participation and interaction in the studies reviewed.

Several studies including Reynolds et al. (2021) and Tandiono (2024) also noted that students engaged in short bursts of discussion before and after each question, which created natural opportunities for shared reasoning and peer explanation. These discussions often centered on interpreting symbolic expressions, comparing answer choices, or checking steps in expressions, for instance, $\frac{4x}{2} = 12$. These patterns align with Sociocultural Theory, which emphasises that learning is shaped by participation in shared activities. A neutral interpretation of these results is that Kahoot provides structured moments for interaction, although participation levels may still vary across different groups of students. The findings suggest that Kahoot is linked to more collective participation and less fear when students respond in mathematics lessons. **Table 1** summarises the participation patterns, discussion behaviours, and interaction features observed in the reviewed studies.

Findings on Peer Relationships and Classroom Cultural Climate

The review also found strong evidence that Kahoot supported positive peer relationships and contributed to a more inclusive classroom climate. Alt (2023), Chan et al. (2023), Figuccio and Johnston (2022), Kohnke and Moorhouse (2022), and Mat Husin and Azmuddin (2022) report that students experience both correctness and errors together in a low-risk, playful environment, reducing mathematics anxiety and encouraging more supportive social interactions. Team mode, in particular, supported peer explanation and collaborative reasoning as groups discussed algebraic steps when working through equations ($3x + 5 = 20$). Classic mode created shared emotional reactions when students compared their choices after seeing immediate correctness feedback. Accuracy mode supported calmer peer interaction as students jointly checked steps on expressions like $\sqrt{64}-2$ before answering.

Team modes reported in research (Litualy et al., 2022; Marsa et al., 2021), along with shared scoreboards, prompted students to encourage one another, celebrate improvement, and respond collectively to feedback. Playful modes, such as Submarine and Treasure Trove, also created opportunities for joint celebration and peer encouragement because groups progressed through the game together and reacted as a team when solving repeated items involving operations or exponent rules. These interactions helped build trust and strengthened peer connections. Gillies (2016) and Singleton et al. (2024) further support the idea that shared, low-pressure participation increases belonging and reduces the social barriers that commonly limit engagement in mathematics. The findings of Muchuweni et al. (2025) also show that gamified tools like Kahoot and Quizizz can broaden participation by reducing the fear of public responses. These studies indicate that Kahoot can shape relational dynamics by supporting positive communication, shared emotional experiences, and cultural norms that value effort, collective involvement, and supportive peer interaction. **Table 2** presents the peer relationship patterns and classroom climate features observed across the reviewed studies.

DISCUSSION

This section examines how Kahoot may change classroom participation by shifting responses from selective volunteering to whole-class involvement, increasing real-time interaction, and reducing hesitation during problem solving. It also explores how Kahoot may reshape peer relationships through shared feedback, playful competition, and coordinated group responses that influence classroom climate. Using Sociocultural Theory, the discussion shows how these interaction patterns and social norms emerge through repeated participation during Kahoot-based activities.

Sociocultural Interpretation of Participation and Interaction

The findings showed that Kahoot shifts participation from selective and individual to collective and inclusive. From a sociocultural perspective, this shift reflects how tools reorganise participation in shared activities. The results show that Kahoot creates a common structure for responding, which positions every student as an active participant and reduces the pressure of being singled out. In Vygotskian terms, Kahoot acts as a mediating artifact that shaped the form and rhythm of classroom engagement (Rogoff, 2003; Vygotsky, 1978). Because all students work through the same sequence of questions at the same pace, Kahoot establishes a shared activity that supports coordinated attention and fosters short bursts of peer talk (Reynolds et al., 2021; Tandiono, 2024).

Integrating the cultural interpretation previously discussed, it becomes clear that Kahoot does more than increase participation; it alters the norms that guide participation. The tool helps redefine what it means to take part in a mathematics lesson by normalising whole-class involvement and reducing the fear of incorrect answers. Kahoot creates structured moments of shared activity, yet the degree of engagement may still differ among students depending on confidence, prior achievement, or familiarity with the tool. These patterns show that Kahoot can influence cultural expectations around participation, turning mathematics learning into a collaborative social practice rather than an individual performance.

From a mathematics education perspective, this reconfiguration also affects how students engage with mathematical thinking. Many reviewed studies reported Kahoot being used for algebraic procedures, symbolic manipulation, and checking solution steps. In these contexts, Kahoot appears to support procedural fluency by encouraging repeated practice and immediate feedback. However, the fast pace of Kahoot may limit opportunities for extended reflection, justification, or deep problem solving if it is not carefully integrated into lesson design. This highlights a tension between speed-based participation and the reflective demands of mathematical reasoning, suggesting that Kahoot is most effective when combined with pauses for explanation, discussion, or worked examples.

In secondary mathematics classrooms, this reconfiguration is visible in topics such as advanced algebra. For example, when students work on finding the zeros of a polynomial function such as:

$$f(x) = (x - 3)^2(x + 2)(x - 4) \quad (1)$$

Kahoot can be used to check intermediate steps, factor recognition, or solution verification. In these situations, Kahoot supports procedural fluency by encouraging repeated engagement with symbolic manipulation and immediate feedback. However, the speed of response may reduce opportunities for students to explain why a factor leads to a zero or to reflect on the structure of the function. This highlights the need for teachers to balance Kahoot-based participation with moments of pause, discussion, and justification so that conceptual understanding is preserved alongside engagement.

This tension reflects a shift in classroom expectations, where students may move from explaining their thinking to making rapid decisions. While this can reduce anxiety and increase participation, it also places responsibility on the teacher to reintroduce short moments of reflection, explanation, and error analysis so that speed does not replace mathematical reasoning. Importantly, the participation patterns identified in this review are not attributed to the Kahoot platform alone. Earlier studies caution that Kahoot can be reduced to entertainment or surface-level assessment when used only for speed or competition (Ismail & Mohammad, 2017; Plump & LaRosa, 2017). Accordingly, this review treated Kahoot as culturally meaningful only when studies reported changes in participation routines, peer talk, handling of correctness, or classroom norms, indicating that shifts in participation emerge through the interaction between the tool and instructional design rather than from the tool itself.

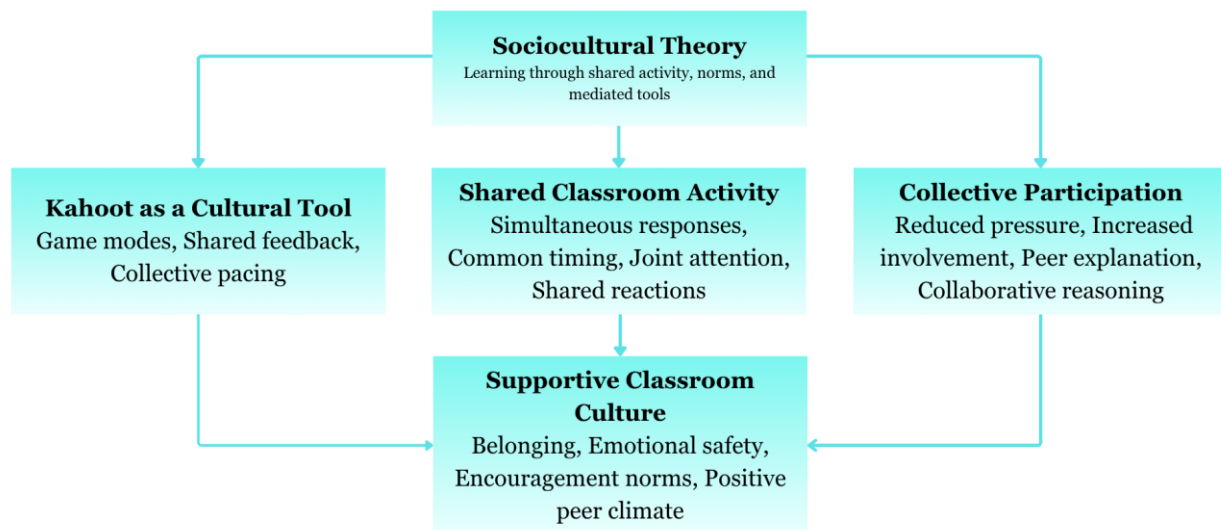


Figure 5. Sociocultural pathway of kahoot's influence in mathematics classrooms (Source: Authors' own illustration)

Sociocultural Interpretation of Peer Relationships and Classroom Climate

The findings also indicated that Kahoot contributes to more supportive peer relationships and a more positive classroom climate (Figuccio & Johnston, 2022; Licorish et al., 2018). Sociocultural Theory emphasises that relationships and norms develop through repeated shared experiences (Boaler & Staples, 2008; Gillies, 2016). Kahoot provided these shared experiences by allowing students to encounter feedback, success, and mistakes together. These shared reactions helped build trust and a sense of belonging. The playful nature of the activity lowers the emotional risk associated with mathematics errors, which encouraged more open interaction and peer encouragement (Alt, 2023; Chan et al., 2023). A neutral reading of these findings acknowledges that while many students benefit from these shared experiences, classroom dynamics and student personalities may influence how strongly individuals respond to collaborative gamified participation. In mathematics classrooms, these changes also affect how students deal with mistakes and mathematical thinking. When students see correct and incorrect answers together, fear of making mistakes is reduced. This is important in algebra and symbolic work, where errors are common. During team-based Kahoot activities, students often talk briefly about answers, explain steps to one another, and check their thinking together. These interactions can support understanding rather than simple guessing.

By merging the insights in this section, it becomes evident that Kahoot shapes both interaction and culture at the same time. The same features that change participation also strengthened peer relationships. The collective response structure supported norms of encouragement and collective effort, and the shared emotional moments helped students feel connected to one another. When peer interaction focuses on explaining mathematical steps or reasoning, these shared norms can support meaningful engagement with mathematics. In sociocultural terms, Kahoot mediates both the actions students perform during mathematics and the meanings they assign to those actions. This dual influence shows that Kahoot functions as a cultural tool that fosters collaboration, emotional safety, and a stronger sense of community in the mathematics classroom. **Figure 5** illustrates how Kahoot operates as a sociocultural pathway, linking shared activity to collective participation and shifts in classroom culture.

LIMITATIONS

This review has several limitations that should be considered when interpreting the findings. First, the analysis relied on published studies of Kahoot, which means the evidence may reflect a publication bias toward positive outcomes. Studies reporting neutral or negative cultural effects may be underrepresented. Second, most included studies were short-term classroom trials, limiting the ability to understand how Kahoot influences classroom culture over longer periods where norms, relationships, and participation patterns develop more slowly. As a result, the review describes patterns reported in the literature rather than long-term or permanent changes in classroom culture.

Third, although the review focuses on secondary mathematics classrooms, not all included studies were conducted exclusively in mathematics-specific contexts. Some studies were situated in broader STEM or higher education settings. To address this, findings were interpreted with attention to whether reported participation and relational patterns were clearly linked to mathematical activity, such as symbolic reasoning, problem solving, or mathematics-related classroom norms. Findings that reflected general enjoyment or motivation without reference to mathematical interaction were treated as generic gamification effects rather than mathematics-specific outcomes.

Another limitation is that many studies provided limited detail on classroom context, teacher experience, or specific school culture. These factors influence how sociocultural norms form, so the review could not fully account for the diversity of classroom environments. Finally, because this is a mixed conceptual and systematic review, some interpretations depended on theoretical

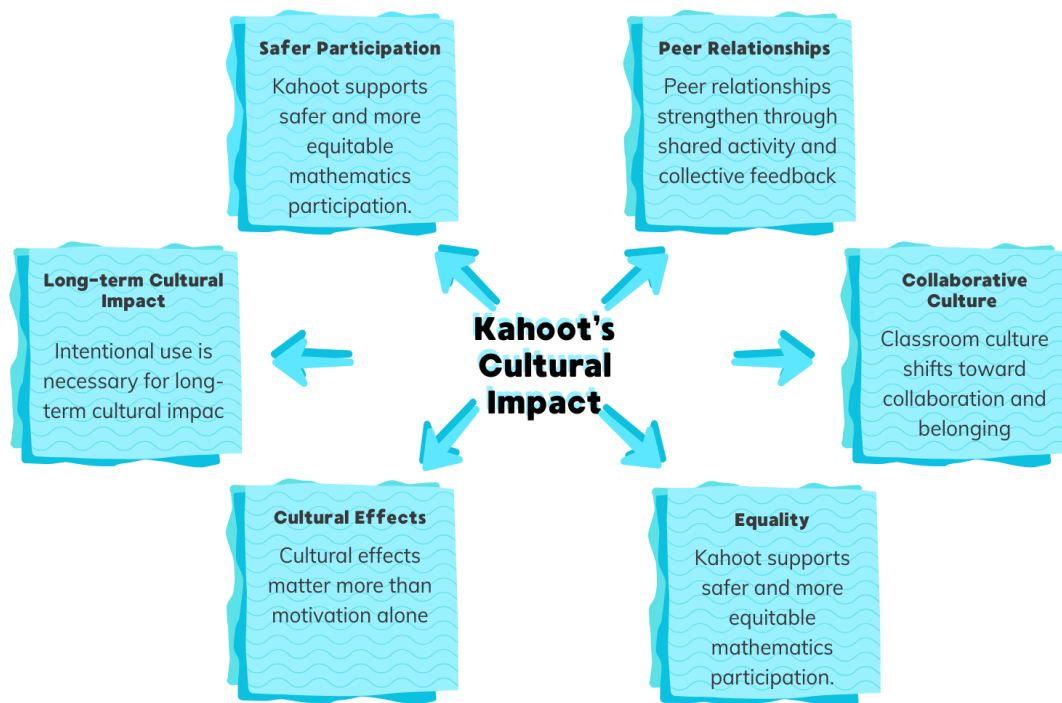


Figure 6. Summary of key cultural insights from the review (Source: Authors' own illustration)

integration rather than direct empirical evidence. While this approach supports explanation using Sociocultural Theory, it also means that conclusions should be understood as interpretive rather than causal.

CONCLUSION

This review examined how Kahoot shapes participation and relationships in secondary mathematics classrooms and what these cultural shifts mean for teaching and learning. In relation to the first research question, the findings show that Kahoot may reconfigure participation by shifting classroom activity from selective volunteering to structured whole-class involvement. The findings show that Kahoot contributes to classroom cultures in which participation is safer, peer interaction is more inclusive, and mathematics is experienced as a shared social activity rather than an individual performance. These cultural changes matter because classroom norms strongly influence how students position themselves as mathematics learners. When participation becomes structured, predictable, and supported through immediate feedback, students who are often silent in traditional lessons gain greater opportunities to contribute meaningfully.

Across the reviewed studies, Kahoot was associated with more positive learning climates marked by reduced fear of mistakes, expanded student voice, and broader participation across the class. In response to the second research question, these patterns show that Kahoot suggests a reconfiguration of peer relationships and classroom climate by supporting shared feedback, peer encouragement, and collective engagement with mathematical tasks. These shifts also strengthened relationships among students and between students and teachers. Sociocultural Theory helps explain these outcomes by highlighting how learning develops through participation in shared activities shaped by classroom norms. Within this context, Kahoot-supported practices related to rapid feedback, communal engagement, and visible progress reshaped how students interacted with mathematical content and with one another.

The review also identified an important gap in literature. Few studies examine cultural dimensions directly, despite the central role classroom culture plays in shaping long-term mathematics identity. If this gap remains unaddressed, educators may continue to adopt gamification tools without fully understanding how these platforms influence relationships, participation structures, and equity. The findings suggest that gamification tools should be understood not only as motivational strategies but also as cultural practices that support shared, social, and accessible mathematics learning environments. **Figure 6** summarises the key cultural insights identified in this review.

IMPLICATIONS AND RECOMMENDATIONS

Teachers can use Kahoot deliberately to support classroom culture, not only content review. When framed as a shared learning activity, Kahoot may reduce fear of judgment, encourage student questioning, and promotes constructive peer interaction. These effects are strengthened when teachers set norms for respectful participation, encourage brief discussion after each item, and use response data to emphasise solution strategies rather than competition.

School leadership plays a key role in scaling these practices. Digital gamification tools can support broader efforts to build inclusive and participatory school cultures when professional development addresses both the technical use of Kahoot and its cultural role in classrooms. Supporting teachers in shaping norms, promoting student voice, and aligning gamified learning with schoolwide expectations is essential.

Future research should examine cultural dimensions of gamified mathematics learning more directly. Studies that track participation patterns over time, explore students' interpretations of classroom climate, and examine differential experiences across student groups would deepen understanding. Longitudinal and mixed-methods designs are particularly valuable for examining how cultural norms, relationships, and mathematics identities develop through sustained Kahoot use.

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