

# FIVE YEARS OF KAHOOT! IN THE CLASSROOMS – WHAT DOES RESEARCH TELL US?

Matthias Murawski, Md Tawhid Hasan, Markus Bick, ESCP Europe Business School Berlin, Germany

### Introduction

One of the current major trends in education is the integration of innovative technology. In this context, gamification – which encompasses the integration of game elements in nongaming systems (Licorish, Owen, Daniel, & George, 2018) – plays an important role. In this paper, we consider one specific game-based learning tool: Kahoot! (Existing literature uses both options, Kahoot and Kahoot!. We select the latter as the exclamation mark belongs to the term.), which can be classified as a student response system (Plump & LaRosa, 2017). Although there are similar tools such as Socrative (www.socrative.com), Kahoot! proved to be the most played one. As stated on the company website (https://kahoot.com/company/, accessed January 29, 2019), Kahoot! reached more than 70 million unique monthly active users at the end of 2017. Around 60% of them were from the United States of America but the tool has been played all over the world. There are 60 million games available, and a total of 2 billion players have played on the Kahoot! platform since its launch. Aside from classroom settings, 97% of Fortune 500 companies use Kahoot! as of October 2018. Kahoot! was founded in Norway and published in September 2013. Thus, when preparing this article in late 2018, it has been in the classrooms for around five years.

We also use Kahoot! regularly during our lectures, for example to review the content of previous classes. Our experiences have been very positive in terms of students' motivation and increased interaction. But these are, of course, only our subjective impressions and therefore we searched for insights from academia on questions such as effects of using Kahoot! (e.g., regarding increased performance of students). During this process, we quickly learnt that an overview of academic studies on Kahoot! does not exist, which indicates a clear gap given its above-mentioned importance. In this context, Bawa (2018; p.2) even states: "However, at present, there is no literature on the use of Kahoot". We approach this gap by screening academic literature dealing with Kahoot!. After our literature search, we can decline the quote of Bawa (2018) as there is at least some academic literature, although the number is small. Nevertheless, we think that an overview of existing research on Kahoot! is valuable, particularly to identify gaps and corresponding needs for future research. Therefore, the research question (RQ) of this paper is:

• RQ: What is the current state of research on using Kahoot! in education?

This question is answered by conducting a structured literature review. For structuring the selected papers, we suggest a socio-technical perspective. This approach, which covers the dimensions: *human, technology,* and *organization,* is often used in the field of information systems (Laudon & Laudon, 2014) but is also suitable for the topic of this paper. Using Kahoot! in the context of education contains *humans* such as teachers and learners, but also *technology* such as devices and other technical requirements. Finally, educational institutions provide the *organizational* context. We structure our paper as follows: In section "Theoretical background", we present a brief overview of gamification in the learning context and some more details on Kahoot!. Subsequently, we explain the suggested socio-technical system. Section "Methodology" contains the main aspects of our research design. The core of the paper is section "Conclusion and outlook" in which we answer our RQ. Finally, the paper ends with the section "Conclusion and outlook" in which future research opportunities are presented.

## **Theoretical Background**

#### Gamification in Education – The Case of Kahoot!

Gamification describes the integration of game elements in non-gaming systems (Licorish et al., 2018) and has become popular in contexts such as education or health in the past years (e.g., Böckle, Novak, & Bick, 2017). Key elements of gamification are rewards and competition (Turan, Avinc, Kara, & Goktas, 2016). Applied to education, the implementation of gamification is found to be beneficial for academic achievement, motivation and classroom dynamics (Wang, 2015). It is important to note that gamification is different to game-based learning. The latter refers to "a pedagogical approach in which games are used to achieve educational outcomes through incidental learning", while gamification means "an integration of game elements in non-gaming systems [...], which engage students and improve the experiential nature of active, intentional learning" Licorish et al. (2018; p.2).

In our study, we consider the case of Kahoot! which turned out to be a very popular game element to enrich learning since its publication in 2013. Wang (2015; p.218) describes it as follows: "Kahoot! is a game-based student response system that transforms temporarily a classroom into a game show." In this show, the teacher becomes the game host and the students become competitors. In its very basics, quiz-like questions, usually with four answer options of which one is correct, appear on the screen, and the students can select one answer using their own devices. Once all answers are submitted or the pre-defined answer time is expired, the correct answer is displayed and can be discussed. The teacher then decides when to proceed, which makes the tool very flexible. Depending on speed and accuracy, a scoreboard is calculated after every question. More details on how to apply Kahoot! in the classroom are presented by, among others, Bicen and Kocakoyun (2018) or Plump and LaRosa (2017).

Wang (2015), who is also mentioned as one of the initial Kahoot! project members, provides some insights on the theoretical background of the tool. He refers to the theory of intrinsically motivating instructions and lists the three categories to make things fun to learn: *challenge* 

#### **Five Years of Kahoot! in the Classrooms – What does Research Tell Us?** *Matthias Murawski et al.*

(goals with uncertain outcomes), *fantasy* (captivate through intrinsic or extrinsic fantasy), and *curiosity* (sensor curiosity through graphics and sound, and cognitive curiosity where the player should solve something unsolved). He describes the development of Kahoot! with these categories in mind, "where the challenge is to answer unknown questions and try to beat other players, the fantasy is to be part of a game show, and the curiosity is provided both through inviting graphics and audio as well as solving a cognitive puzzle (finding the correct answer and wait to see if it was correct or not)" (Wang, 2015; p.218).

### Using Kahoot! in education as a socio-technical system

We suggest structuring the topic of Kahoot! in education as a socio-technical system as depicted in Figure 1. Socio-technical systems deal with the interactions of *humans* and *technology* while also considering the *organizational* setup (Laudon & Laudon, 2014). It is therefore not about the question *technology or human*? but about the design and optimization of a mutually synchronized system. Transferred to our specific topic, we can identify some sub-categories of the three main dimensions. Regarding *technology*, related aspects are the different *devices* that can be used to play Kahoot!. In addition, there are further *technical requirements* such as a stable internet for all the players and the instructor. These two roles, also called *learners* and *teachers*, represent the sub-categories of the *human* dimension. The dimension *organization* means the *educational institution* in our setting. This dimension covers the *effects* of using Kahoot! such as increased students' motivation and better achievements, as these belong to the overall objectives of educational institutions. Furthermore, Kahoot! can be used in different *subjects*, and it can have different *purposes* such as reviewing or introducing content.



Figure 1. Kahoot! in education - a socio-technical perspective

## Methodology

According to our research question, we first conducted a structured literature review (e.g., Webster & Watson, 2002) and subsequently applied a content analysis (e.g., Mayring, 2014). Table 1 provides an overview of the main parameters of the literature review.

Table 1:	Overview of literature review parameters
----------	--

EBSCO, JSTOR, Google Scholar
"Kahoot" and "Education"
2013 – 2019 (Kahoot! started in 2013)

LanguageEnglishTypeAcademic journal articles or conference proceedings

The described search strategy initially resulted in 23 papers which indicates the very early stage of research of the topic at hand. After reading the abstracts, we excluded seven of the 23 papers because they were not relevant to our analysis. We furthermore applied a backward search (a forward search was not useful as all selected papers are very new) which yielded one additional paper that has been included in our sample. Thus, our final sample contains 17 academic publications about Kahoot! in the context of education. For the content analysis, we used the dimensions and sub-categories of the socio-technical model (see Figure 1) to assign the selected articles. We furthermore distinguished between *conceptual* and *empirical* papers. Thus, we conducted a deductive category assignment (Mayring, 2014).

## **Research findings and discussion**

The findings of our analysis are summarized in this section and in the corresponding Table 2. We briefly mention the key aspects of each paper in an alphabetical order. Akbar (2016) generally places the focus on recent innovative technological solutions which are used in higher education. She clearly emphasizes the perspective of the educators. Pointing on Kahoot!, she particularly describes its use as an assessment tool but mentions interacting and engaging students as well: "Systems, such as [...] Kahoot, [...] allow educators to share interactive lessons, engage students, and view student responses in real time" (Akbar, 2016; p.3). Ares, Bernal, Nozal, Sánchez, and Bernal (2018) present an empirical study conducted with chemistry students in Spain. They found that the application of Kahoot! "has proven to be positive for the students' academic performance in a Chemistry course" (Ares et al., 2018; p.1221). They furthermore mention different devices such as smartphones, tablets, or laptops. Bawa (2018) can find similar evidence regarding the positive effects of Kahoot! in student's performance. He applied a mixed-methods analysis considering 96 American undergraduate students from introduction to business courses. He states that "additional limitations are that this study focused on learners and did not include the teachers' perceptions" (Bawa, 2018; p.11), which confirms our choice to consider the holistic socio-technical system as the framework of our study.

Bicen and Kocakoyun (2018) also consider mainly the student's perspective and present the results of their analysis of 65 undergraduates who were studying Preschool Teaching at a Turkish university. They found, amongst others, a positive impact of using Kahoot! on the motivation of the students. Interestingly, they also describe typical issues such as internet connection problems. Gonen, Sharon, and Lev-Ari (2016) discuss how innovative technology can be used to improve education of nurses in Israel and mention Kahoot! as an example for encouraging students. They integrate the perspectives of both educators and students for suggesting improvements of the nursing curriculum. By conducting a questionnaire study with 113 medical students in Malaysia, Ismail and Mohammad (2017) find that Kahoot! supports in making learning fun and enjoyable, and that it fosters motivation of the students.

**Five Years of Kahoot! in the Classrooms – What does Research Tell Us?** *Matthias Murawski et al.* 

They however elaborate that "Kahoot was unable to simplify complex subject matters" (Ismail & Mohammad, 2017; p.21), thereby indicating potential barriers of the game.

Aside from a very detailed and deep introduction to Kahoot! and gamification in education in general, Licorish et al. (2018) select a qualitative research design and conducted 14 interviews with students of an information systems strategy and governance course at a university in New Zealand. They find "that Kahoot!, and the use of games and gamification in general, have a positive influence on classroom dynamics, students' engagement and motivation, and ultimately, their learning" (Licorish et al., 2018; p.21). They furthermore emphasize that "challenges are still likely to remain in terms of the time needed to learn and setup these technologies, creating appropriate content, and providing students with useful and timely feedback" (Licorish et al., 2018; pp.21-22). Mehring (2016) provides a conceptual analysis of the flipped classroom and places the focus on the subject English as a foreign language. He considers both human perspectives, educator and learner, and briefly discusses Kahoot! as a "clicker" (Mehring, 2016; p.8), which is just another term for student response system. Mu and Paparas (2015) start with discussing the positive effects of using clickers in higher education (e.g., regarding performance, attention, or attendance) and the role of devices (i.e., bring your own device, byod) before presenting the findings of a study conducted with undergraduate students of economic and business environment at Harper Adams University, UK. The respondents state that they are satisfied with using Kahoot! and most of them would like to use it in other modules. Olofsson, Lindberg, and Fransson (2017) put the teacher in the centre of their study. Pointing on Kahoot!, they find a "teachers' lack of preparation for the uptake and use of ICT in the classroom and the emergence of new technological applications over time" (Olofsson et al., 2017; p.2910).

		/ / /	,						
	Hur	man	Te	chnology	Educ	cational inst	titution	Researc	h type
Paper	Teacher	Learner	Device	Requirement	Effect	Subject	Purpose	Conceptua	Empirica
	S	S	S	S	S	S	S		
Akbar	./				./			./	
(2016)	v				v			v	
Ares et al.		1	1		1	1			1
(2018)		•	•		•	·			•
Bawa		$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$
(2018) Diana ang d									
Bicen and		,		,	,	,			,
(2018)		V		v	V	V			v
(2018) Gonen et									
al (2016)	$\checkmark$	$\checkmark$				$\checkmark$			$\checkmark$
Ismail and									
Mohamma		1			1	1			1
d (2017)		•			•	·			•
Licorish et		,			,	,			,
al. (2018)		$\checkmark$			$\checkmark$	$\checkmark$			$\checkmark$
Mehring	,	,				,		/	
(2016)	v	V				V		v	
Mu and									
Paparas		$\checkmark$	$\checkmark$		$\checkmark$	$\checkmark$			$\checkmark$
(2015)									
Olofsson et	J								1
al. (2017)	•								•

Table 2:	Summarv	of	paper	anal	vsis
	5 a	<b>U</b> .	paper	annan	,

Plump and									
LaRosa	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$
(2017)									
Røkenes									
and Knowe evila	$\checkmark$	$\checkmark$							$\checkmark$
Turan et al									
(2016)		$\checkmark$			$\checkmark$	$\checkmark$			$\checkmark$
Veljković									
Michos	$\checkmark$								
(2017)									
Wang		./			./	./			./
(2015)		v			v	v			v
Wang and									
Lieberoth		$\checkmark$			$\checkmark$	$\checkmark$			$\checkmark$
(2016) Xaaaaa									
Yapici and						,			
Karakoyun	$\checkmark$				$\checkmark$	$\checkmark$			$\checkmark$
(2017) Total	0	14	Λ	2	12	14	р	2	14
TULAI	0	14	4	2	15	14	Z	2	14

The paper of Plump and LaRosa (2017) is probably the most-cited one in the fairly new research field around Kahoot!. They provide both a comprehensive overview of the tool and corresponding advantages and disadvantages (such as limited characters for questions). Their empirical study is focused on students (undergraduate and graduate students in two different business courses), but they also make useful suggestions for instructors. Aside from increased comprehension and motivation of the learners, they find, amongst others, that Kahoot! increases the engagement from "even the most introverted" (Plump & LaRosa, 2017; p.157) students. Røkenes and Krumsvik (2016) investigate digital competencies of Norwegian teachers. Interestingly, they combine the human perspectives teacher and learner as their case study considers "four cohorts of postgraduate student teachers taking an ESL (English as a second language) didactics course". Kahoot! is mentioned as an example that is often shown as a valuable tool during the study programme, but the teachers criticize the missing reasoning and background information. Turan et al. (2016) analyse the answers of Turkish students of an information technologies and software course. Kahoot! is applied as the gamification element. They, amongst others, elaborate that Kahoot! users reach higher achievements.

Veljković Michos (2017) covers most of the dimensions of the socio-technical system. She presents different purposes of using Kahoot!, i.e., "flipped classroom", "icebreaker activity", and "review activity" (Veljković Michos, 2017; p.514). Furthermore, both teachers and learners and different technical aspects are briefly mentioned. The main added value of the paper of Wang (2015) is the comparison of results from students using Kahoot! for the first time in a single motivational lecture versus using Kahoot! in every lecture in a class for five months. Through applying quasi-experiments with 252 Norwegian students, he elaborates a decrease in classroom dynamics while engagement, motivation, and learning remain high after using Kahoot! repeatedly which underscores the high value of this tool for keeping students' attention. Wang and Lieberoth (2016) conduct a study on 593 Norwegian software engineering students to investigate the impact of points and audio when applying Kahoot! in

#### **Five Years of Kahoot! in the Classrooms – What does Research Tell Us?** *Matthias Murawski et al.*

class. They find statistically significant differences for concentration, engagement, enjoyment, and motivation. Furthermore, they observed in the classroom that "audio and music affects the classroom dynamics in a significant positive way, and points also contribute to improve the classroom dynamics but to a more limited extend" (Wang & Lieberoth, 2016; p.746). Yapıcı and Karakoyun (2017) investigate the effects of using Kahoot! on Turkish Biology teachers and find an increased motivation of the teachers. However, they also discuss some negative aspects such as "students' insufficient technological skills" (Yapıcı & Karakoyun, 2017; p.397).

Looking at the total counts per dimensions (see Table 2) enables us to better understand the current state of research. On the meta level, the focus is placed on the dimensions: *human* and *educational institution* while, so far, less research efforts are put on *technical* aspects. Most of the articles put the *learner* in the centre of interest while only three out of 14 exclusively analyse the *teachers*' perspective. Also, *effects* of using Kahoot! are part of most of the papers (13 out of 17). Most studies are furthermore very context-specific, meaning that a concrete *subject* is considered. The *purpose* of using Kahoot! is hardly investigated. Regarding the research type, 14 out of 17 papers are of *empirical* nature. However, it must be noted that in most cases relatively small samples were collected and analysed. Exceptions are particularly Wang (2015) as well as Wang and Lieberoth (2016), who work with larger samples.

## **Conclusion and Outlook**

The overall objective of this paper was to elaborate the current state of research on using Kahoot! in education. This objective has been reached by conducting a structured literature review and a subsequent content analysis. The main findings are summarized in Table 2. Despite its practical importance and dispersion, our analysis reveals that research around Kahoot! is still in an early stage. This is firstly indicated by the very small number of academic articles dealing with Kahoot!. Secondly, existing articles place the focus on specific aspects of the socio-technical system while other also important aspects are neglected, which, in turn, paves the way for further research opportunities. This is especially true for *technical* questions around Kahoot!. For example, does the type of device (i.e., mobile, tablet, laptop) have an influence on the mostly positive effects of using Kahoot!? Or could a change of device even increase attention in specific settings? Also, technical requirements such as a sound internet connection even for large student groups or the availability of sound systems are hardly picked out as a central theme. Regarding the educational institutions, there seems to be a kind of agreement on the effects of the use of Kahoot! which are generally found to be positive. However, except for Wang (2015), differences between short-, medium-, and long-term effects are not researched yet. Thus, future research could be focused on longitudinal studies to fill this gap. Also, the purpose of using Kahoot! is associated to interesting questions, but rarely exists in current research. For example, how could Kahoot! be applied or - if required modified in the context of distance learning? What is furthermore completely neglected in research so far is the use of Kahoot! in companies, e.g., for training purposes. This topic seems to be highly relevant, given that almost all Fortune 500 companies use Kahoot!. Future research could start with case studies to explore related questions. Finally, considering the *human* dimension, we believe that more efforts are necessary to better equip the *teachers* with, for example, competencies to apply Kahoot! appropriately which is linked to the topic of digital competencies in general (Murawski & Bick, 2017). In addition, scholars should try to generate more generalizable results, for instance, through studies with larger samples or cross-subject analyses. This would contribute to a better overall understanding of Kahoot!.

#### References

- Akbar, M. (2016). Digital Technology Shaping Teaching Practices in Higher Education. *Frontiers in ICT*, *3*, 1–5. https://doi.org/10.3389/fict.2016.00001
- Ares, A. M., Bernal, J., Nozal, M. J., Sánchez, F. J., & Bernal, J. (2018). Results of the use of Kahoot! gamification tool in a course of Chemistry. *Proceedings of the 4<sup>th</sup> International Conference on Higher Education Advances (HEAd'18). Valencia: Universitat Politècnica València.* https://doi.org/10.4995/HEAd18.2018.8179
- Bawa, P. (2018). Using Kahoot to Inspire. *Journal of Educational Technology Systems*, 47(3), 1-18. https://doi.org/10.1177/0047239518804173
- Bicen, H., & Kocakoyun, S. (2018). Perceptions of Students for Gamification Approach:
  Kahoot as a Case Study. *International Journal of Emerging Technologies in Learning*, 13, 72. https://doi.org/10.3991/ijet.v13i02.7467
- Böckle, M., Novak, J., & Bick, M. (2017). Towards adaptive gamification: a synthesis of current developments. Proceedings of the 25<sup>th</sup> European Conference on Information Systems (ECIS), Guimarães, Portugal, 2017, 158–174.
- Gonen, A., Sharon, D., & Lev-Ari, L. (2016). Integrating Information Technology's competencies into academic nursing education An action study. *Cogent Education, 3*, 686. https://doi.org/10.1080/2331186X.2016.1193109
- Ismail, M. A.-A., & Mohammad, J. A.-M. (2017). Kahoot: A Promising Tool for Formative Assessment in Medical Education. *Education in Medicine Journal*, 9, 19–26. https://doi.org/10.21315/eimj2017.9.2.2
- Laudon, K. C., & Laudon, J. P. (2014). *Management Information Systems: Managing the Digital Firm* (13<sup>th</sup> ed., Global edition). Boston: Pearson.
- Licorish, S. A., Owen, H. E., Daniel, B., & George, J. L. (2018). Students' perception of Kahoot!'s influence on teaching and learning. *Research and Practice in Technology Enhanced Learning*, *13*, 1–23. https://doi.org/10.1186/s41039-018-0078-8
- Mayring, P. (2014). *Qualitative content analysis: theoretical foundation, basic procedures and software solution*. Retrieved from http://www.ssoar.info/ssoar/handle/document/39517
- Mehring, J. (2016). Present Research on the Flipped Classroom and Potential Tools for the EFL Classroom. *Computers in the Schools, 33*, 1–10. https://doi.org/10.1080/07380569.2016.1139912

- Mu, H., & Paparas, D. (2015). Incorporating the advantages of clickers and mobile devices to teach Economics to non-economists. *Cogent Economics & Finance, 3*, 233. https://doi.org/10.1080/23322039.2015.1099802
- Murawski, M., & Bick, M. (2017). Digital competences of the workforce a research topic? *Business Process Management Journal*, 23, 721–734. https://doi.org/10.1108/BPMJ-06-2016-0126
- Olofsson, A. D., Lindberg, J. O., & Fransson, G. (2017). What do upper secondary school teachers want to know from research on the use of ICT and how does this inform a research design? *Education and Information Technologies*, *22*, 2897–2914. https://doi.org/10.1007/s10639-017-9590-5
- Plump, C. M., & LaRosa, J. (2017). Using Kahoot! in the Classroom to Create Engagement and Active Learning: A Game-Based Technology Solution for eLearning Novices. *Management Teaching Review*, 2, 151–158. https://doi.org/10.1177/2379298116689783
- Røkenes, F. M., & Krumsvik, R. J. (2016). Prepared to teach ESL with ICT? A study of digital competence in Norwegian teacher education. *Computers & Education*, 97, 1–20. https://doi.org/10.1016/j.compedu.2016.02.014
- Turan, Z., Avinc, Z., Kara, K., & Goktas, Y. (2016). Gamification and Education: Achievements, Cognitive Loads, and Views of Students. *International Journal of Emerging Technologies in Learning*, 11, 64. https://doi.org/10.3991/ijet.v11i07.5455
- Veljković Michos, M. (2017). Gamification in Foreign Language Teaching: Do You Kahoot? In A. Milenković, M. Veinović, Z. Konjović, D. Cvetković, M. Šarac, A. Jevremović, ... V. Miškovic (Eds.), *Proceedings of the International Scientific Conference - Sinteza 2017* (pp. 511–516). Belgrade, Serbia: Singidunum University. https://doi.org/10.15308/Sinteza-2017-511-516
- Wang, A. I. (2015). The wear out effect of a game-based student response system. *Computers* & *Education, 82*, 217–227. https://doi.org/10.1016/j.compedu.2014.11.004
- Wang, A. I., & Lieberoth, A. (2016). The effect of points and audio on concentration, enagagement, enjoyment, learning, motivation, and classroom dynamics using Kahoot! *Proceedings from the 10<sup>th</sup> European Conference of Game Based Learning, Reading, UK*, 737–748.
- Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS Quarterly, 26*, xiii–xxiii.
- Yapıcı, İ.Ü., & Karakoyun, F. (2017). Gamification in Biology Teaching: A Sample of Kahoot Application. *Turkish Online Journal of Qualitative Inquiry*, 8, 396–414. https://doi.org/10.17569/tojqi.335956