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Research Article

Transformations in Digital Linguistics: How Social Media Shapes Vocabulary and Grammar

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ABSTRACT

Introduction: The development of information technology and social networks has significantly influenced the evolution of digital language. Using mobile applications on social networks improves a foreign language's grammatical and lexical knowledge.

Objectives: The study aims to identify the role of a game-based approach based on mobile applications in social networks on the development of students' grammar and vocabulary.

Methods: The chosen digital tool is Kahoot, which offers various templates for minigames that support learning, repeating, and testing.

Results: The experiment included Group A (n = 22), which was exposed to frequent Kahoot minigames for learning, practising, and repeating, and Group B (n = 22), the English grammar curriculum, which included no games. During the two-month study, the students of both groups were subject to (1) self-assessment aiming to measure their basic psychological needs (BPNs) satisfaction and (2) academic performance tests evaluating their knowledge and skills. The patterns shown by comparing both measurements reveal that introducing gamification through Kahoot minigames enhances vocabulary and grammar skills. However, more game details should be added to satisfy all three BPNs. Besides, while the progress from topic to topic was inconsistent in both Groups, students who used Kahoot were more successful than their counterparts.

Conclusions: The current study proves that the digital game approach, in general, and the Kahoot platform, in particular, can be incorporated into Chinese colleges to improve the quality of education and students' well-being and motivation.

Keywords: digital language, social networks, vocabulary, academic performance, English as a second language, grammar.

INTRODUCTION

New technologies diversify the teaching process and increase learners' motivation, for example, by introducing elements of competition. The new virtual didactic reality helps promote knowledge and the process of self-education of young people and adults. However, it brings many websites, pages, social networking portals, e-learning platforms dedicated to learning foreign languages, blogs, dictionaries, translation programmes, encyclopedias, and virtual clouds. It can cause stress and aversion to new information and communication technologies in teachers and learners [1]. This observation is crucial for educators to understand modern learners better and create an environment where the studying process is appropriately designed to meet its objectives.

Dynamic cultural, technological and social developments have influenced the evolution of digital language. As a result, digital language has evolved from simple online chats and forums to social networks, mobile applications and online platforms, which could not but affect the approaches to learning a foreign language [2]. Digital language is characterised by brevity and simplicity, dynamism, i. e. constant updating of vocabulary, and visual elements, such as emoticons and memes. Therefore, lexical and grammatical skills are developed in communication on social networks [3].

In social networks, digital language is developing dynamically and rapidly. It is created by exchanging new words that become popular and entering into speech use the next day. In addition, digital language in social networks is created through new abbreviations and acronyms, as some social networks have restrictions on characters (for example, Twitter). Moreover, digital language is created by visual elements (emojis, memes, gifs, stickers, etc.) that can replace text. Communicating in different languages contributes to creating new words by combining words from different languages.

Digital language significantly impacts the grammar and vocabulary people use. First, syntactic constructions are being reduced in grammar, as users use mostly short, concise sentences. In addition, punctuation is also being simplified, as users often omit punctuation marks or place them incorrectly. Users are also actively using new grammatical forms. Second, vocabulary is characterised by creating new words (mainly Anglicisms and neologisms). Digital language is quite diverse, as users actively use slang and jargon. Also, well-known words can acquire new meanings in digital language.

Today, a convergence of social networks and digital gaming media is observed. This phenomenon was noticed in 2008, mainly by Griffiths and Light [4]. In a recent study, Wang [5] analyses the trend of convergence between online games and social networks and explores how this convergence enhances the social attributes and player engagement of games. Accordingly, this convergence phenomenon further impacts digital language shaping and transformation, and today, educational practice should consider this in teaching language skills and forming students' motivation to learn.

The pursuit of dopamine can be stimulated and used in numerous ways, including gamification, which has already been studied and applied in various fields. For example, introducing a game element into the mundane routine has demonstrated positive effects in the study on mental health [6]. The concept of gamification and the research on its effects entered the discourse of anthropology and behaviourism even earlier [7, 8]. The fact that gamification is approached as one of the methods to facilitate studying, among other things, can be explained and justified by two factors. Firstly, games have been a part of human civilisation for ages, and even though they have changed formally, the concept's purpose and overall meaning remain [9]. Secondly, the progress of technology and the fact that technology, both stationary and mobile, both Internet-powered and not, has become even more accessible accelerate the progress that the gaming industry experiences and creates new opportunities for games to be improved and used for various reasons beyond entertainment [10]. The combination of such factors creates a complex situation in which there is an abundance of instruments to facilitate the needs of the learners. However, the effects and features of such instruments still need to be studied.

Digital gaming has already been applied at different academic levels as an educational method. It has shown an effect that encourages to continue incorporating gamification in kindergartens, schools, and colleges. However, the pool of digital gaming tools is so vast that it is impossible and, most importantly, unreasonable to choose one approach over the other, as many strategies can be developed and effective for various scenarios. Therefore, studying games and their application in the educational process is theoretically and practically significant. Such studies propose ideas on developing better gaming instruments and what facet of gaming to rely on in which situation.

There are no restraints on the teachers that could create obstacles in gamifying English as a second language discipline, especially the topic of English grammar. While it is more of a tradition to rely on computers and board games to study vocabulary, English grammar is a category that requires students' attention and dedication. Applying the digital gaming approach to studying English grammar as a part of the educational routine for Chinese college students is a step towards creating a better atmosphere for learning theory and familiarising oneself with its practical implications. However, the effect of this positive change is a phenomenon that requires attention.

The central topic of this study is to identify the role of a game-based approach based on mobile applications in social networks in developing students' grammar and vocabulary.

In order to achieve this aim, the following tasks should be completed: (1) choosing social media for applying the digital game approach, namely the game or a game-based app; (2) choosing or designing a framework for evaluating the respective aspects of the student's response to applying the digital game approach; (3) conducting an evaluation of the chosen medium through the chosen or designed evaluation framework; (4) analysing the collected data, tracing and highlighting the apparent patterns if any are present; (5) comparing and contrasting the feedback on the digital game approach provided by students and teachers. Tasks 1 and 2 are more detailed in the Methods and Materials section.

LITERATURE REVIEW

The study group of this research includes college students, and the psychological portrait of the modern college student has been studied from various perspectives. Firstly, the basic psychological needs theory (BPNT) can be applied to this category of learners, as it is stated that (1) autonomy, (2) relatedness, and (3) competence are essential for the majority of people to show better performance in many aspects [11]. Besides, the recent study of the satisfaction of these three needs proves to have a positive effect on the overall performance of East Asian, namely Chinese, college students [13]. In the context of basic psychological needs (BPNs), when applied to the educational sphere, it is crucial to highlight the importance of these factors for motivation [13]. As addressing the BPNs can make a learning process more effective by enhancing motivation and self-determination, neglecting them can be extremely harmful. The effects of neglecting basic psychological needs are detrimental; students whose BPNs were not fulfilled tend to show less resilience to stress and often struggle with feelings of dissatisfaction, especially when they have no way to be autonomous [14]. Similarly to ignoring the need for autonomy, not satisfying the basic need of competence by not designing a proper feedback model can be dangerous [15]. Finally, facilitating relatedness among all the participants of an education process is essential, especially in the context of the recent transformation of learning and its moving towards an online format due to lockdowns, as studied and demonstrated by the example of college students [16, 17]. As a result, the framework of BPNT can be highly relevant in a study that approaches college students, their academic performance, and the ways to enhance it.

The study by Tao and Zou [18] aimed to determine how the Kahoot app affects Chinese students' perceptions and effectiveness in learning English. The results showed that this game-based app positively impacted students' motivation and engagement in learning English. The researchers concluded that the game-like interface effectively increased foreign language proficiency [18].

Gamification has entered the world of education as an efficient method alongside the development of technology, and some aspects of this approach were analysed and evaluated in academic research. The current level of technological progress, the accessibility of devices for all participants in the educational process, and the wide range of instruments that the technology provides justify the interest in digitalised approaches [19]. Using games, among other computer-based tools, can prove fruitful in many aspects. It was also suggested and proved that applying digital games can even help students with special educational needs [20]. Other researchers, in turn, note that the digital game approach is directly connected to students' motivation and engagement, justifying the connection of this method with the BPNs and overall academic performance [21]. Using gaming in education, especially in teaching foreign languages, allows highlighting the positive effects of the approach on children's performance in a foreign language classroom and behind it [22]. Aside from all the addressed studies, gamification also shows its effects in the long run. Different methods focused on using digital games in language education were applied to different levels of education and evaluated positively [23, 24]. However, the usage of the digital game approach is not limited to linguistics; this method's efficiency performed successfully in STEM education [25], healthcare education [26], and chemistry [27]. As there are almost no limitations to the application of digital gaming across disciplines, the target audience this approach can benefit is almost unlimited, too. For example, when the impact of six categories of games on elementary school students was studied, it was concluded that there is a specific effect in applying all of them [28]. In an even earlier study, when the impact of digitalised and gamified classroom assessment on middle schoolers and college students was addressed, the results proved the same thesis [29]. While digital games in social media affect the quality of education and students' vocabulary/grammar skills, the results vary depending on the game category and the age/curriculum difference.

While the digital game approach is a treasure trove for educators and its positive effects have already been studied, there is an alternative point of view, a concern that this method can hurt the students who have already developed

gaming obsessions. In two different studies [30, 31], child gaming addiction was named a serious condition that can alter the studying process and, even though caused by different factors, would alter the possible progress of a game-based approach. These circumstances should be considered when designing any studies related to digital games and analysing their results.

METHODS

Research design and sample

The collected information was evaluated based on a theoretical framework, which revealed and further evaluated the patterns. To ensure a proper evaluation, the basic psychological needs theory (BPNT), a sub-aspect of the self-determination theory (SDT), was chosen as a fundamental theoretical framework. SDT is connected to motivation, so one of the facets of students' response to the approach application addressed in this study is motivation.

The three fundamental factors outlined by BPNT as the essential needs include autonomy, relatedness, and competence. Previous academic studies, observed in the Literature review section, show that the satisfaction of these three BPNs significantly impacts the overall well-being and the student's performance and progress. The omission of even one of the BPNs can have a deteriorating effect and alter the educational process, which is why the fulfilment of all three BPNs will be assessed separately; the general level of satisfaction of the combination of BPNs will be organised based on the analysis of the collected data. A questionnaire known as the Basic Psychological Needs Satisfaction Scale (BPNSS), retrieved from the official website of the SDT research (selfdeterminationtheory.org), is used as an evaluation device.

Before Kahoot was introduced to Group A as a study tool, the students of both groups were asked to complete a BPNSS questionnaire. The students were asked to treat the questions about their studies and provide answers with their educational process in mind. Table 1 demonstrates the questions used to evaluate the satisfaction of each basic need used in the evaluation.

Table 1: BPNSS questionnaire used for BPNT satisfaction among the students of both groups (Basic psychological need satisfaction scales (BPNSS, n.d.)

Please answer with a number 1 (strongly disagree) to 7 (totally agree)		
Autonomy	Relatedness	Competence
I feel like I am free to decide for myself how to live my life.	I really like the people I interact with.	People I know tell me I am good at what I do.
I generally feel free to express my ideas and opinions.	I get along with people I come into contact with.	I have been able to learn interesting new skills recently.
People I interact with on a daily basis tend to take my feelings into consideration.	I consider the people I regularly interact with to be my friends.	Most days I feel a sense of accomplishment from what I do.
I feel like I can pretty much be myself in my daily situations.	People in my life care about me.	I often feel competent.
What is your overall feeling about this course?		

Source: developed by the authors based on data from Center For Self-determination Theory [32]

The same BPNSS questionnaire was offered to the students of Groups A and B in one month to evaluate the students' SDT halfway through the process and once again in two months after the application of the Kahoot tool for this study was completed.

The digital game approach requires a technical medium; the current study focuses on Kahoot, an interactive platform for creating educational content. Firstly, Kahoot is a digital game-based platform, which means that the research based on it can represent the efficiency of the digital game approach. Secondly, Kahoot is web-based, and most of its features are free, while the price for educators is not too high, which means that Kahoot

can provide better accessibility for teachers and students. Additionally, Kahoot is easy to use. The choice of this platform makes gamification accessible. It minimises the required technical aid, especially for teachers and professors who have not yet incorporated technology into their mundane toolbox. At the same time, while offering the basic instruments for facilitating the educational process and maintaining the gamified form, the elements of deep immersion are not present, which means that even for those students who struggle with digital game obsession, this platform will not cause harm. Finally, Kahoot has been on the educational scene for a while, especially considering its contribution to the shaping of contemporary online education; the fact that Kahoot proves helpful in linguistic education can be proved by several studies where the same technological medium is chosen [33, 34]. Kahoot also proves relevant regarding all three BPNs used for evaluation; more information can be found in Table 2.

Table 2: The correspondence of Kahoot features to BPNs

Autonomy	**Relatedness**	**Competence**
An opportunity for a teacher to create an arsenal of minigames for learning, repeating, and testing, an opportunity for a student to choose one	Each student has a personal account with their scores all accounts of one class belong together and form the same rating	Each separate minigame is testing a specific topic and provides results, both comparing to other students and on an overall leaderboard
Kahoot is web-based, and its games are available on many devices	Students can compete in real-time when the seconds can decide who's the winner	Each Kahoot can be played many times, meaning that the result of each minigame can be improved
The results of every Kahoot minigame can be saved the results are accumulated regardless of the testing time.	Students can create and share their own Kahoots.	Different types of questions within every minigame can improve one's understanding of different aspects of the same topic or enable mastery of all related skills.

Source: developed by the authors based on data from Kahoot [35]

The study is conducted within two student groups. Group A used Kahoot for two months, while Group B followed the same curriculum but was not exposed to game-based tools. Both groups are first-year students from Kyiv National Linguistic University; there is no notable disbalance in terms of gender or age. Both groups consist of 22 students aged between 18 and 20; in Group A, there were 12 women and 10 men; in Group B, there were 9 women and 13 men. It is believed that neither the age nor the gender of the students had any visible impact on the study results; thus, this information is only descriptive and is not considered a variable.

Apart from evaluating BPNs and estimating the SDT's change after implementing the digital game approach based on social media, the vocabulary and grammar skills assessment was also conducted. The curriculum was analysed, and the topics mentioned in Table 3 were used to categorise the knowledge and skills to be tested. The number of hours each of the topics took on the curriculum was the same for both groups. However, Kahoots designed for each were only available to Group A.

Table 3: The English grammar topics, hours spent on each topic and the number of Kahoot minigames

English grammar topic	**Hours**	**Kahoots**
Present Forms	4	12
Past Forms	4	12
Future Forms	2	6
Future in the Past	2	4
Modal verbs	6	18
Three Conditionals	4	12
Mixed Conditionals	2	6
Passive Verbs	2	6

Source: developed by the authors based on the education curriculum of Groups A and B

After the end of each module, Groups A and B conducted tests to evaluate the quality of their education. The correct answers from an entire group were summarised and converted into percentages to demonstrate the overall tendency. The results of this analysis were structured visually in Figure 2. The Kahoots designed for each topic included at least three minigames with different purposes: (1) learning, (2) repeating, and (3) testing. The Kahoots of the first type included numerous exercises on choosing the correct answer, frequently asking the students to rely on their logic instead of memory. For the minigames of type 2, right-option questions were mixed with drag-and-drop mechanics and a small number of questions that required writing an answer without any outside help. Finally, for the testing stage, all types of questions offered by the Kahoot templates let each student evaluate their knowledge and skills. Some topics which cover more material (e.g. modal verbs) or require more explanation (e.g. conditionals) featured more than 3 Kahoots and instead received three types of minigames for each hour of teaching. Therefore, the Kahoots covered all topics and sub-topics taught during the two-month experiment.

Data analysis and statistical processing

With the instruments of measuring Kahoot's efficiency in the educational process described above, the basic pool of data received during all stages of the research included students' feedback (BPNSS questionnaire) and the results of students' grammar and vocabulary evaluation (tests after each module of their English grammar curriculum). The BPNSS answers were collected, analysed, and converted into numbers manually. In each questionnaire, the students were encouraged to provide feedback. However, the clause was not claimed to be mandatory because the BPN theory and the structure of BPNSS are not related to studying the gamification approach. Besides, the students were not limited in their opinions as the question did not address the application of Kahoot. Therefore, while analysing the questionnaires, the general feedback answers in which Kahoot was featured were also used to identify the underlying patterns.

The results of the grammar and vocabulary tests were provided by the educational institution, which means that the authors did not have access to the answer sheets, which was unnecessary. The test results themselves, instead, were important to demonstrate the changes in the overall performance, which was expected to increase with the use of Kahoot.

Because the study's sample is not overwhelming, manual data processing was the most efficient way to collect and analyse the material necessary for this research.

Ethical issues and methodological limitations

The study was conducted with the support of the educational facility. However, the facility's name and the names and academic titles of the personnel involved were to be kept private because the facility had a right not to share the details of its curriculum and innovations that are designed to be applied in the future. An NDA with the said condition was signed by the facility's representative and the authors of the current research.

The students participating in the experiment, both Groups A and B, gave their written permission to participate in the research. However, the authors were to keep all participants' names and exact grammar and vocabulary achievements, as well as their thoughts on the educational curriculum, autonomous.

All agreements were designed, proposed, updated according to the needs of all sides, and signed prior to the experiment. Thus, the abovementioned conditions eliminate all possible ethical issues.

The research limitations are bound to the sample size and the participant groups' homogenous nature. The gender of the students and their ethnicity are believed to not have any impact on the study design as such. However, the age, occupation, and background similarities mean that the results would be based on quite a limited sample. However, this limitation was created intentionally to avoid any external varieties influencing the comparison of Group A and Group B, as such comparison is believed to be the key variable to understanding the exact effect of Kahoot, which was used for one group of students and was not used for another.

RESULTS

The key factor in evaluating the use of Kahoot in the college classroom is the motivation levels measured and compared through the BPN framework using BPNSS. Figure 1 presents both groups' median results before and after the experiment, categorised by the BPN factor.

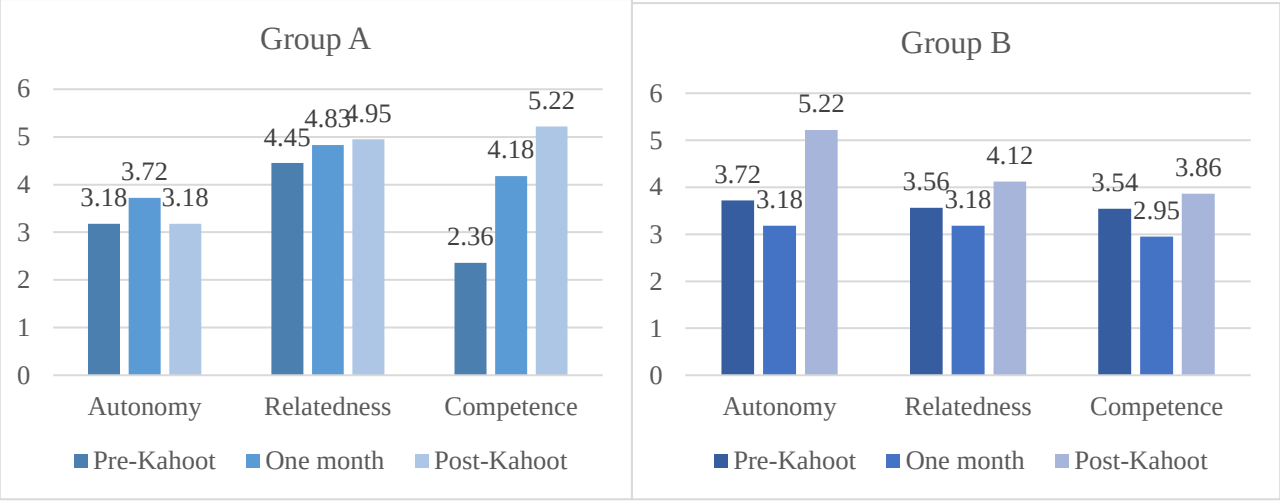

Figure 1: The BPNSS results of Groups A and B before and after the experiment

Source: developed by the authors

The difference between the results depicted by both groups is significant; the evaluation patterns conducted within one month are visible when compared and contrasted within or outside the group. Firstly, Group A shows progress in two out of three BPN factors, while the results of Group B are inconsistent in all aspects.

The most significant improvement can be seen in the BPN of competence of Group A, where the difference between the pre-experiment SDT evaluation and one-month evaluation is 1,82 while the difference between pre-experiment and post-experiment evaluation is 2,86. Because the highest result for each BPN that could be achieved is 7, the result of 5,22 is considerably high. This drastic positive change can be explained by the fact that the BPNSS for competence is most obviously related to the knowledge and skills that can be achieved during the educational process. In contrast, processes outside of the classroom can influence the evaluation of relatedness and autonomy. Therefore, it is reasonable to suggest that the implementation of Kahoot will not necessarily influence the BPN of autonomy, or its impact will not be too visible.

Amid the results of Group A, Group B tends to demonstrate some fluctuations which do not speak of steady progress. For all three BPN factors, the results tend to drop by the first month of the studies and increase after two months. This wave can be explained by psychological factors outside the linguistic classroom, especially considering that it is the first year of college studies, and stress and adaptation can also take a toll on educational performance. However, the fact that Group B had the same curriculum and teachers as Group A but failed to demonstrate the same stability of progress means that the digital game approach helped to provide better structure to the educational process and ensure a steady basis for students' motivation.

Beyond the Yes/No questions of the BPNSS questionnaire, the extended feedback was evaluated with special attention paid to Group A and their mid-experiment and post-experiment feedback. The fact that they mentioned or did not mention Kahoot in the context of their motivation cannot be used as a quantitative variable. However, it can provide a better understanding of how the students themselves perceive this gamification tool. A considerable part of determining the essential psychological needs satisfaction is related to self-assessment, which is why the extended feedback addressing the overall impression of the approach is also a helpful cluster of data. Applying such an extension to the BPNSS proved efficient in this research as some relevant information was collected.

After the first month of the experiment, the students of Group A were comparably uninterested in providing feedback; only 10 out of 22 students shared their views of the course. Among these 10 responses, however, 8 answers mention the Kahoot tool. Besides, all 8 mentions were positive. The most complete and comprehensive feedback on Kahoot applied in the curriculum was provided by Student 7 of Group A: *The tests and games in Kahoot helped me train myself and use my knowledge in practice. I often use a 'Play solo' game before competing with my classmates to get better at this game and win. I also like to invite my classmates to play together and then talk about our mistakes together*. This feedback is important as it demonstrates the satisfaction of the relatedness BPN and mentions two fundamental features of Kahoot (solo mode and competition mode), proving that the student has familiarised himself

with all the opportunities that Kahoot can provide. Besides, the said student shared that he talked about Kahoot and achievements in the game with other students, which means that it increases the overall acceptance of the tool in the classroom.

After two months of the experiment, when the same BPNSS questionnaire was offered to the students, more participants from Group A were willing to share their thoughts. However, unlike the feedback process a month ago, some responses were neutral or harmful. One of the concerns displayed by Student 11 was related to using Kahoot in evaluating the students' grammar and vocabulary. The student shared *that when I did well in Kahoot, I still received low grades from the teacher. This game is interesting, but I do not write my exams* well. This response can speak of two things: (1) The teacher and the designers of the experiment did not communicate the role of the Kahoot tool properly and Student 11 suggests that the results of the Kahoot minigames should have impact on the actual students' grammar and vocabulary evaluation, while, in reality, it was used to boost motivation and influence self-assessment; (2) Student 11 did not find Kahoot very useful, because even when performing well in Kahoot minigames, his knowledge and skills did not increase well enough to perform better when writing actual tests.

Among other responses of Group A in the extended feedback field, answers indicate the following patterns: (1) Kahoot becomes a part of the learning routine, especially for practising the things learned theoretically and preparing for tests and exams; (2) Kahoot brings students closer and encourages them to share their opinions and support each other in the educational process, which makes overcoming obstacles in education easier; (3) while playing Kahoot, the students are more relaxed if compared to other types of learning activities, which reduces the stress levels; (4) the students are willing to include Kahoot minigames in other disciplines, as well.

At the same time, the extended feedback question offered for Group B demonstrated the students' need to incorporate an interactive instrument into their curriculum. In the questionnaire offered after the first month of the experiment, three students called the course '*Boring*', while the overall evaluation of the Competence BPN dropped. After the two months of the experiment, no students of Group B suggested including games in their curriculum. However, most of the responses demonstrated a certain level of frustration related to the course's '*stuffiness*' and '*boredom*' (as they described it).

The comparison of the BPNSS results and the extended feedback section supports the idea that gamification is good for motivation and self-assessment. At the same time, the results of the actual students' grammar and vocabulary tests, provided by the Groups' teachers, can provide objective data on improving English grammar knowledge and skills (Figure 2).

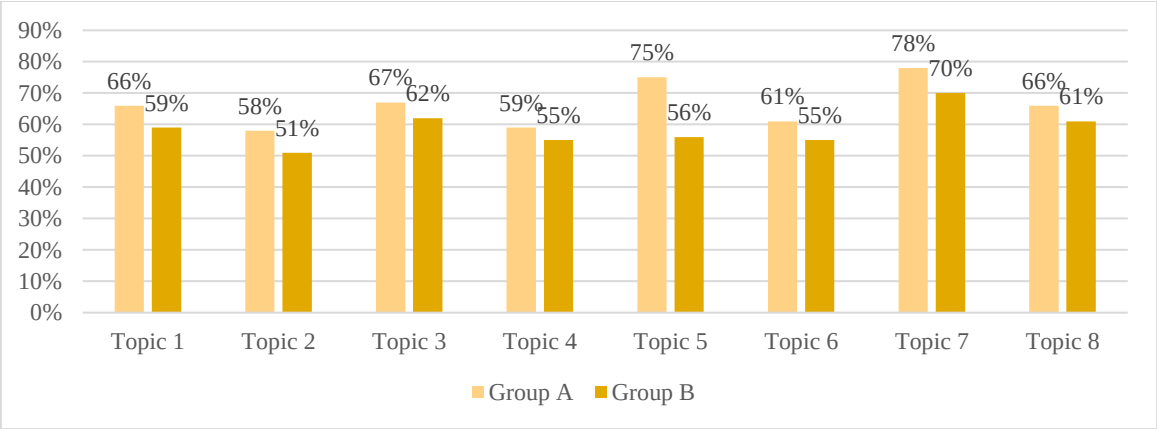

Figure 2: The percentage of positive performance for Groups A and B in each topic

Source: developed by the authors

According to the student's grammar and vocabulary analysis, Group A always demonstrates better results. However, the difference between the groups is not too big. For example, the most significant difference between the grammar and vocabulary evaluation of Group A and Group B was demonstrated in Topic 5 (19%). In comparison, the most minor difference was observed in Topic 4 (4%), Topic 3 (5%), and Topic 8 (5%). Regardless of the similar curriculum, the space each topic took can explain such a difference. Topic 5, which demonstrated the most significant difference between Group A and Group B, is also the topic where the most hours throughout the course were assigned. Therefore, both groups had

more time to familiarise themselves with this aspect of English grammar and make fewer mistakes in the upcoming evaluation. However, the superiority of results that Group A has shown can be related to their digital game engagement because it is Topic 5, in which the number of Kahoots used for learning, repeating, and testing is the greatest. At the same time, Topics 3, 4, and 8 were the blocks with a few Kahoots throughout the curriculum.

At the same time, when analysing the students' grammar and vocabulary results, there is no sign of steady progress for any groups. Each topic shows better or worse performance when compared to other topics, and such variables as the number of teaching hours are also significant. At the same time, Group A tend to show better results, which can be explained by their engagement with the Kahoot tool and the considerably higher indices on the SDT scale. This lack of an identifying chronological pattern in Figure 2 does not correspond with the tendencies outlined in Figure 1, which can be explained by the fact that the self-evaluation, which is essential for SDT and BPN, can be different from the objective evaluation of the student's grammar and vocabulary.

The technological characteristics of Kahoot can explain the lack of substantial all-round progress explains the lack of substantial all-around progress. Chosen for its convenience and easy, comprehensive structure, Kahoot also has its limitations. Firstly, all minigames have the structure of a test, where the basic unit of the win/loss evaluation is a question. This game mechanics limitation can be compensated by the diversification of the questions, as demonstrated in Figure 3.

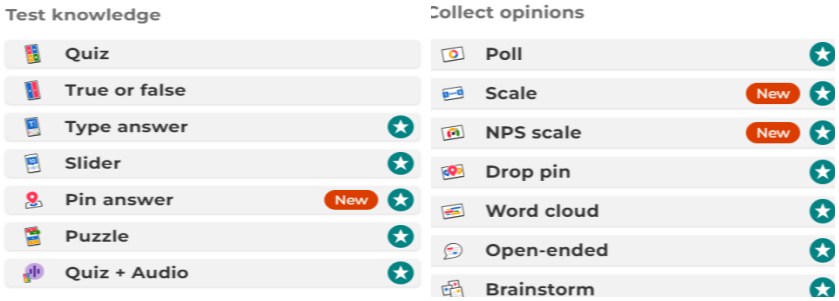

Figure 3: The design options for Kahoot minigame questions

Source: Kahoot [35]

Different questions can be applied to fulfil different learning objectives. Varying such questions is crucial for addressing all academic needs, including understanding and remembering theoretical knowledge and familiarising oneself with its practical use.

At the same time, the minigames, even though connected by topics/learning objectives and synchronised with the curriculum, offer little cohesiveness and, as demonstrated by the BPNSS analysis, do not offer much autonomy. It is reasonable to combine Kahoot with a storyline-based gamification tool to fulfil this need and create all-around satisfaction in terms of students' motivation and grammar/vocabulary skills. To keep the game tool as simple and low-effort as Kahoot, it can even be a Dungeon&Dragons type of scenario, where each student is given a character that is upgraded along the course development. For example, specific Kahoot achievements add up to the character stats. A particular game scenario (e.g. defeating a monster or getting an artefact) is cleared if many points are accumulated.

Designing such a scenario requires time and effort, making it engaging even more complicated, but it can develop a strong frame for the Kahoot minigames, keep the students involved, and enhance their feeling of autonomy by providing options for scenario development. Kahoot is well-suited for combining and accompanying other gamification models in this context. Besides, it will resolve the problem of the course being 'boring'; moreover, the students will see that the Kahoot achievements are related to the overall game scenario development rather than their grammar/vocabulary achievements, as Student 11 from Group A suspected.

DISCUSSION

After the study was completed, two significant patterns appeared. Firstly, the comparison and contrast of all the findings demonstrates that the interactive digital game platform impacts the studying process; however, this impact is inconsistent from the perspective of both BPN/SDT and grammar/vocabulary skills evaluation. This difference is not surprising, as it only confirms what the other researchers in the field have witnessed in their studies. For example,

when measured, self-assessment frequently demonstrates results different from objective grammar/vocabulary skills [36]. At the same time, the study showed an undoubtable connection between motivation, enhanced by the digital game approach, and the results students demonstrate in the classroom, which, overall, also confirms the shared belief in educational research [37, 38]. The choice of SDT has proven helpful in this specific research, and the theory remains a convenient and efficient framework for similar research in the educational context [39]. Therefore, the study's chosen design allowed for better shaping of the results and understanding the recurrent patterns, especially in comparison to the control group; thus, this theoretical framework can be used in further research.

The attention to the satisfaction of the basic psychological needs differs much across the countries or cultures, but it does show some changes in chronology. Recently, with the lockdown influencing the educational process, the question of student relatedness and satisfaction when studying online has become crucial. It is undoubted that it is much more challenging to build a teacher-to-student and student-to-student bond without the face-to-face engagement [40]. The surge of attention to the BPN framework can be seen in societies where the lockdown had a significant impact on the studying process [41] or in countries where online college education is on par with classical offline colleges [42]. The current study highlights the relevance of SDT and BPN for enhancing students' engagement and providing a proper learning environment.

A similar study was conducted in China [18]. Using a sample of Chinese students who were learning English using Kahoot! app, researchers examined how the playing form of the word affected their language skills. The results are similar to those of our study, which concluded that the app effectively increased students' motivation to learn a foreign language.

The introduction of the digital game approach in the educational process of Group A allowed speaking about more structural progress and a steady pace, even when the basis was constructed of the same curriculum. Gamification is no news to college education, and the behavioral changes depicted in the current study were predictable [43]. However, it is reasonable to suggest that Kahoot, which was used as a technological medium for the study, increases engagement and improves motivation, but not dramatically; it is, indeed, an innovative approach, but the format of minigames helps to structure the learning process and find better ways for relaxing learning, as also demonstrated in the studies forerunning the current research [44, 45]. However, a notable disadvantage, even in increasing the motivation with Kahoot, lies in autonomy. While the design study suggested that the platform format allows much freedom and can thus improve the satisfaction of autonomy, Kahoot proved almost incompetent. Therefore, the teachers should combine Kahoot with other games or gamified materials or turn to an alternative method to ensure maximum self-determination and motivation.

The application of the digital game approach in the case of Chinese college students is not yet a common practice. However, the results of this study, among others, prove that it can be changed to improve the quality of education. Similar to Zhang and Chen [46], who studied the effects of gamification on Chinese students' foreign language apprehension, Li and O'Rourke [47], who focused on the learning experience outside of the classroom, the current study shows that implementing the digital game approach regularly will only be beneficial. Considering the level of stress that Chinese students go through, the significant number of people in classes, and the severe competition, it is reasonable to relieve the stress and support well-being by enhancing the BPNs with digital gaming. The case of Chinese students can easily be approached by technologies other than Kahoot, as well; relying on other studies in the field, it can be suggested that Quizizz [48], Duolingo [49], and HelloTalk [50], which are all free to use from different devices and are easily accessible, are also alternative technologies for educational gamification. However, even though the fundamental structure of the minigames is similar, other features lead to the conclusion that the application of these technologies will yield different results compared to Kahoot.

As gamification has already been applied in other educational institutions, it is possible to rely on the experience of other countries and cultures, where Kahoot and other gamification tools have already proven their worth. Numerous studies show that the most applications on a practical level, as well as the most convincing results, appear in such countries as the USA, the UK, Spain, and Germany [51, 52]; all of these countries have a comparably high GPA in terms of economy and, most importantly, in the first positions of PISA in terms of education. At the same time, attention to gamification and some attempts to incorporate it into educational programmes can be seen in other countries with different levels of development that are working on their educational reforms [53]. Therefore, the current study highlighting the Chinese student groups and comparing their self-assessment and grammar/vocabulary test results is among those experiments encouraging such a change.

While Kahoot improves the overall structure of improvement in terms of self-determination and motivation, the grammar/vocabulary skills can be increased even more by using serious gaming of a different scenario. As Kahoot was chosen for its convenience and accessibility, as well as a low level of immersion, other strategies can be discovered and examined to reach other results. For example, designing a semester-long or a year-long campaign that will align all topics and study objectives with the turns of the game narrative can have more fundamental changes. Students can develop more engagement if a game is designed as a digital Dungeons and Dragons campaign, and their BPNSS feedback will show higher levels. At the same time, such a complex and immersive game can increase motivation but alter basic grammar/vocabulary skills.

CONCLUSION

The study shows that applying the digital game approach with Kahoot as a set of minigames can benefit Chinese college students who study English as a second language, especially in English grammar. Kahoot minigames, created in learn-repeat-test batches for each topic depending on the number of classroom hours, were offered as gamified support material. Students of Group A, in the curriculum of which using Kahoot was encouraged, demonstrated a significant and reliable increase in the satisfaction of the basic psychological needs of relatedness and competence. At the same time, while the results depicted by the grammar/vocabulary skills evaluation did not show much growth, the test marks of Group A were consistently higher than the marks of Group B, in which Kahoot was not used. Besides, when providing feedback, the students of Group B shared some criticism that demonstrated their low motivation and an unfavourable opinion of the level of educational engagement, while Group A already viewed Kahoot as a part of their learning routine.

Therefore, using Kahoot and Kahoot-like minigames in linguistic education can positively affect self-determination and motivation. However, grammar/vocabulary skills demonstrated more correlation with the number of classroom hours than with the implementation of gamification. Amid the development of gamification models in countries where this method was introduced earlier, considering the challenges of modern education and the technological development available to Ukrainian universities, it is highly recommended that the digital game approach be introduced.

The results of the current study can be used both theoretically and practically. The patterns of Kahoot and digital gamification influence on the education process can be used as a framework for further research, expanding it by offering more topics other than English grammar or choosing a different, more immersive game tool. At the same time, all participants of the educational process can rely on the findings to implement Kahoot in their practice, both centralised (by teachers and education managers) and individual or self-managed (by students). Finally, the game developers who have also turned into stakeholders in the educational sector in recent years can consider the information revealed in this study when working on new games and platforms to facilitate learning.

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