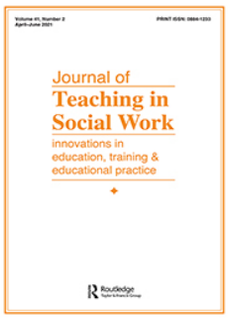

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Online Quiz as Exit Ticket: Using Technology to Reinforce Learning in Face to Face Classes

Rachel Shapiro Kirzner, Theodore Alter, and Caleigh A. Hughes

School of Social and Behavioral Sciences, Stockton University, Galloway, New Jersey, USA

ABSTRACT

Social work students are required to take research methods courses because research-informed practice and practice-informed research are essential to professional practice. However, these students are often reluctant to take a research course and can be difficult to engage in the classroom. We used a mixed methods survey-based design to evaluate the use of an online polling website at the end of each class session in an undergraduate program. This pedagogical approach combines formative assessment, technology, and gamification as an "Exit Ticket." We document that students found the online Exit Ticket to be a fun activity that supports their confidence, learning, and retention of course material. Further, we found no association between age and appreciation of Kahoot and weak associations between race/ethnicity and appreciation of Kahoot. Higher grades and female gender both correlated positively with perception of Kahoot benefits.

KEYWORDS

Social work education; gamification; technology; formative assessment; exit ticket

Introduction

Learning research skills is an essential component of social work education and mastery is required by one of nine Educational Policy and Accreditation Standards (EPAS) for accreditation (Council on Social Work Education, 2015). Furthermore, conducting and utilizing research is featured in one of the six ethical standards of the National Association of Social Workers' Code of Ethics (National Association of Social Workers, 2017). Goals in teaching research include reaching competence in understanding research, effectively applying research to practice, and using both quantitative and qualitative research skills to build knowledge and evaluate one's own practice. Students need to understand that there are multiple ways of knowing, as well as how to translate research findings into effective social work practice. These aspects of research are captured well in the terms of practice-informed research, and research-informed practice (Council on Social Work Education, 2015).

While research supports and is supported by the values and practice of the social work profession, social work students have been found to feel anxious, apprehensive, and intimidated by learning and conducting research (Maschi

CONTACT Rachel Shapiro Kirzner rachel.kirzner@stockton.edu Stockton University, 101 Vera King Farris Drive, Galloway, NJ 08205-9441

et al., 2013; Morgenshtern et al., 2011) and students have reported problems linking theory to the act of research. They often find the material dense due to the math-based portions of the material and the complexities that go into crafting a proper study (Murtonen et al., 2008). Most students are interested in direct practice and do not immediately realize the benefits of including research methods into their practice or of following a career in social work research (MacIntyre & Paul, 2012).

These negative attitudes and concerns of many social work students can make engaging them in research classes especially challenging. Studies suggest that varying one's approach may assist an educator in successfully teaching this material. Some useful approaches include demonstrating a caring attitude by instructors (John & Bang, 2017), conducting actual research in community settings (Harder, 2010), using team-based learning (Hostetter et al., 2013), and deploying technology-oriented designs (Veloso et al., 2018).

Our research question asked whether online quizzes that combine formative assessment and gamification, inserted at the end of class, are perceived by students to enhance mastery and subject retention in a social work research class. We report on a survey documenting students' perceptions of online quizzes using the website Kahoot, as an "exit ticket" at the end of each class. We show that students found the online quizzes engaging and fun and also perceived them as assistive in learning the material. Our research evaluated an innovative, technology-based approach that combines the two pedagogical methods of using exit tickets and gamification.

Literature review

Exit ticket

An exit ticket, sometimes called an exit slip, is an educational method implemented at the end of a class session. Exit tickets allow students to provide a response relating to that day's material. Exit tickets use a number of approaches, including soliciting student feedback on a lesson, promoting student self-reflection, and asking questions on class content, all as a type of formative assessment (Danley et al., 2016; Marzano, 2012). Exit tickets are an example of student-centered teaching because they allow students to clarify and evaluate their own learning (Brookhart, 2013). This in turn has been shown to enhance student learning (Dixson & Worrell, 2016). Black and Wiliam (2010) note that for a formative assessment tool to adequately function, the results must be used to adjust teaching and learning.

Exit tickets may be implemented in a number of ways. Traditionally, they have been administered on slips of paper or index cards (Marzano, 2012), but more recently, instructors have started using technology. This can include Twitter (Amaro-Jiménez et al., 2016) and Socrative (another polling website

often used in education) (Green, 2016). Amaro-Jiménez and colleagues described using Twitter with four classes (sizes unspecified) of undergraduate education students at a university that draws from a diverse, low-income, urban population. They conducted a qualitative analysis of class artifacts, tweets, and reflective memos and found that using Twitter as an exit ticket increased engagement, and allowed for immediate feedback and responses to students. Green used Socrative for general review questions and as an exit ticket with about 200 macroeconomics students in two experimental groups and one control group. Pooled demographics were not provided; however, each group had about one-third African American students, between 2.0% and 5.3% Latinx students, and between 2.2% and 15.8% "international" students. Across the groups, the percentage of female students ranged from 54.9% to 76.1%. Using quantitative analysis to compare exam and posttest score differences between the experimental and control groups, the researchers found a significant positive difference for the students who used Socrative. This is the only study cited that examined differences between demographic groups. The researchers found a significantly greater benefit for international students compared to other students, but this was on only one of the two measures used. They did not test for age, but did find an association between higher SAT scores and increased benefit.

Socrative comes with a built-in exit ticket feature; however, it allows only three questions and just one may be content-based. Kahoot has been used as a formative assessment (Dellos, 2015), but no studies apparently have explored its use specifically at the end of class. The advantage of an online polling site over paper exit tickets is that it allows students to immediately see their own answers, their peers' answers, and the correct answer, all posted in real time. This allows for immediate correction of misconceptions on the day's material. An exit ticket of any kind enhances instruction, and a technology-based exit ticket adds additional features to this traditional end-of-lesson technique. Additionally, a major benefit of the technology-based exit ticket is that it can easily incorporate gamification.

Gamification

The use of gaming in education is separate and distinct from recreational gaming. Sawyer (2002), an early writer on interactive game development, postulates that educational gaming falls under the category of "serious learning" and suggests that education through gaming can provide an extremely effective training tool and that the entertainment aspect of games can encourage unmotivated learners. Gamification combines technology and serious gaming. Terrill (2008) coined the term "Gameification" [sic] to describe taking game mechanics and applying them to web properties to increase engagement. Game mechanics have rules and rewards and arouse feelings such as curiosity,

competitiveness, frustration, and happiness (Werbach & Hunter, 2012). Gamification is increasingly being used in higher education and can refer to either games or using game-like elements as part of teaching. Research on gamification spans geographies, genders, races, and ethnicities, although not all studies provide full demographic detail. Subhash and Cudney (2018) systematically reviewed 25 published studies and found that game elements can be deployed in different combinations and across various approaches and applications to improve student attitudes, engagement, and performance. The reviewed studies involved university students, where individual sample sizes ranged from 37 to 371, and classes were in a variety of subject areas, with the largest grouping found in computing. Gamification as a feature of a number of educational websites is a growing area of research. Solmaz and Çetin (2017) conducted a mixed methods study using a survey with multiple-choice and open-ended questions to investigate the views of 111 Turkish college freshman in business courses (45% male and 55% female) on three Interactive Response Systems (IRS), Kahoot, Socrative, and Plickers. The researchers found that gamification across all IRS resulted in high satisfaction levels for gamification-based IRS tools, and had benefits such as improved student engagement, attitude, and performance. Kahoot is an especially popular IRS site, and after its inception in 2016, it has continued to grow at a rate of 75% a year and reached 70 million users in 2018 (Harrell, 2018).

A number of studies have highlighted the efficacy of the Kahoot platform. Tsihouridis et al. (2017) investigated whether Kahoot could be used as a tool in teaching basic concepts of electrical circuits with a sample of 67 high school students in Greece. One group used Kahoot in designing their own formative assessment questions while the control group used a traditional learning assessment. The researchers found that Kahoot improved students' understanding of concepts, motivated them in the learning process, and was a fun tool to use for teaching purposes. The researchers highlighted that using Kahoot afforded the instructor an opportunity to provide direct feedback to each student's answers, providing a picture of the student's difficulties and misunderstandings. Employing a mixed methods approach, Bicen and Kocakoyun (2018) evaluated the use of Kahoot with 55 female and 10 male undergraduate education students in Turkey. The researchers developed a three-dimensional scale to measure the effect of gamification on achievement. Three dimensions were also evaluated by students using a five-point Likert-style scale. Researchers found that Kahoot increased students' interest, motivation, and ambition for success. Iwamoto et al. (2017) used a mixed-method approach with a sample of 49 undergraduate psychology students at a university in the South Pacific. The sample was representative of the university's student population, which was about 67% Asian/Pacific Islander, 17% white, 6% Latinx, 4% African American, and 6% other, and about two-thirds male and one-third female. The researchers found that Kahoot improved

academic performance on high-stakes examination scores. Bawa (2019) likewise incorporated a mixed methods model with 96 undergraduate business students at a midwestern United States community college. The sample was racially diverse and ranged in age from 18 to 60. Qualitative data were collected through a survey with open-ended questions and students' exam scores were evaluated. The researchers found that Kahoot improved exam scores, and qualitative analysis of student surveys indicated that Kahoot helped engage students.

Gamification has been employed internationally in a host of educational settings, from primary school through university level, with striking success. The outcomes include a sense of accomplishment, enhanced critical thinking skills, increased motivation, and improved academic performance. Gamification and websites such as Kahoot have been shown to benefit student populations across subject matter, geographies, grade levels, ages, gender, and ethnicities.

Research gap

Exit tickets, gamification, and Kahoot in particular have been examined in a number of settings. To our knowledge, however, Kahoot has not been analyzed specifically as an exit ticket and has not been examined in the context of a social work research class, or with respect to differential benefits with varied demographic groups. Furthermore, Kahoot has primarily been studied using either quantitative or qualitative methods (Licorish et al., 2018). Our study expands the body of knowledge by applying a mixed methods approach to examining the efficacy of Kahoot as an exit ticket in a social work research class, including a subanalysis by demographic groups.

Methods

Use of Kahoot

Kahoot is an online gaming platform that allows instructors to design quizzes or surveys to be administered to students. The basic functions of Kahoot are free, with extra features available for small fees. Kahoot can be accessed on mobile devices via a web browser or the Kahoot app and includes features of gamification such as a scoring system, a scoring board, rewards for speed, and music. It has been shown to be easy to use, even for technology novices (Plump & LaRosa, 2017). Kahoot allows instructors to create quizzes that they can control, including the types and the content of questions and images projected, the pacing of the game, and whether music is added. The correct answer, distribution of answers, and the top student scores are projected as a "leaderboard" after each question. This gives students real-time feedback on their knowledge. Students can also choose any name, abbreviation, or even

emoji to be displayed on the leaderboard as a means of identification, or remain anonymous if they so desire. Figure 1 illustrates how questions and then student answers are displayed on Kahoot. The sample question is from a quiz used in this study.

We designed short Kahoot quizzes of about 10 multiple-choice questions covering the content of each day's material, implemented at the end of each class as an exit ticket. In order to increase engagement, the last item in each quiz was generally a humorous question, e.g. referencing the course, weather, or current events, and often content questions included at least one humorous answer option. These quizzes were used in two undergraduate research methods class sections each for two of us (Alter and Kirzner) across two semesters, for a total of four class sections in 2018 and 2019. There were 15 and 16 survey respondents in the two 2018 sections, and 15 and 25 in the two 2019 sections. Students were told at the beginning of the semester that the Kahoot quizzes

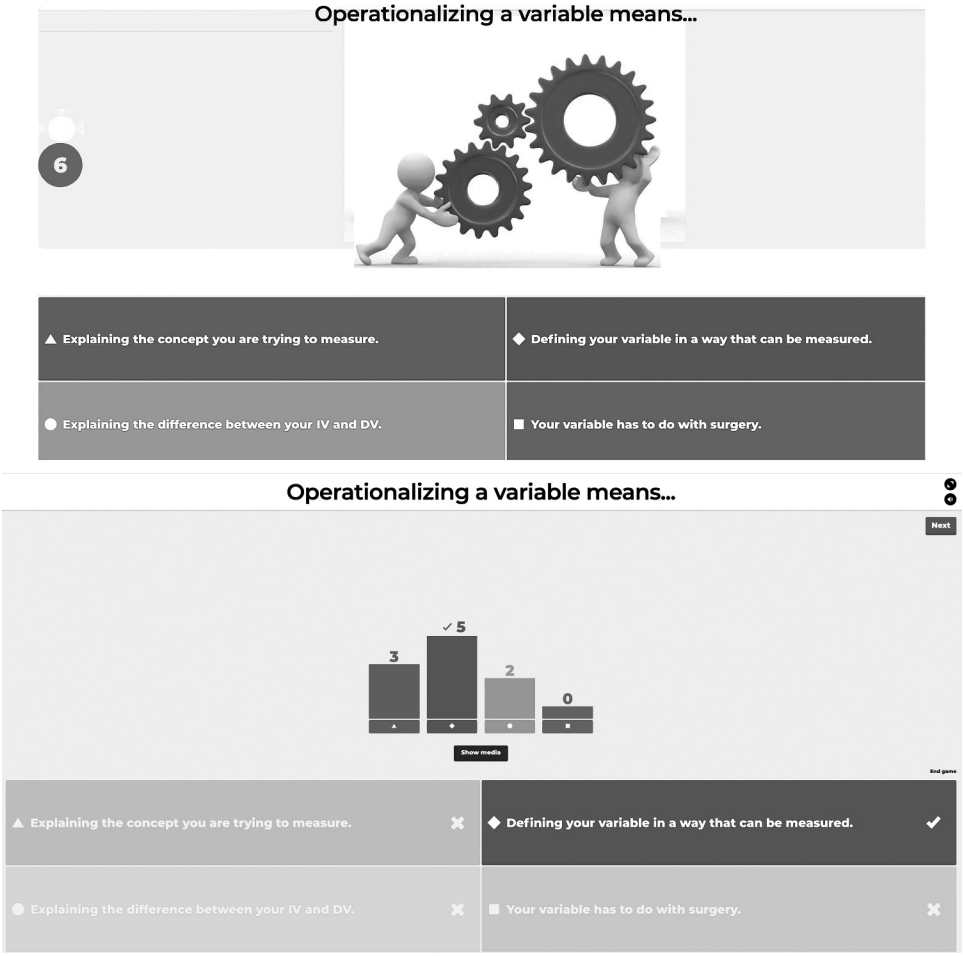

Figure 1. Kahoot question and student responses.

would be a part of each class and the PowerPoints for each class included Kahoot as an item on the class agenda. The questions were administered at the end of each class session. Questions and answers were projected onto a screen at the front of the classroom. For these quizzes, we used the music and scoring features and selected a 20-second option for each question. Music and scoring were included based on informal index card feedback solicited from students by one of us in a course section prior to the study. The 20-second timing option is the default and was retained based on observation of how long it took for students to complete the surveys in a previous semester.

Students answered the questions on their phones, tablets, or laptops, and answers were then displayed on screen. If more than a few students selected incorrect answers, the correct material was briefly reviewed by the instructor. We allowed about ten to fifteen minutes per quiz, depending on the number of questions, in order to complete the activity before the end of class time. This timing allowed for students to answer the questions, and then for the students and instructor to view the scores and answers and briefly discuss incorrect answers. If there were areas where students clearly had not mastered the material, we reserved time at the beginning of the next class to review that material more fully.

Research design

We used a one group, posttest-only design, with quantitative and qualitative questions administered via Qualtrics XM survey software, to evaluate the use of Kahoot. The survey explored the overall experiences, perceptions, and impact on mastery and retention of material of Kahoot class quizzes and was administered to social work students in our research classes. The study took place at a midsize (about 9900 undergraduate students) public university in northeastern United States. Students at the university tend to be low-income: 41% were receiving Pell grants in 2019. The study was approved by the university's Institutional Review Board.

Data collection

Surveys were anonymous and voluntary and were completed both synchronously and asynchronously. E-Mails inviting participation in the survey were sent to undergraduate social work students in four of the researchers' Research Methods in Social Work class sections. Current students were asked to complete the survey during class time. Potential ethical issues were avoided by giving an option to take the survey as a class exercise and not have the data used for the research. Students could choose to do nothing; to look at the survey and not complete it; or to complete it while in class, or at their convenience.

Students were provided with a hyperlink to the online Qualtrics survey site. Once they accessed the link, they were asked to read and sign the informed consent document before beginning the survey. The demographic section of the survey asked students about their year in school, gender, age, race, calendar year taking Research Methods, instructor, and grade (already received or expected). The demographic questions were followed by Likert-style items regarding student experiences with Kahoot quizzes. The last two questions were open-ended, asking for students' general comments about Kahoot quizzes and anything else they would like to tell other professors about Kahoot quizzes. The Appendix includes the survey items relating to Kahoot.

Data analysis

Quantitative data, focusing on descriptive statistics and a comparison of subgroups, were analyzed using SAS version 9.4 statistical software, and qualitative data using NVivo version 12. We used a semi-open coding scheme. A core list of codes was developed using the findings of a study on Student Response Systems (Aljaloud et al., 2015), with student responses clustered into categories including interactivity, academic performance, and engagement. Each author then read through the student answers and added additional codes, as indicated by the data. The resulting codebook was used to code each of the two questions, with more codes added if indicated upon further examination of the data. The authors decided to use each sentence as the unit of analysis, and paired coding was used to reduce bias. After initial coding, NVivo coding comparison reports were deployed to measure interrater reliability. Codes were discussed and adjusted until agreement on all codes was above 90%. When coding comparison was completed, the authors discussed themes evident in the students' responses. Three major themes (and related sub-themes) were identified and will be discussed below.

Results

Demographics

We sent the Qualtrics XM link to 129 students. Seventy-one students agreed to be in the study and took the survey, yielding a response rate of 55%. Table 1 presents respondent characteristics. The mean age for students was 27.24, with a range of 18 to 57. The largest group of students was between the ages of 21 and 25 years old (48.53%). Six students were 50 years old or older (8.82%), while 13 students (19.12%) were between the ages of 18 and 20 Table 4.

A large percentage of the participants identified as female (81.69%), with the remainder identifying as male. Students were given the option of "Other" for gender, but none selected it. Most students were juniors (47.89%) and seniors

(42.25%). This corresponds to the program recommendation that students take Research Methods in their junior year and to how some students were surveyed after they had already completed the course. The majority of students were White (62.32%). The next largest group was Latinx (26.09%), followed by African American (13.04%), Asian American (5.80%), and "Other" (4.35%). Students were given the option of selecting more than one race/ethnicity category. Six students selected two races and one student selected three. Because of this, the numbers in the racial categories sum to more than the total sample size and percentages to more than 100%.

Quantitative results

The quantitative section of the survey contained two sets of items: first, students were asked to rate nine Kahoot features, such as music, scoring, and humor. The rating scale was from one to five, including Really Dislike (1); Somewhat Dislike (2); Neither Like nor Dislike (3); Somewhat Like (4); and Really Like (5). The next set of items was comprised of an index of perceptions of Kahoot benefits. The index has 11 items, such as "Kahoot is fun" and "Hearing explanations of the wrong Kahoot answers helps my learning." Students were asked to record their level of agreement with each item, with options including Strongly Disagree (1); Somewhat Disagree (2); Neither Agree nor Disagree (3); Somewhat Agree (4); and Strongly Agree (5).

Table 2 displays the results of the first set of items in which students were asked to rate various features of Kahoot. Students' responses are presented as means and as percentages of students selecting four or five for each Kahoot feature. The results of this section were overwhelmingly positive. With one exception, all features had mean ratings of over four. The highest rating (4.76; SD = 0.57) was for being "like a game," followed closely by "questions on class material" (4.68; SD = 0.71). Humorous questions were valued by students, with a mean score of 4.58 (SD = .75). The feature with the lowest mean score, and the only one below four, was music (3.89; SD = 1.19).

The second set of quantitative items evaluated students' perceptions of Kahoot's benefits. The questions were evaluated individually and then summed to form an index. Table 3 presents the results of these questions. The index score is reported as a mean (total divided by number of questions) for easier interpretation. Again, the students were positive in their responses to these questions. The mean score for the full index was 4.03. All but two individual questions had mean scores over four.

More than half of the questions have mean responses above 4.5. Students endorsed statements, including "Kahoot is fun" (4.80: SD = 0.47), "I enjoy the Kahoot quizzes" (4.68; SD = .58), and "Explanations of wrong answers help learning" (4.60; SD = 0.80). Students believed that Kahoot was helpful to learning class material (4.55; SD = 0.69) and was effective in assisting with

Table 1. Respondent characteristics.

Characteristics	N	%
Age: 18–20	13	19.12
Age: 21–25	33	48.53
Age: 26–40	12	17.65
Age: 41–57	10	14.71
Gender: Male	13	18.31
Gender: Female	58	81.69
Gender: Other/Not Sure/Decline	0	0
Year in school: Freshman	1	1.41
Year in school: Sophomore	6	8.45
Year in School: Junior	34	47.89
Year in school: Senior	30	42.25
Race: White	43	62.32
Race: African American	9	13.04
Race: Asian	4	5.80
Race: Latinx	18	26.09
Race: Other	3	4.35
Surveyed by e-mail only	31	44.29
Surveyed in class	39	55.71

Note. Seven respondents selected more than one race, therefore total numbers for race are higher than the sample size and percentages sum to more than 100%.

Table 2. Evaluation of Kahoot features.

Feature	n	Mean	SD	% 4 or 5
It's like a game	71	4.76	0.57	92.96
Questions on class material	71	4.68	0.71	91.55
Humorous questions	71	4.58	0.75	91.55
Community with classmates	70	4.50	0.83	85.71
Competing with myself	68	4.47	0.78	82.35
Picking my nickname	69	4.43	0.96	79.71
Competing with others	70	4.41	0.88	88.57
Scoring	70	4.34	0.95	80.00
Music	71	3.89	1.19	67.61

Note. Items were rated from 1–5, with 5 being best.

Table 3. Benefits of Kahoot – index.

Item	N	Mean	SD	% 4 or 5
Kahoot is fun	71	4.80	0.47	97.18
I enjoy the Kahoot quizzes	71	4.68	0.58	94.37
Hearing explanations of the wrong Kahoot answers helps my learning	70	4.60	0.80	90.00
Kahoot is worse than other quiz sites I've used*	69	4.55	0.74	88.41
Kahoot is helpful to my learning the material	71	4.55	0.69	88.73
Kahoot is effective in helping me understand class material	70	4.54	0.76	91.43
Kahoot is boring*	71	4.48	0.89	83.10
After taking a Kahoot quiz, I feel more confident about my knowledge	70	4.41	0.79	84.29
I prefer paper ungraded quizzes over Kahoot ungraded quizzes*	70	4.04	1.12	70.00
I think paper quizzes would be just as good as Kahoot quizzes*	70	3.77	1.34	64.29
I think I would remember the material just as well without Kahoot quizzes*	71	3.08	1.14	33.80
Total Score	71	44.30	5.22	–
Full Index Score (Total score/11)	71	4.03		–

Note. * Indicates reverse coded question, with 1 being best. For purposes of the index, scoring of these questions is reversed.
Unless otherwise noted, questions were rated from 1 to 5, with 5 being best.

understanding (4.54; SD = .76). Similar to the earlier questions relating to Kahoot features, the highest scoring questions addressed both the learning and game-like features of Kahoot. The lowest three scores related to comparison of Kahoot with paper quizzes and to Kahoot assisting with memory. These three answers were all reverse-coded items, which will be explored later.

We examined whether subgroups of students perceived the benefits of Kahoot differently, as captured by scores on the "Benefits of Kahoot" index. We analyzed index scores (maximum score 55) for groups including age, gender, race, ethnicity, and expected/received grade. In order to include all of the variables into one model, Ordinary Least Squares (OLS) regression was used to evaluate associations between student characteristics and index scores. For this analysis, students who identified as more than one race/ethnicity were counted as "more than one race" in order to eliminate overlap between categories. Once the "more than one race" students were removed from the individual race/ethnicity categories, there was only one student left who identified solely as Asian. Therefore, Asian was included along with "Other" in this analysis. There were no students who expected/received an F, and only two students selected a D. Therefore, C and D were combined into one variable. The results of the OLS regression are presented in Table 4. Mean index scores for each group are included here. There were only two characteristics that were statistically significant: gender and grade. (Race/ethnicity was marginally significant at the .1 level.)

The most significant association found was between grade and index score. Students expecting/receiving a B had lower predicted scores on the Benefits index (b = −3.83; SE = 1.52, p < .05) compared to those expecting/receiving an A. Students expecting/receiving C/D grades had even lower predicted scores

Table 4. Associations by respondent characteristics (OLS regression, dependent variable is benefits of Kahoot index score, maximum value = 55).

Characteristics	N	b (SE)	Mean of Index Score (SD)
Intercept		49.88 (1.13)***	
Age: 18–29	55	Reference group	47.33 (6.02)
Age: 30–39	5	0.12 (2.64)	46.80 (4.55)
Age: 40–49	5	1.25 (2.70)	47.40 (5.73)
Age: 50 and over	6	−1.79 (2.51)	44.83 (8.80)
Gender: Female	58	Reference group	47.84 (5.63)
Gender: Male	13	−3.49 (1.72)*	43.69 (6.98)
Race: White	39	Reference group	47.74 (5.88)
Race: African American	7	−4.54 (2.39)+	41.43 (6.16)
Race: Latinx	13	0.49 (1.82)	47.54 (5.80)
Race: More than one	7	5.15 (2.58)+	50.29 (5.47)
Race: Other	3	−2.02 (3.40)	47.00 (4.58)
Grade: A	36	Reference group	48.97 (5.21)
Grade: B	22	−3.83 (1.52)*	45.23 (6.00)
Grade: C/D	12	−5.46 (1.94)**	44.50 (7.29)
Adjusted R^2 = .18			

Note. + p < .1; * p < .05; ** p < .01; ***p < .001.
For this analysis, participants who selected more than one race are coded as "more than one race" to avoid overlapping categories. "Other" now includes Asian.

(b = −5.46; SE = 1.94; p < .01). Male students had lower predicted mean index scores (b = −3.49; SE = 1.72, p < .05) than females. For race/ethnicity, there were marginally significant differences between African American students (b = −4.54; SE = 2.39; p < .1) and White students and between students of more than one race (b = 5.15; SE = 2.58, p < .1) and White students. There were no significant associations between students grouped by age and index scores. Adjusted R^2 is .18, indicating that 18% of the variation in index scores is explained by this set of predictors.

Qualitative results

Preface

Consistent with the quantitative results, student responses to the two open-ended survey questions were overwhelmingly positive. As previously noted, students were asked to respond to qualitative questions that asked for "general comments about Kahoot quizzes" and things they would like to "tell other professors about Kahoot quizzes." Student comments fell into three general metathemes: academic performance, gamification, and overall ratings of Kahoot.

Academic performance

Our research question asked students whether they perceived Kahoot to be helpful in learning and retention. The metatheme of academic performance most closely speaks to our research question and encompasses themes of learning, review and reflection, and instructional methods. Student comments described how Kahoot helped with their learning: "Really fun way to absorb the information in class!" and "... it is instrumental in learning material, as well as bringing the class together in an exciting experience." Students also commented on retention: "It helps the questions and answers stick more in my head and helps me to understand better," "I believe it was a big factor in why I remembered the information so easily," and "It was interactive and that helped me remember the information better."

A second theme within academic performance was "review and reflection." Here we looked for statements referring to students and instructors assessing knowledge, reviewing the day's material, and preparing for exams. Students responded positively in this area, mentioning content review in general and test preparation specifically: "Kahoot is great for reviewing material before a test or exam," "Kahoot quizzes are interactive and always result in a positive response from students as a method to review material," and "I think it can be integrated into any classroom setting as a great way to review the day's material and help study for exams." Students also described how Kahoot gave them the opportunity to evaluate their own learning and gave their professors the ability to assess understanding and retention: "They [professors] should use it as it provides easy feedback on if the information has been

retained," "Other professors should utilize them so they see how the class is comprehending the material," and "I think it's great for student and prof to summarize material and make sure everyone is understanding the content :) ."

The final subtheme of Academic Performance was "instructional methods." Students referred to Kahoot as a positive pedagogical method in comments such as "They [the Kahoot quizzes] are definitely an effective tool for reinforcing the lecture," and "Thank you for thinking outside of the box and bringing a different way of teaching to the table." Of special relevance to the topic of the study, a number of students commented that placement at the end of each class – the exit ticket strategy – was particularly useful. As one student noted, "It brings the end of the lesson together and reinforces the information learned in a nice fun competitive way."

Gamification

The second of the three metathemes is gamification. This metatheme captures a dimension of Kahoot that differentiates it from traditional exit ticket methods, and as such is of special interest to this study. Many of the student comments overtly connect the game-like and learning aspects of Kahoot. The metatheme of gamification includes themes such as interactivity and engagement, fun, competition, scoring, and general game-like features.

Students described how Kahoot involves interactivity and engagement: "The game was instrumental in bringing the class together," "It was fun to have an interactive way to test your knowledge with your peers and break up the lecture material to get everyone moving and talking," and "They are incredibly helpful and interactive." Students found Kahoot to be fun and exciting: "Kahoot was interactive and fun!" "Really fun way to absorb the material given in class," "Exciting experience," and "Kahoot is fun!!!" One student's comment underscored that while the class can sometimes be boring, Kahoot served as an antidote: "Kahoot quizzes are great because they are interactive and can turn a dull lesson into a fun one."

Another component of the gamification metatheme was competition. Students commented: "It is a way to get everyone involved and have some friendly competition while also bringing home the important points from class" and "It's lighthearted and allows the student to compete with others in a friendly way." While students enjoyed the competition, several had mixed responses to the time limits on the responses (students gain points for speed), and timing was the only feature rated negatively. Even when sharing negative comments about timing, students framed their responses within an overall positive rating of Kahoot: "I like Kahoot, but the short timing we have throws me off."

Students also liked the anonymity that Kahoot affords. Some students connected anonymity to protecting their feelings should they give wrong answers: Kahoot "allows nicknames so no one feels bad" and "They really do

help since it's anonymous, so people playing do not feel discouraged if they get the wrong answer." Another student connected the online administration of the quizzes to allowing quieter students to participate: "Even students who do not typically speak up in class had a chance to participate and test their knowledge from the comfort of their phone screens."

Rating of Kahoot

The final metatheme was overall rating of Kahoot. Students' comments were extremely positive. A number of students used the word "love" in describing their perceptions of Kahoot: "Love them," "I love the Kahoot quizzes!! Kahoot is great," "Love it," and "Love them, different learning experience." The second open-ended question asked students what they would tell faculty about Kahoot and did not suggest specifically that students use it to rate Kahoot. However, many students used this prompt to recommend that instructors use Kahoot: "Use Kahoot more often," "I like Kahoot," "Professors should continue to use Kahoot," "Keep doing them for future classes." Repeated instances of multiple exclamation points, "smile" emojis, and the word "love" highlight the enthusiasm with which students evaluated and recommended Kahoot.

Overlapping themes

Although for the purposes of this paper we sorted quotes into specific metathemes, many of the comments regarding learning and retention also mention Kahoot's game-like aspects. Students clearly see the connection between gamification and learning/retention. Overlapping comments that referenced both gamification and learning/retention include "It gives the students a time to laugh and learn at the same time which college students do not do much of!" and "It's fine, light hearted and allows the students to compete with each other in a friendly way, motivating students to fully understand and take in during class and recognize their weakness." The relative importance to students of the learning and gamification aspects of Kahoot will be addressed further in the Discussion section.

Discussion

Research question

Our primary research question was whether students perceived Kahoot as assisting them in learning and retention; in essence, whether Kahoot is successful as a gamified version of an exit ticket. Our results show that an overwhelming majority of students perceived Kahoot to assist them in learning and retention. They particularly enjoyed the gamification features of Kahoot, reflecting that it was engaging, fun, and funny. Most importantly, they also reported that Kahoot assisted with various aspects of course mastery.

A potential concern is that using Kahoot in every class session could result in students becoming bored. However, we did not find this. Students were asked to complete surveys in April, nearly at the end of the semester and some even completed surveys after the semester had ended. Nevertheless, by this point, after a partial or full semester of playing Kahoot, students' comments about Kahoot were still overwhelmingly positive. However, should an instructor be concerned with students becoming bored with Kahoot, the frequency they are played could vary, perhaps in every other class. Another approach would be to obtain class feedback by adding a Kahoot question regarding the frequency of using the quizzes.

Interestingly, the two features with highest scores in the quantitative data were for items that measured gamification and learning, rather than just one or the other. This finding was consistent with the qualitative data. However, students put equal weight on the Kahoot online quiz as a technique that is effective in supporting their mastery of challenging material. In other words, it is not just "fun and games," but a game that furthers their learning in an effective way. Since social work is a career-oriented major that draws students who are already focused on a challenging career path, it is not surprising that these students placed a strong emphasis on the educational aspects of the online quiz.

One unexpected outcome was that students enjoyed the anonymity of the quizzes. In the qualitative data, one theme was the ability to answer questions without embarrassment or fear of getting the wrong answer in front of their professor and peers. This finding is consistent with earlier research supporting the use of technology to address student shyness and reluctance to speak up in class (Licorish et al., 2018). Kahoot allows the more quiet student to fully participate, while also affording students who experience difficulty with the material to answer questions without risk of embarrassment.

Kahoot as an exit ticket

Our research explored the use of Kahoot as a technological exit ticket. Our student responses supported the idea that they valued the use of Kahoot in this way. In the quantitative questions, students appreciated Kahoot as a means of reviewing each day's material and noted that the explanations of wrong answers helped their learning. Traditionally, written exit tickets are reviewed by instructors after class and then responses, if any, are given at the beginning of the next session (Marzano, 2012). Online quizzes such as Kahoot allow for instant correction of student misconceptions, before the misunderstandings can solidify.

In the qualitative data, students stated that they valued the ability to assess their own knowledge, specifically mentioning the timing of the quizzes at the end of each class. Taken together, the students' quantitative and qualitative

answers support that Kahoot is a highly effective tool when timed at the end of class, enabling both student and instructor to assess learning and allowing for instant corrections. This is a picture of a classic exit ticket, enhanced by technology.

Differential perception of benefits

When considering implementing a new technology, however, it is important to think about populations that may be advantaged or disadvantaged – a key consideration in our profession. First, a prevalent stereotype about technology is that older individuals may have more difficulty with new technologies. Yet, we did not find that to be the case in our study sample. Second, those with less access to resources may have had less exposure to technology in prior educational experiences. Under-resourced schools are more frequently found in lower income neighborhoods, which are often correlated with race (Tawfik et al., 2016). We did not ask about income level in our survey; however, we did find that identification as African American was weakly associated with lower perceptions of Kahoot's benefits, as measured by our index. At the same time, being of more than one race was weakly correlated with higher mean averages on the index, and being Latinx showed no significant association. Our sample was fairly small, especially within subgroups, and the differences among race/ethnicity groups likewise were fairly small. If differences did exist, our analysis may have lacked the power to detect them. Another possible explanation is that our university draws from several low-income, primarily White counties, so the expected correlation between race and poverty may not be as high as in other geographic regions. Regardless, further research with larger sample sizes, data on income, and more focused qualitative questions would help explore this further.

The two associations found which were statistically significant include expected/received grade, and gender. Because this is a cross-sectional analysis, it is not possible to discern whether good grades lead to more appreciation of Kahoot or the reverse. It seems reasonable that the same factors that lead students to do well in class may lead them to appreciate educational games. To maximize the benefits of Kahoot, it is essential that it appeals to students regardless of grades. Arguably, it is even more important to reach students who are struggling. And there may be specific reasons that these students find Kahoot less appealing. The other statistically significant association was between gender and appreciation of Kahoot. It is not clear why male students had lower mean index scores than female students. The difference in means between the two groups was only about four points out of a possible 55; however, it would still be helpful to understand the source of that difference. Qualitative questions that explore the reasons behind our findings could add to our

understanding of how to extend the benefits of this approach equally to all groups. Less than one-fifth of the variation in index scores is explained by this set of characteristics, so there are clearly unmeasured variables impacting perceptions of Kahoot.

Lower-rated features and student preferences

Two features of Kahoot – music and scoring – had relatively lower ratings, both having mean scores close to or above four – but they were the lowest two scores. If desired, both of these features can be turned off. However, competing with self and competing with others were both evaluated highly in the survey. Competition of either type cannot be achieved without scoring, and this needs to be considered before turning off the scoring feature. Assessment of student preferences can be a part of the exit ticket quizzes. We suggest asking students early in the semester whether they prefer to play with or without scoring and music.

Perception of learning versus objective measures

The students in our study resoundingly endorsed Kahoot as a fun and engaging learning tool. They believed that Kahoot helped them to review the material at the end of each class, prepare for exams, and enhance understanding and retention. However, self-report of increased learning and retention is not the same as objective measures of these positive features. Our study design did not include a comparison group, so direct measurement of increased learning was not possible. Nevertheless, some of our results strongly suggest that features of Kahoot online quizzes do support increased learning. A number of constructs endorsed by our respondents have been linked to increased learning and academic achievement, including confidence (Nicholson et al., 2013; Stankov et al., 2012), engagement with the material and with peers (Kahu, 2013; Kuh et al., 2008), and class participation (Rocca, 2010). Many students specifically recommended that professors use Kahoot, and choosing teaching methods that students say they prefer has been shown to increase conceptual learning (Jang et al., 2016). Our results do not directly provide objective measures of increased learning; however, student participants' quantitative and qualitative responses consistently identified constructs that are linked to greater academic performance.

Lessons learned about Kahoot implementation

From our regular implementation of Kahoot during and before the study, we have learned some lessons about practical approaches in our setting. The first

is about technology access. In our experience, all students in our classes have smartphones and have been able to access Kahoot through these devices. This aligns with at least one other study (Green, 2016). Some classrooms, especially those in basements, may have weaker wireless signals. We have found that if students download the Kahoot app (rather than accessing the site each time) wireless access is less of an issue. If Kahoot is implemented asynchronously for students to complete at home, students who do not have Internet access or who have limited data of course will not be able to access the quizzes.

It is important for the instructor to save sufficient time at the end of class for each quiz. If questions are timed at 20 seconds each, then allotting about two minutes per question should be enough even for brief review of selected answers. Longer explanations may need to be saved for the next class if the quiz identifies an area that needs extensive review.

We have found that there are typically a few students who do not access Kahoot but do not state that they are having tech issues (slightly fewer students are logged on than are present in class). Because we allow students anonymity, those who do not participate cannot be identified or easily approached about why they are not participating. Our evaluation survey likewise was anonymous, so we do not know if these students were included in our study. Nonparticipation would be an important area for future research on Kahoot because it may be tied to demographic issues or particular learning styles. For students who are not logging on at all, we plan to solicit index card feedback to address the reasons for nonparticipation.

Limitations and further research

As a career-oriented major, social work attracts students who may put a higher weight on the academic versus the fun aspects of Kahoot. Our results may therefore not be generalizable to students outside of social work. Another limitation is that our study took place at a regional public university that attracts low-income and non-traditional students. This also may limit generalizability to dissimilar institutions. We found some weak associations between race/ethnicity and perceptions of Kahoot and statistically significant associations between Kahoot appreciation and grades and gender. Deeper exploration of these associations is needed in further research. In addition, we measured student perceptions of learning and not objective measures such as grades. Lack of a comparison group made it impossible to compare change in objective measures of learning, such as grades. However, as discussed earlier, the constructs endorsed by students have been shown to correlate with subject mastery, higher grades, and academic achievement. The lowest rated items on our quantitative index were the reverse-coded questions. It is unclear whether students were confused by the reverse phrasing of the questions, and did not answer as accurately, or these

questions actually earned the lower scores. Further research that includes alternate wording on the survey, different student populations, expanded exploration of subgroup differences, and objective measures of mastery and retention should address these limitations.

Implications for social work

Practice based on empirical research – evidence-based practice – is at the core of social work. However, social work students are often reluctant, anxious, or disengaged learners of this foundational subject. Hence, it is essential that we engage future social work professionals in the challenges and joy of research, both as learners and practitioners. An innovative tool that engages students, builds their confidence, and helps them master the material will be a valuable addition to the toolkit of social work educators. The use of instructional methods that are well received and enjoyed by students is a feature of student-centered learning – a parallel to client-centered practice. Showing respect to our students by choosing pedagogical approaches that increase both their enjoyment and mastery represents modeling for them the respectful interactions that we expect them to have with their future clients. As such, integrating new methodologies such as Kahoot online quizzes as exit tickets may prove to be an effective pedagogical method to further the aims of social work education.

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ORCID

Rachel Shapiro Kirzner http://orcid.org/0000-0002-9866-0714

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