

Use of traditional and smartphone app flashcards in an introductory psychology class

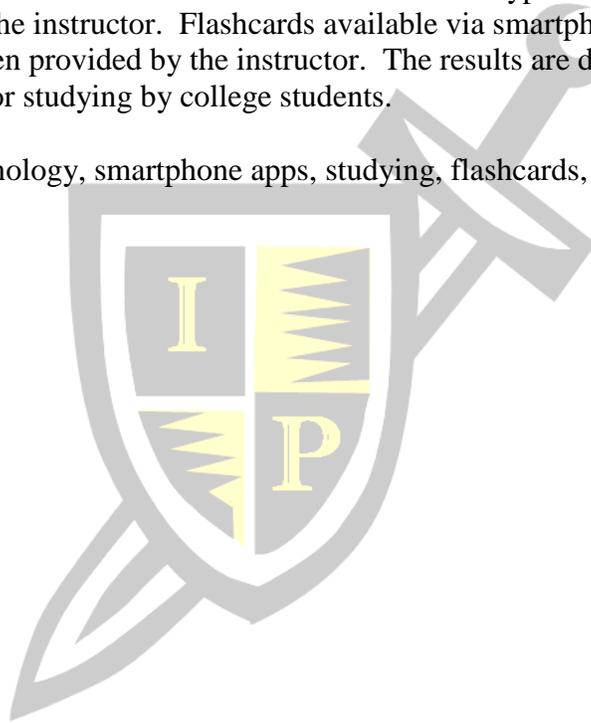
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ABSTRACT

The use of traditional and smart phone flashcards was examined in two Introductory Psychology college classes. Student use of flashcards of some type increased significantly when they were provided by the instructor. Flashcards available via smartphone app were not used by many students even when provided by the instructor. The results are discussed in terms of the use of mobile devices for studying by college students.

Keywords: mobile technology, smartphone apps, studying, flashcards, notecards



INTRODUCTION

Flashcard use is a standard study technique where traditional flashcards are typically pieces of paper or notecards that have a term written on one side and a definition on the other side. When one studies using flashcards, users often look at one side and try to recall information on the other side. Advantages of flashcards include their portability and their ease of use in various locations.

Golding, Wasarhaley, and Fletcher (2012) found that approximately 70% of the 415 general psychology study students studied used flashcards for at least one exam with 65.5% using written flashcards and 3.9% using computer flashcards. Forty-eight percent of the same students reported using written flashcards in other classes, 2% used computer-based flashcards, and 6.5% used both written and computer flashcards. No research studies were identified that examined the use of flashcard apps on smartphones.

It is estimated that at least 80% of college mobile phone users own smart phones and that by 2016, about 90% of college students will own a smart phone (emarketer.com, 2012). With the increased popularity of smartphones there has been an increase in apps designed to facilitate studying. Among these are apps that permit the creation or use of flashcards (e.g., Study Blue, Quizlet, Flashcards +). The advantages to using app-based flashcards include that many students have their smart phones with them most of the time and smart phones are more portable than large stacks of traditional flashcards. Seventy-five percent of college students report using a smartphone during breaks, meetings, etc, 55% while waiting in line, and 45% of those surveyed for school related uses (Dean, 2012). This pattern of use opens the possibility of increasing study time if students use a flashcard app during these opportunities.

When compared to traditional flashcards, flashcards used on smartphones have the additional advantages of being available whenever the smartphone is in use, ability to carry as many cards as desired for multiple classes, and collaboration with other students to create large groups of flashcards. Also, smartphone technology enables the students to set reminders to study. Golding, et al. (2012) suggested that the almost universal availability of mobile technology could lead to an increase in use of computer flashcards.

Historically, students would make their own flashcards, but more recently textbooks have started making flashcards available on their websites. These programs require internet access and may require the user to log in each time. Smartphone apps have the advantage of being self-contained on the phone and immediately available without internet access. Additionally, many flashcard apps have an option to make users' flashcards available for general use or sharing. This means that the flashcards for many classes are already available (Gikas & Grant, 2013).

The use of smartphones for educational purposes is an understudied area even though their accessibility and potential as educational tools is expanding rapidly. A 2012 survey of approximately 1,000 teens in 6th through 8th grades found the students reported using their mobile devices for school related purposes such as completing their homework (TRU, 2012). These activities seem to focus on searching for information rather than using mobile devices to facilitate the process of studying. Little research has examined how mobile technology may be used to facilitate other academic activities such as studying using flashcards or other study aides.

The present study was designed to explore the use of traditional flashcards and a flashcard app when provided to college students in a general psychology class. The correlation of flashcard with both exam performance and overall class average was also examined.

STUDY 1

Method

Participants

Ninety-two General Psychology students from 2 classes, with an average age of 19.12 ($SD = 2.03$), participated. The 2 instructors (1 male and 1 female) used the same course outline, content, notes, and exam content.

Materials

Flashcards with all the vocabulary words in each chapter from the course textbook grouped by exam were created. Flashcards were either 3x5 traditional paper notecards or app-based flashcards using the app StudyBlue. Each traditional flashcard contained the vocabulary word printed in 14 point Times New Roman font on one side and the definition from the textbook on the other side. The app StudyBlue can be accessed via a smartphone (iPhone or Android) or a computer and also included the vocabulary word on one side and the textbook definition on the other.

The flashcard use survey was patterned after Golding, et al. (2012) and modified to include additional questions about smartphone app flashcards. Students were asked whether they used flashcards for each exam. They were asked whether they created their own, used the paper flashcards provided, or used the flashcard app provided. They were also asked why they did or did not use flashcards when they studied.

Design & Procedure

Students were not provided flashcards in any form for the first and final exams. For the second and third exams students were provided with traditional and app-based flashcards. For the fourth exam students were provided with only the app-based flashcards. Instructions were provided to the students on how to access and use the app-based flashcards. The instructors gave no special instructions or encouragement to use the provided flashcards once they were handed out beyond general reminders to use the course notes and study materials, as the purpose was to assess the baseline use of the materials. Following each exam, students were given the flashcard use survey. All students were treated in accordance with APA ethical guidelines and the university human subjects review board approved the study.

Results

There were not significant differences between the two classes in the pattern of results. Therefore only the analyses for the combined classes are reported. The use of flashcards of some type varied greatly by exam overall. For exam one, where neither paper nor app flashcards were provided, 15% of students used flashcards of some type. For exam two, where traditional and app flashcards were provided, flashcard use increased to 74.2%. For exam three, where traditional and app flashcards were provided, flashcard use increased to 90.6%. For the fourth exam, where only the app was provided, flashcard use decreased with 40% of students reporting

flashcard use of some type. It is noteworthy that flashcard use increased dramatically when paper and app were provided. It is also interesting that flashcard use decreased dramatically when the paper flashcards were not provided. A chi-square analysis found that the change in flashcard use between exams was significant, $\chi^2(df = 3, n = 60) = 139.78, p < .05$.

Additionally the type of flashcards used by students for each exam was examined. App flashcard use also varied greatly by exam. For exam one, where neither paper nor app flashcards were provided, no students used a flashcard app. For exam two 19.4% of students used the flashcard app while none used it for exam three even though it was provided. For the fourth exam 10.9% of students used the flashcard app.

The paper flashcards were used much more often than the app flashcards. This was observed even for exam 4 where the app flashcards were provided but the paper flashcards were not. For exam one, where neither paper nor app flashcards were provided, 15% of students used paper flashcards. For both exams two and three, paper flashcards were provided to the students. For exam two 54.8% of students used paper flashcards and for exam three 90.6% of students used paper flashcards. For exam four where no paper flashcards were provided, flashcard use decreased dramatically to 29.1% of students reporting using paper flashcard use.

Group differences in exam performance based on overall flashcard use and type of flashcard used were also examined. Overall flashcard use was coded for use (yes/no). Type of flashcard was coded by type of flashcard used (traditional, app, both, or none). There were no significant differences in exam grades as a function of use or type for each exam. However, students who used flashcards on the first exam had a significantly higher final average than those who did not, $F(1,29) = 6.413, p < .05$. Of note, the first exam was the only exam where no flashcards of any type were provided by the researchers.

Several open-ended questions were completed by participants regarding reasons for using versus not using flashcards in general as well as the flashcard app. Students reported using traditional flashcards because they were a good way to study, were repetitive and useful, and were portable. Students reported not using traditional flashcards because they did not like to study using them, they did not have time to use them, forgot about them, or they lost them.

Students who responded that they did not use the app-based flashcards for studying focused on smart phone technical issues such as it used too much of their battery, that they were easily distracted by other things they could do on their smart phones, and that they would forget about the app availability. Students who did like the app-based flashcards for studying indicated that the portability, ability to study almost everywhere, and availability on their smartphone was convenient.

Discussion Study 1

Flashcard use by college students was examined when traditional and smart phone app flashcards were provided. Overall flashcard use increased when flashcards were provided. This increase was mainly true for the use of the provided traditional flashcards. The provided app flashcards were not used by most students.

The use of flashcards increased when flashcards were provided. Flashcard use increased greatly from exam one to exams two and three. It could be questioned whether this change was due to the provided flashcards or whether students realized that they needed to study differently following the first exam. To answer this question study 2 was designed and conducted in a comparable class.

STUDY 2

Method

Participants

Two General Psychology classes taught by the same instructor were used. Fifty-seven General Psychology students with an average age of 19.51 ($SD = 4.71$) participated, 33 were female and 24 were male.

Materials

The Flashcard use survey patterned after Golding, et al. (2012) was completed after each exam. The survey was modified to include questions about flashcard app usage as well as traditional flashcards. The survey asked students to report their flashcard use for each of the first 3 exams in the course.

Design & Procedure

Students were not provided flashcards for the first three exams. The instructor only encouraged students to use flashcards if they asked for study tips after class. All students were treated in accordance with APA ethical guidelines and the university human subjects review board approved the study.

Results

The percentage of students who used some form of flashcards on exam one was 37.5%, on exam two was 35.7%, and on exam three was 33.9%. A chi-square analysis showed that this difference in flashcard use was not significant, $\chi^2(df = 2, n = 57) = .16, p > .05$. The percentage of students who used app-based flashcards for exam one was 7.3%, for exam two was 5.3%, and for exam three was 3.6%.

Discussion Study 2

This study was conducted to examine baseline flashcard use when students were not provided with flashcards by the instructor. Flashcard use remained stable across tests, suggesting that poor performance alone does not increase flashcard use.

GENERAL DISCUSSION

Overall use of flashcards increased when traditional or app-based flashcards were provided to the students as indicated in Study 1. However, even with the convenience of smartphone-based flashcards, students used the app flashcards less frequently than the traditional flashcards both when traditional flashcards were provided and when they had to make their own. Study 2 suggests the increased use of flashcards seen in Study 1 was not associated with

performance on exam one as students did not increase their use of flashcards when they were not provided by the instructor.

Interestingly, when only app flashcards were made available to the students (exam 4 in study 1) most students did not utilize them. Reasons for not using the app included technical issues such as battery consumption, simply forgetting about it, using entertainment apps instead of studying, and a preference for traditional flashcards. Often, students stated making flashcards was too time-consuming which would help explain why flashcard use was so low when flashcards were not available. Furthermore, in both studies students often stated that they didn't know flashcards were available, suggesting that emphasizing the availability of pre-made flashcards on the textbook website would increase the likelihood that students will use them. Lastly, students reported that the app drained the battery on their phone too quickly. These responses are consistent with the idea students used or planned to use the app in long study sessions as opposed to short sessions that would add to time spent studying per day. It also suggests the students were not using the app to study during the short times they have available standing in line, between classes, or other places an entertainment app (e.g., Twitter, Facebook, or Instagram) might be used.

Long sessions as a method of studying are less effective than shorter, more frequent study sessions. A meta-analysis of 317 experiments located in 184 articles found that spacing effects positively improved memory in 259 of the 271 comparisons (Cepeda, Pashler, Vul, Wixted, & Rohrer, 2006). Additionally, the researchers found that spacing studying across several weeks or months also positively improved memory as opposed to learning material in one day.

Students do not have a history of using smartphones for studying purposes. There are apps available for smartphones that are designed to encourage and facilitate studying, but most apps appear to be designed for entertainment.

Two areas for future investigation involve how to encourage students to study for shorter periods of time more frequently and how to encourage students to utilize the smartphone app accessibility and portability in the times they might otherwise use an entertainment app. For example when standing in line for a few minutes several times a day reviewing flashcards instead of accessing a social media site. Limitations of the study include that the survey did not ask in detail how the flashcards were used. Future research should look at whether apps can be used to encourage students to study over several days or weeks to facilitate learning. Additionally future research should study the effect of making your own flashcards versus using supplied ones. The researchers speculate that providing students with flashcards may not be as beneficial as them making their own for studying.

REFERENCES

- Cepeda, N. J., Pashler, H., Vul, E., Wixted, J. T., & Rohrer, D. (2006). Distributed practice in verbal recall tasks: A review and quantitative synthesis. *Psychological Bulletin, 132*(3), 354.
- Dean, J. (2012, February). *Smartphone user survey: A glimpse into the mobile lives of college students*. Retrieved from <http://testkitchen.colorado.edu/projects/reports/smartphone/smartphone-survey/>

- Gikas, J., & Grant, M. M. (2013). Mobile Computing Devices in Higher Education: Student Perspectives on Learning with Cellphones, Smartphones & Social Media. *The Internet and Higher Education*, 19, 18-26.
- Golding, J. M., Wasarhaley, N. E., & Fletcher, B. (2012). The use of flashcards in an Introduction to Psychology class. *Teaching of Psychology*, 39(3), 199-202.
- Kornell, N., & Bjork, R. A. (2008). Optimising self-regulated study: The benefits—and costs—of dropping flashcards. *Memory*, 16(2), 125-136.
- TRU (Teenage Research Unlimited). (2012). *Verizon foundation survey on middle school students' use of mobile technology*. Retrieved from <http://www.thinkfinity.org/docs/DOC-10549>

