



Qualitative assessment of Anki as a tool for medical education

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Context

- Research has shown that active recall testing and spaced repetition improve long-term retention of information.¹
- Anki is a free, open-source platform that applies these concepts in the form of user-created flashcards.
- Anki flashcards were developed for the first-year medical students at the John A. Burns School of Medicine (JABSOM).
- Anki flashcards were based on topics covered in the cardiology and pulmonology unit, and organized into “decks” based on each problem-based learning (PBL) session.
- After each “deck” was sent out, a follow-up survey asked for the perceived usefulness of the “deck” using the Likert scale.
- To assess the project’s impact on students’ overall learning, 16 questions were included on their final exams [based on our Anki decks].
- Finally, an end-of-unit survey was sent out regarding the efficacy, relevance, and practicality of the flashcards using the Likert scale.

Objectives

1. Provide an avenue for students to become acquainted with the Anki flashcard application, and provide an additional study resource for first-year medical students.
2. Contribute to first-year medical students’ learning of the relevant topics in cardiology and pulmonology.
3. Evaluate the effectiveness of flashcards, through the Anki platform, as a tool for learning in the medical curriculum.

Key Message

The data strongly suggests that the MD2 Anki Card Project was an effective tool for learning. Based on the 64 student responses (83% of the class) on the End-of-Unit survey, 100% used at least 7 of the 10 decks. Of these responses, 100% of the students “agreed” or “strongly agreed” that the MD2 Anki Project Decks improved their learning. Additionally, 81.2% of students spent an average of 2 hours or less each day, with 35.9% of these students having spent less than 1 hour, on average, each day doing these flashcards. 100% of the students who responded to the End-of-Unit survey found the MD2 Anki Card Project material relevant to the PBL cases and “would like to see more Anki decks linked to PBL cases in the future.”

The students scored well on the relevant final exam questions that were based on material from the MD2 Anki Card Project decks. The students scored an average of 89.4% across the 16 questions submitted to the final exam. This value was higher than the average PBL exam score of 85.1% ($p=0.00024$) and fell above the 75th percentile of 88.8%.

Table 1. Complete results from individual Anki Deck surveys

Anki Deck number	Prompt: Did you find the deck useful for your studies? % of students who responded				
	N/A (Did not use)	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
1 (n=56)	7.1%	3.6%	0.0%	14.3%	75.0%
2 (n=74)	10.8%	2.7%	0.0%	17.6%	68.9%
3 (n=74)	9.5%	2.7%	0.0%	9.5%	78.4%
4 (n=74)	12.2%	4.1%	0.0%	8.1%	75.7%
5 (n=73)	4.1%	1.4%	0.0%	9.6%	84.9%
6 (n=74)	6.8%	0.0%	0.0%	10.8%	82.4%
7 (n=73)	5.5%	0.0%	0.0%	5.5%	89.0%
8 (n=74)	4.1%	0.0%	1.4%	6.8%	87.8%
9 (n=74)	4.1%	1.4%	0.0%	2.7%	91.9%
10 (n=39)	2.6%	0.0%	0.0%	7.7%	89.7%

Figure 1. Perceived usefulness of individual Anki Decks

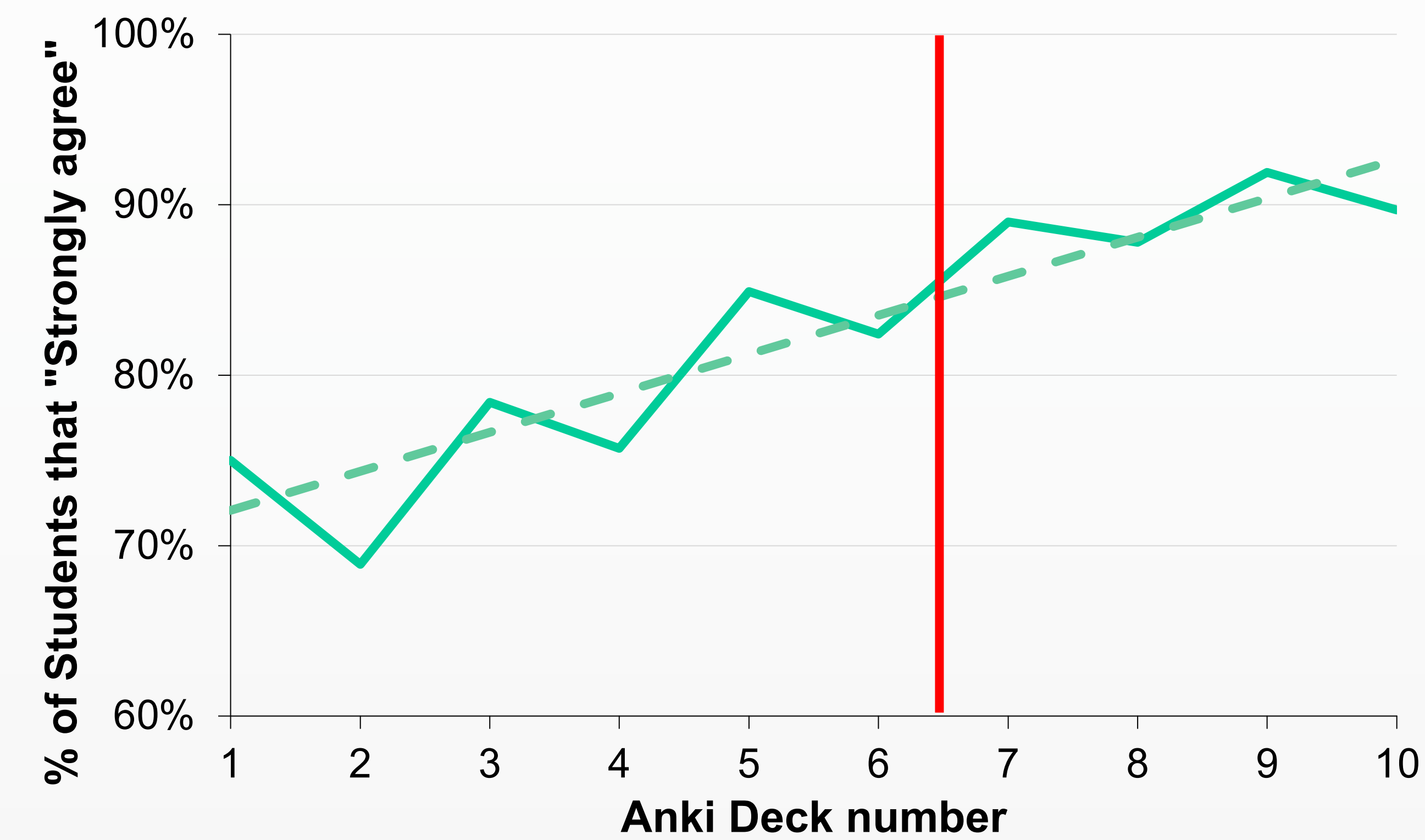


Figure 1. The survey asked “Did you find the deck useful for your studies?” on a scale of 1 (strongly disagree) - 4 (strongly agree). The dotted green line represents the linear trend. The red line is when the first year medical students took their MD2 midterm exam.

Table 2. Student responses to the End-of-Unit survey

Prompt	% of respondents (n=64)				Average Score (1-4)
	1 I used a few of them [1-3]	2 I used some of them [4-6]	3 I used most of them [7-9]	4 I used all of them [10]	
Did you use the MD2 Anki Projects Decks?	0.0%	0.0%	3.1%	96.9%	3.97
The MD2 Anki Project Decks improved my learning	0.0%	0.0%	15.6%	84.4%	3.84
I found the MD2 Anki Project Decks relevant to the PBL material	0.0%	0.0%	14.1%	85.9%	3.86
I would like to see more Anki decks linked to PBL cases in the future	0.0%	0.0%	6.2%	93.8%	3.94
On average, how much time did you spend doing these cards per day?	< 1 hour	1-2 hours	2-3 hours	> 3 hours	1.85
	35.9%	45.3%	17.2%	1.6%	

Table 3. Results from Anki-based questions on the MD2 Final Exam

MD2 Curricular Objective Tested (# of Questions per Objective)	Average % Correct (n=77)
Pharmacology of Vancomycin (1)	96%
Systemic Lupus Erythematosus (1)	95%
Microbiology of <i>Klebsiella pneumoniae</i> (1)	100%
Microbiology of <i>Mycoplasma pneumoniae</i> (1)	99%
COPD (1)	95%
Asthma (1)	99%
Congestive heart failure (1)	86%
Pharmacology of Spironolactone (1)	99%
Pharmacology of Heparin (2)	74%
Acute myocardial infarction (1)	73%
Pharmacology of Quinapril (1)	100%
Pharmacology of various classes of antihypertensive agents (1)	91%
Acid/base abnormalities (1)	38%
Pulmonary embolism (1)	99%
Pharmacology of Isoniazid (1)	97%

Students’ Quotes

- “The decks were SO helpful. This was how I did [the] majority of my studying for the MD2 PBL final and I ended up doing really well on the exam.”
- “This project helped show the benefits of using Anki and now I’m hooked! It was a little intimidating to use at first, but after the MD2 midterm, I could tell how the cards really helped with my recall. Also despite the Fair Games list, I think the Anki deck really helped highlight the true key important parts of each PBL case.”
- “This is probably the greatest med-ed project of all time. I can only speak for myself but these decks were some of the greatest tools I had in the unit.”

Conclusion

Through this medical education project, students found the Anki flashcard platform to be an effective adjunct to their learning. Exam scores suggest that the Anki flashcards helped students recall the information. This project also found that medical students would want to use this platform for future PBL material.

Further research on the integration of platforms such as Anki into the pre-clerkship curriculum can examine long-term retention of the information when tested on examinations such as the USMLE. This project is limited in not having a true control group, making the assignment of causality more difficult. We opted for this approach because we did not want to deprive some students of the educational intervention, and our educational philosophy encourages the integration of learning across multiple methods and platforms.

Target Audience

- Faculty of medical schools and other health profession learners, medical students, health care professionals.

References

1. Deng F, Gluckstein JA, Larsen DP. Student-directed retrieval practice is a predictor of medical licensing examination performance [published correction appears in Perspect Med Educ. 2016 Nov 18;]. Perspect Med Educ. 2015;4(6):308-313. doi:10.1007/s40037-015-0220-x

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