

Whither the Sketched Flashcard? Studying Architectural Precedents in our Digital Age

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1. Introduction

Learning architectural history is an essential component of the architect's education. In and out of the studio, students are asked to examine and interpret complex compositions, be it in painting, architecture, sculpture, or photography, and how these come together to make meaning. When properly applied within design studios, the benefits of a strong grasp of historical precedents are clear. Learning and memorizing the exemplars provided in our curricular canons, however, is no small task. While most educators apply a multi-pronged pedagogical approach, one tool that has traditionally proven helpful for students is the flashcard. This paper looks at the traditional flashcard, its digital descendent, and its application as a learning resource for the student of architecture. The topic exploration is extended by looking at best learning practices from several other disciplines— Law, Language Acquisition, and Education—where copious memorization is needed and where flashcards have often been deployed. The benefits and drawbacks of this teaching and learning tool are addressed in each case. Finally, the paper suggests several strategies to encourage the educator to better leverage the potential of this tool in our digital age.

2. Didactic Tools + Contexts

2.1 Traditional approaches

Flashcards are traditionally defined as a card with words and images etc., used as an aid to learning. Specifically, they have been a tool for memorization and have long been a part of architecture students' repertoire of learning resources. The primary tool was the 3x5 index card with a building or site name on one side and notes and sketches on the other (Figure 1).

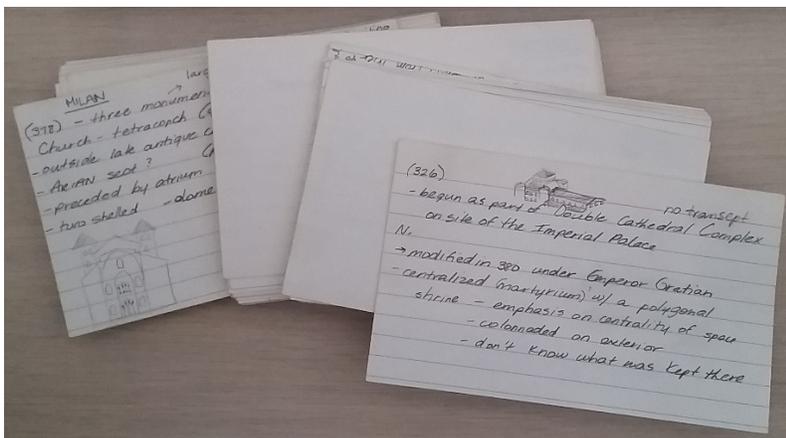


Figure 1. Architectural History Flashcard Desk. Author.

The source material used to build these decks came from textbooks and from Study Rooms, spaces full of drawings and photographs curated by a teaching assistant or professor to support the classroom learning objectives (Figure 2). Lining the walls and organized by class section, these would be dutifully sketched, sometimes on index cards for flashcards, and often accompanied by notations and personal mnemonic devices. With time short due to limited library hours, the student would rush, planning to return frequently to solidify their visual literacy in preparation for the “building/site recognition” tests that lay ahead.



Figure 2. Prints, Drawings & Photographs Study Center, Philadelphia Museum of Art. *creative commons.org*.

While the effort to construct (draw and write) the flashcards and to cross-pollinate the Study Room materials with lecture notes and textbook findings is significant to learning, essential to the success of flashcard use is repetitive practice or spaced repetition; the process of engaging with the cards in an ongoing, deliberate manner. This strategy requires significant self-motivation and discipline on the part of the student with minimal opportunity for instructor oversight or even encouragement.

Fundamental to the theory of spaced repetition is the idea of the “forgetting curve,” an idea thought up by the German psychologist Herman Ebbinghaus in the late 19th century (Figure 3). It describes the rate at which you forget something once you learn it, either for the first time or after reviewing (Sonnad, 2018).

The forgetting curve slopes steeply downward after you first learn something. Through review and repetition, however, the curve can be softened. Flashcards offer an easy and versatile tool for the exercise of spaced repetition in a variety of subjects.

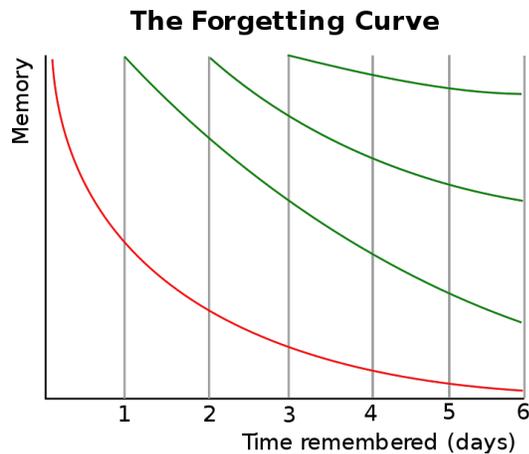


Figure 3 The Forgetting Curve. creative commons.org.

In addition to the ability to individualize the flashcards with personal sketches and mnemonic devices, these small, rubber-band sorted stacks of cards were very portable. They could be pulled out of a backpack as needed for review or class assignments. The format was flexible even if the process could be laborious. Of course, should the deck be misplaced, lost, or doused in coffee, replacing this work meant starting from scratch.

2.2 The Digital Turn

Since the late 1990s digital tools have played an increasing role in education. Technological advancements have touched on every aspect of our lives, and education is no exception (**Stoop, Kreutzer, and Kircz, 2013**). Flashcards do not have to physically exist as a card - they can take on an electronic form resembling a card. As noted above, the traditional flashcard would feature writing, perhaps even a drawing or image. In digital flashcards this can be extended to include animation, movies, audio, music, social networking and a multitude of interactive elements. Increasing affordability and accessibility of the Internet and personal computing devices now means learners have a wide variety of digital flashcard tools, such as Quizlet, started in 2005, at their disposal.

Today, the Study Room and Sketch Flashcard scenario, presented above with its place specificity and focus on rigorous, quick memorization, has been replaced by a proliferation of online images and flashcard tools, including Quizlet, StudyStack (Figure 4), etc. In addition to being able to create their own flashcards, students have access to decks created by their teachers and by other students. No longer limited by library hours or sketching ability, the contemporary student seemingly has no barriers to leveraging the past. The ability to democratize the playing field by offering decks that are curated and learning objectives-focused to all students is very appealing to instructors. Embraced as another teaching tool, digital flashcards have been positively received by those studying and teaching architecture as evidenced by the thousands of sets available online, and an ever-growing internet of pedagogical tools. Even the Architect Registration Examination (ARE) has Archiflash, a collection of digital flashcards decks that cover all areas of the exams. Finally, the fact that many of these tools can be linked to school Learning Management Systems like Blackboard and Canvas means that instructors can monitor and encourage student usage; they can require "spaced repetition" as a part of the curriculum which renders students accountable for this aspect of their studies.

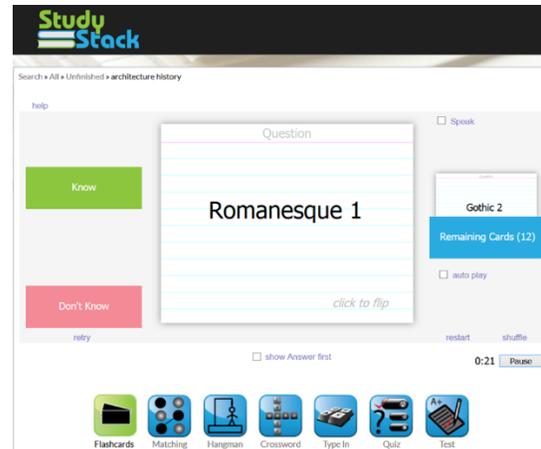
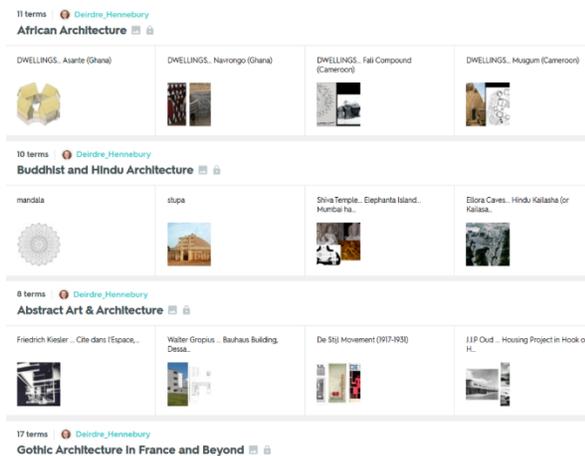


Figure 4 Quizlet and Study Stack. Author screen shots.

In practice, however, the picture is more mixed. Reliance on the instant gratification of the internet has both broadened, by positively opening up new areas for exploration, and narrowed, by removing the push for students to own the materials through consolidation, the way that visual materials are engaged with and recalled by the beginning architecture student. Though the digital flashcard promises so much, student results in our classrooms were not reflecting their effectiveness. Additional research into the flashcard as a teaching and learning tool was required. Are flashcards still relevant or useful today?

3. Best Practices from Research

3.1 Language Acquisition Instruction

*“An essential element of language learning is building one’s **personal** store of words and expressions, a necessary component to improving competency in all areas of communication.” (Goodwin-Jones, 2010)*

*“Flash cards continue to be a popular method of working with vocabulary, typically with the L2 and L1 on opposite sides. Today electronic texts and dedicated software programs provide considerable help in increasing vocabulary through **reading and listening** and in learning a targeted set of words or expressions. Online, **student-driven collaboration** is also proving beneficial for language acquisition.” (Linda C. Jones quoted in Goodwin-Jones, 2010)*

Language acquisition instruction, including first and second languages (L1 and L2), continues to see the use of flashcards as a potent tool in learning (Dizon and Tang, 2017; Chien, 2015). One important finding is how essential it is for the students to create their own cards or personalize communal decks (Green and Bailey, 2010). While “gifting” students with a stack of flashcards seems like a kindness, recent scholarship suggests that the making of the card itself is important to learning and retention. The academic process of synthesis of information and presentation in simple format is a valuable cognitive exercise in itself.

3.2 Legal Instruction

*“Visual pedagogy advocates the teaching of media literacy across the curriculum, and as part of a plan that is sensitive to the **diverse concerns, knowledge, and experiences of students**. Media literacy has been conceptualized as the ‘the process of critically analyzing and learning to **create one’s own messages** - in print, audio, video, and multimedia, with emphasis on the learning and teaching of these skills through using mass media texts’. It includes the cognitive and affective processes involved in viewing and producing audio-visual materials.” (Julian Hermida quoted in Colbran, Gilding, Colbran, Oyson, and Saeed, 2015)*

*“Multimedia, such as computer graphics, video and animation, will help engage digital students by bringing material to life and helping them understand the context and relevance of the material to the ‘real world.’ However, students need even more. They need their learning to be three-dimensional-not flat, linear or purely textual. They need **interactivity** where their minds (and screens) are turned on and working in overdrive. They need to become a part of the material through **collaboration, interactivity, and simulation**.” (Donahoe, 2010)*

A review of Legal Education literature finds a pronounced support of online tools. Specifically, the web is seen as an opportunity for collaboration and interactivity that was not available to earlier generations of students studying law. The use of flashcards, always a staple for those studying case law, has translated to the digital with additional enhancements including links to online media, web references, and other relevant materials. One aspect that is particularly emphasized is how the online format can be individualized and how important this is for learning retention. Colbran, et al, argue that flashcards may be developed in any one or more combinations of three processes: Individual academic development, Individual student development, and, Collaborative development (Colbran, Gilding, Colbran, Oyson, and Saeed, 2014). A move toward more visually-based pedagogies in legal instruction is already underway and many authors are arguing for even more interactivity and simulation (Donahoe, 2010; Colbran, Gilding, Colbran, Oyson, and Saeed, 2015).

3.3 Teaching Instruction

*“When we read, we construct a mental representation of the text in which meaning is anchored to structure. The exact nature of such representations remains unclear, but they are likely similar to the **mental maps** we create of terrain—such as mountains and trails—and of man-made physical spaces, such as apartments and offices.” (Jabr, 2018)*

*“The preferred approaches are those that encourage and support deep rather than surface approaches to learning. The majority of these approaches are based on learning strategies that promote knowledge construction and include such forms as **problem-based learning, computer-supported collaboration, and student-centered learning**.” (Nikoopour, 2014)*

"...increased use of mobile phones has made them a popular device not only for communication, but also for entertainment and learning purposes. Accessibility, portability, and ubiquity of mobile phones prompted students to use them as an English vocabulary learning tool in their leisure time. Therefore, vocabulary learning gain of students using mobile flashcards was found higher than paper flashcard users." (Nikoopour and Kazemi, 2014)

A key argument in Education pedagogy has been the "digital vs. paper" debate. While those mourning the loss of paper-based teaching materials are frequently charged with being overly nostalgic or Luddites, the research suggests a more nuanced approach to how digital and physical materials are leveraged in the classroom. Ferris Jabr tells us that "...there is evidence that e-reading and e-technologies fail to replicate the 'intuitive and satisfying' ways of navigating text which may subtly inhibit retention" (Jabr, 2018). Jabr's piece delves into the science behind reading and posits that our brains conceptualize text as inherently physical. This theory supports the idea that the context of learning, for example the traditional image Study Room, is in itself a fundamental part of memory retention. Other research finds that while people routinely report preferring paper over digital reading for a focused study, scholars are quick to note that the new generation of "digital natives" who lack a subtle bias towards screens may not be limited in these ways (Myrberg and Wiberg, 2018).

Overall the research in field of Education echoes what is seen in the other areas: collaboration and interactivity are a primary strength of online digital teaching and learning tools. Another finding of interest is that it may be in a student's best interests to digest information from multiple media forms. Students who elect to print their digital flashcards for additional practice and "hands-on" use might be on to something. Finally, Azin Kazemi and Jahanbakhs Nikoopour's flashcard research points to the benefit of mobile phone and tablet applications where the digital flashcard is portable and, therefore, accessible for use at any time. The digital flashcard, like the paper index card of earlier generations, is now untethered making spaced repetition more feasible.

Conclusions

Traditional flashcards have long been a part of architecture students' repertoire of learning resources.

Recent research on online teaching and learning tools supports the continued use and development of the flashcard as an effective tool for memorization and retention, though further work is needed to fully take advantage of the agility of the online environment. From the research, the following are some fundamental ways in which flashcards can be effective as teaching and learning tools:

FLASHCARDS as effective TEACHING TOOLS

1. Personal
2. Collaborative
3. Student-focused
4. Interactive

FLASHCARDS as effective LEARNING TOOLS

1. Use Digital Flashcards with built in Spaced Repetition Systems
2. Review Daily

3. Use multiple media forms for optimal learning
4. Make your own cards; make them your own
5. Add context to your cards – mnemonic devices, links, personalized details

In architectural education, digital flashcards can provide an opportunity to teach history in new, more connected ways. In addition to aiding learning, flashcards can act as an aid to memory, recall, collaboration, as well as a tool for formative and summative assessment. From “flipping the classroom” pedagogical strategies to “synchronous” online sessions to instructor-curated digital flashcards or audio sound bites, the time that students spend engaging with course materials no longer follows the traditional model of presentation (in-class) and review (out-of-class). When offered as a set of complementary learning tools suited to a myriad of information retention techniques, these new technologies can benefit the beginning student immeasurably. The brief analysis presented in this paper reveals that the traditional definition of a flashcard is unduly restrictive and there is increasing potential and flexibility in the application of the digital flashcard as a tool in teaching architectural precedents. While still evolving, cloud-based environments are already providing an opportunity to build democratized, participatory tools that make it easier for students to use and create shared representations that go beyond what may be achieved in print-based cards or desktop applications. In conclusion, YES!, flashcards are still relevant and offer a convincing method for memory retention based on recent learning research.

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