

Nursing Students' Preferences in Test-taking, E-Books, and Learning Styles: A Longitudinal Study

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Abstract

Aim: This study was conducted to determine the preferences of testing and learning styles of undergraduate nursing students within a baccalaureate school of nursing.

Background: Historically, nursing education has been in a face- to face (F2F) lecture format. One of the most pronounced trends in higher education over the last decade has been a strong growth in distance education through online course work ¹.

Method: A survey was given to 685 undergraduate sophomore level nursing students within a baccalaureate undergraduate school of nursing over eight semesters. This same survey was given again to these sophomore undergraduate nursing students during their senior year to determine if results waivered. There were 228 seniors surveyed over four semesters.

Students were asked to indicate their age (17 to 27 years, 27 to 37 years, > 37 years)

Students were queried about their preferences among the following categories:

1. Test taking preference: computer exams, or paper and pencil exams
2. Book preference: traditional hard copy textbook, or E-book
3. Learning style preference: online learning, or attending classroom lecture, or both

Results: Overwhelmingly, sophomore and senior level undergraduate nursing students surveyed, selected their preferences in test taking, book usage, and instruction styles, to support traditional learning methodologies period.

Conclusion: The results from this study emphasize the need for nurse educators to listen attentively to their students and not assume that advanced technology is the ultimate learning method to be utilized.

Keywords: *Student preferences, computer exams, e-book, hybrid online learning, classroom lecture, asynchronous, synchronous, blended learning, F2F, face-to-face, learning outcomes.*

Introduction

Although nursing education has historically been in a face-to-face format (F2F), a pronounced trend in higher education encompasses a strong growth in distance education and online learning. Teaching and learning formats have evolved largely due to changing technologies and student demographics. According to Smart et al.², there was a paradigm shift in technology as far back as 2000, and that upcoming the technology would include “distance education, computers,

scantrons, AMS learning systems, CD-RM, DVD, [and] learning management systems.”^(p19)

The use of the internet became more popular². They also maintain that in 2010, the education became a mobile environment with hybrid courses and asynchronous and synchronous course platforms.

Online and blended-learning formats have become increasingly popular, especially in higher education³. In blended learning formats, instructors will utilize

learning and teaching methods with an emphasis on best-practice learning outcomes. Blended learning is a hybrid approach to delivering instruction through online and traditional F2F learning formats, the one enhancing the other. In a blended course, instruction may occur F2F, online, or both.

Studies illustrate a variety of technological differences in learning styles. Student's exposure to technology differs depending on the primary and secondary educational level. Educators need to be attentive to their student's learning style preferences and not assume that one type of learning style works for everyone.

Because nursing educators have traditionally approached blended learning from a learning outcomes measurement, researchers have been battling with the dilemma of comparing paper-based and computer-based-testing, understanding preferences for e-books and text-book usage, and preferences in online learning programs for more than two decades. Although research abounds regarding the learning outcomes of blended learning, sparse data is available about students' learning style preferences.

Literature Review: As the numbers of national and international online programs increase, so will the numbers of online nursing programs. These online classes offer one or more of the following: asynchronous, synchronous, hybrid, or F2F. One advantage of these online programs from the student's preference, is that the courses offer flexibility in the times and places where they learn, providing a better way to balance home/work/school obligations. Other students experienced the disadvantages of being socially isolated from other classmates and faculty and becoming lost in technical glitches. These students are also susceptible to situations where the instructor uses a teaching method not conducive to all learners. Students have also expressed dismay with these technologies if they have a visual or auditory disability.

Published research from within the nursing profession gathers data on learning outcomes and measures. Data on student learning preferences is less abundant. Limited data exists regarding student perceptions, so that we can create programs conducive to what they need to be successful. In particular, this research study and literature review focuses on three main instructional aspects: online vs. paper testing,

e-book or print preferences, and most preferred teaching format. Additional information on the need to educate both faculty and students is discussed.

Testing: While computer-based testing can be beneficial from an educator perspective, the literature regarding this testing mode from a student performance perspective is controversial. Studies analyze test modes and the effects of computer versus paper-based test mediums, for example. The literature did not always find a favorable result for computer-based tests.⁴ According to Doggett⁵ students preferred exams with multiple attempts and disliked exams with forced completions. Online testing also faces technology issues. Stowell and Bennett⁶ said potential disadvantages of online testing include hardware or software failures, proper functionality of all technology, and temptations to cheat when unsupervised or in an unknown environment.

E-books: "E-books are a contemporary resource that can be used to facilitate both learning and teaching. As with any new technology, here is an expected learning curve and users just develop some level of proficiency before e-books are enjoyable to use. Student identified barrier included, among others, lack of orientation, too much scrolling, perceived eye strain, and trying to break habit with tradition."⁶(pp84-85) A study done by Blissit³ found that nursing students enrolled in an introductory pathophysiology course overwhelmingly preferred print textbooks to digital textbooks. Students complained of eyestrain, frequent headaches from looking at a computer screen, and the distraction of the internet.

According to a study of pharmacy and nursing students' express anxiety over online classes and struggle with e-books⁷. "These student expressions of concern provide opportunities for library instruction interventions. A workshop on the use of e-books could help to alleviate student anxiety about using e-books"⁸. Lack of knowledge seemed an obstacle. Institutions need to support the use of e-books. Folb et al.⁹ also said that it is important to display the eBook collection prominently on the library website, but to also provide instruction. Instruction and exposure will lead more patrons to this collection.

"Nursing students described factors that hindered e-learning computer skills and perceived ability. Positive factors for e-learning were flexibility in time management and access¹⁰. Goodman and Fayle⁸ said that focus groups expressed conflicting preferences of

e-books over print. They are easier to search within to find keywords and concepts. Nursing students “preferred print as a medium that makes study easier, with appealing layouts for diagrams, charts, and ease of highlighting text.” (p54)

Folb et al.⁹ found that reference and pharmaceutical drug books were preferred most often over e-books and handbooks. However, those preferring print would consider using an e-book even more than as those using e-books will use print.

Learning Styles: Students have varying levels of learning styles and their exposure to technology differs depending on the primary and secondary education experiences, which sometimes relates also to the generation in which they were born. Nursing educators can’t assume that one type of learning style works for everyone and therefore need to be more attentive in their assessment of student’s learning styles.

According to Hampton et al.¹¹, Gen Z students, also known as iGen, reported that “lecture with audience response clickers” was the preferred teaching method (94%) while traditional lectures were preferred 63% of the time.”(p162) Walker et al.¹², found the preferred teaching methods between traditional nursing students and nursing students who are 25 years and older, did not have a significant difference. Students indicated they did not like Web-based methods. Both student groups said their preferred teaching method was lecture-based. Smart et al.² said the institutions of higher education must acknowledge that students have a varied range of computer skill and that courses must be designed with a “broad range of students adaptability, flexibility, and proficiency with educational technology.”¹³ Pettigrew et al.¹⁴ said student ratings of online teaching formats with PowerPoint and in class-video ranked the highest. “Accelerated students [those who work fewer hours, study more and have higher career aspirations] gave higher ratings to online chats and discussions and problem-based learning. Older baccalaureate students gave higher ratings to guest lecturers whereas younger baccalaureate students gave higher ratings to simulations and skill laboratory demonstrations with practice.”(p232)

Pettigrew et al.¹⁴ went on to say that when all students are divided by age, younger students preferred lecture with PowerPoint and the use of in-class videos. Again, Hampton et al.¹⁵ found that most students preferred an engaging method of incorporating videos

and PowerPoint presentations converted with voice over

The research results from a Western New York state community college illustrated that voluntary technology and student orientations should be offered a few weeks prior to the beginning of the semester. This provides students an opportunity to gauge their comfort levels with technology and gave them a chance to drop the course if not prepared for the technological platforms.¹⁶ Given that most college students receive their primary and secondary education in the F2F setting, online course work may represent an adaptation challenge for many.¹⁷

Despite some faculty perceptions of students’ technical skills, students’ responses showed, Rubenstein and Schubert¹⁸ reported findings on the use of learning in the classroom with iPads. Overall, 73% of the faculty want students to have an orientation to using these iPads. More than half of the students found training beneficial. Students and faculty agree that technology training is among a top priority¹⁸. Smart, et al.² said that nursing faculty are now expected to be proficient in nursing content and office computer software and online instructional platforms. As a result, “faculty need to be proficient in technologies that are used by student and supported by their institutions.”(p22)

Methodology

A nursing professor and librarian, both from a college in Western New York, conducted a longitudinal study to determine student preferences on testing and learning style methods. Sophomore level nursing students completed a volunteer questionnaire during the Fall 2016, Spring 2017, Fall 2017, Spring 2018, Fall 2018, Spring 2019, Fall 2019, Spring 2020 semesters to determine preferences on testing and learning style methods. Four of these sophomore student cohorts (Fall 2016, Spring 2017, Fall 2017, and Spring 2018) were asked to complete the same survey during their senior level year (4 semesters; Fall 2018, Spring 2019, Fall 2019, Spring 2020) to determine if their results changed following more exposure to online testing and learning methodologies as they progressed through their nursing curriculum.

The volunteer questionnaire given to the students asked them to select their age, their preference from three learning style categories, and to provide comments about their learning style preferences. The categories addressed on the questionnaire included:

1. Prefer taking exams by computer or paper and pencil
2. Prefer electronic books or hard copy traditional books
3. Prefer online learning, or attending classroom lecture, or both
4. Comments

Students could elect not to complete the form.

685 sophomore level students completed the questionnaire and 228 senior level students completed this same questionnaire during their senior year.

Information was entered into a database for analysis.

An IRB approval was obtained for the initial pilot study of 100 sophomore level students during their fall 2016 semester. A second IRB approval was obtained for this to become a longitudinal study in following subsequent sophomore students and to follow up with these sophomore level students during their senior level semester.

Results

Age:

Age Breakdown of 685 Sophomore level students who completed the survey:

17-27 Years → 576 students (84%); 27-37 Years → 81 students (12%); > 37 Years → 28 students (4%)

Age Breakdown of 228 Senior level students who completed the F/U survey:

17-27 → 180 students (79%); 27-37 → 38 students (17%); > 37 Years → 10 students (4%)

Exam Preference

Sophomore Level:

Prefer Computer Exams → 90 (13%)

Prefer Paper/Pencil Exams → 587 (86%)

No Preference in Computer or Paper/Pencil Exams → 8 (1%)

Senior Level:

Prefer Computer Exams → 37 (16%)

Prefer Paper/Pencil Exams → 191 (84%)

No Preference in Computer or Paper/Pencil Exams → 0 (insignificant)

Book Preference

Sophomore Level:

Prefer Electronic Books → 147 (21%)

Prefer Hard Copy Books → 527 (77%)

No Preference in Electronic or Hard Copy Books → 11 (2%)

Senior Level:

Prefer Electronic Books → 36 (16%)

Prefer Hard Copy Books → 190 (83%)

No Preference in Electronic or Hard Copy Books → 2 (1%)

Lecture Format Preference:

Sophomore Level:

Prefer Online Only → 32 (5%)

Prefer Attending Classroom Only → 387 (56%)

Prefer Online and Attending Class → 266 (39%)

Senior Level:

Prefer Online Only → 15 (7%)

Prefer Attending Classroom Only → 126 (55%)

Prefer online and Attending Class → 87 (38%)

| Age Breakdown of 685 Sophomore level students who completed the survey | | |
|---|---------------------------------|----------------------------|
| Age Group | Sophomore Level Students | Percentage of Total |
| 17-27 Years | 576 | 84% |
| 27-37 Years | 81 | 12% |
| > 37 Years | 28 | 4% |
| Total: | 685 | |

| Age Breakdown of 228 Senior level students who completed the F/U survey | | |
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| Exam Preference | | |
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| | Sophomore Level Students | Senior Level Students |
| Prefer Computer Exams | 90 | 37 |
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| No Preference in Computer or Paper/Pencil Exams | 8 | 0 |
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| Book Preference | | |
|--|---------------------------------|------------------------------|
| | Sophomore Level Students | Senior Level Students |
| Prefer Electronic Books | 147 | 36 |
| Prefer Hard Copy Books | 527 | 190 |
| No Preference in Electronic or Hard Copy Books | 11 | 2 |
| Total: | 685 | 228 |

| Lecture Format Preference | | |
|-----------------------------------|---------------------------------|------------------------------|
| | Sophomore Level Students | Senior Level Students |
| Prefer Online Only | 32 | 15 |
| Prefer Attending Classroom Only | 387 | 126 |
| Prefer Online and Attending Class | 266 | 87 |
| Total: | 685 | 228 |

Students were forthright in offering their comments on test taking and learning style preferences.

Comments shared from Sophomore level students included:

➤ “Less stressful when taking exam with paper and pencil”

➤ “Like writing out thoughts on paper exams and can’t do this on computer exams”

➤ “Prefer paper/pencil exams in class because I can underline & circle key words”

➤ “Both are useful; like E-book but prefer hard copy.”

- “Prefer hard copy books to e-books, as student will always have the hard copy for reference. Computer screens are hard on eyes”.
- “Hard copy texts are easier to read and retain information”.
- “E-books overwhelming in beginning, yet nice for convenience, as I don’t have to carry heavy books”.
- “Like online, but like attending class to reinforce online content”
- “Like face-to-face conversations & to speak directly with professor’s when confused”
- “Online learning hard to focus & prefer face to face with teacher”
- “Attending class lecture is easier to ask questions & helps with understanding”
- “Don’t think it’s a good method to have 1st time nursing students take hybrid or online nursing courses.”
- “Taking exams with paper and pencil, and using hard copy books was all I had ever used, so being thrown into all this technology is difficult”
- “Like online practice exams and tutorials”
- “Prefer taking exams on computer, but not with all computer programs”
- “The biggest issue with the online portions is navigation and knowing exactly what should be done. If there was more structure there, it would be more useful.”
- “Prefer learning more in class and have less anxiety by doing paper exams. Hard copy books help retain more information and can physically highlight and write notes in book.
- “Online textbooks not user friendly. Highlighting on hard copy easier to do rather than highlighting in an e-book”
- “Frustrating when technology isn’t working. Don’t have this problem with hard copy books”
- “Taking an older student into consideration, sometimes technology is difficult & challenging”
- “Paper & pencil allows me to cross out, underline, & eliminate”
- “I like paper & pencil exams, but I feel computer exams prepare us for NCLEX”
- “Please bring back paper and pencil exams. Harder to read questions on computer, especially for people with dyslexia and vision problems.”
- “Hard copy books are a must for me”
- “Hard copy books easier to navigate”
- “Prefer Hard copy textbooks that can be rented, as they are cheaper. Otherwise, online texts are cheaper.”
- “I continue to learn better & absorb material when I have face to face interaction”
- “Attending lecture allows for better explanation, & opportunities to ask questions”
- “In certain situations, it is dependent on how well instructor teaches in the classroom. If teacher does well at lecturing in the classroom, would prefer classroom”
- “Depends on class. A hybrid class is hard for some nursing classes because it’s so heavy in content. If hybrid, the teacher must offer support”

Conclusion

- The overwhelming majority of sophomore students (86%) selected their preference to be paper and pencil exams, rather than computer exams (13%), and the overwhelming majority of senior students, having increased exposure to computer exams since first taking this survey, selected their preference to be paper and pencil exams (84%), rather than computer exams (16%). Sophomore students selected their preference of hard copy textbooks (77%), rather than e-books (21%), and Senior level students selected their preference of hard copy books (83%) rather than preferring e-books (16%). Sophomore students selected their preference of attending class (56%), rather than BOTH online and attending class (39%), or Hybrid only (5%) and interestingly, senior level students after having increased online teaching formats, selected their preference of attending class (55%), rather than BOTH online and attending class (38%). 7% of seniors selected their preference as online only.

Comments shared from Senior level students included:

- “Online testing causes anxiety.”

- Participants answering the survey were enrolled in both on-campus courses and co-requisite Hybrid-online courses, encompassing online assignments, e-book usage, and computer exam testing at the sophomore and senior levels. Several students reported at both the sophomore and senior level that although they had previous exposure to technology, and had taken Hybrid-online courses, they still preferred traditional methods of learning.
- Students repeatedly expressed unfavorable comments on taking computer exams, using E-Books, and participating in online learning.
- Although the literature indicates that there are significant advances in online technological learning modalities and the use of technology is the preferred method of learning, the results from this longitudinal study did not concur. Findings from this study significantly reveal that traditional learning modalities are the preferred learning style, as evidenced from 8 sophomore level nursing student cohorts between the ages of 17 to 27 years (84%), 27 to 37 years (12%), and > 37 years (4%) and 4 senior level nursing student cohorts between the ages of 17 to 27 years (79%), 27 to 37 years (17%), and > 37 years (4%).

Implications:

- When designing a nursing curriculum, there is a need for nursing educators to listen and be aware of prospective students preferred learning style methods, and NOT assume that technological learning styles are always the best solution for everyone.
 - A slower, more gradual transition towards advanced technological learning methodologies may need to be implemented when students enter the program.
 - Offering choices for both technological and traditional teaching modalities within a curriculum may provide an optimal venue for learning.
 - There is a need for ongoing research to evaluate undergraduate nursing students preferred learning styles as they enter and exit their program of study. Eight sophomore student cohorts had answered this survey. Only four of these eight cohorts have completed the follow up survey in their final undergraduate year at this college to determine if test taking and learning style preferences changed following further exposure to computer exams, e-books, and online learning methodologies.
- In light of the recent COVID pandemic, students have certainly experienced a surge of online learning formats. In due course, it's noteworthy to ascertain how students' learning preferences and also how nursing educator's implementation and delivering of online teaching modalities evolve.
 - Advanced technical support needs to be recognized, especially with the advancing technological platforms of the 21st century.
 - In addition to surveying undergraduate nursing students, other schools of discipline or professions could be queried to further determine if results would demonstrate similar findings to this study.

Ethical Clearance: Institutional Review Board of D'Youville, NIH, and CITI training

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Conflict of Interest: Nil

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