Beyond the surveys: Qualitative analysis from the Academic Reading Format International Study (ARFIS)

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Abstract: From 2014-2017, the Academic Reading Format International Study (ARFIS) collected data from over 21,000 university students in 33 countries regarding their reading format (print or electronic) preferences and behaviors when engaging with academic texts. Quantitative analysis from the amalgamated survey data show a consistent preference for print reading among the majority of students worldwide. This paper presents previously unpublished findings from our qualitative analysis of students' survey comments. We investigate the questions: Why do students prefer to read in print or electronically? What factors affect their decisions to read a text in their less preferred format? What behavioral patterns present themselves that will assist librarians and educators when deciding upon format policies?
Keywords: Print reading; electronic reading; college students

1. Introduction

Research partners in 33 countries participated in the Academic Reading Format International Study (ARFIS), the largest study of its kind. Data was collected from 21,266 college and university students at all levels regarding their academic reading format preferences and behaviors, whether print or electronic, from 2014-2017. Approximately half of the quantitative data, which was gathered in the first phase of this project, was analyzed and published in 2018 along with the instrument and full methodology (Mizrachi, Salaz, Kurbanoglu, Boustany et al., 2018). Subsequent analysis of the complete dataset builds on these findings and concludes that a firm majority of students in each country favors print, and a breakdown of amalgamated results show 71.06% (n=15,110) prefer print, 8.67% (n=1,843) prefer electronic, and 20.27% (n=4,309) exhibit no clear preference either way. These findings are consistent with similar studies conducted by other researchers over the past 20 years, as will be discussed below. Each of the 16 questions on the Likert-style ARFIS instrument afforded respondents space for explanatory comments, and a final question

encouraged additional general comments. In order to dig beyond the numbers provided by our statistical analysis, we completed a qualitative analysis of the comments from all electronic-preferring respondents who offered English language comments (n=325), as well as a comparably sized random sample of respondents who prefer print (n=328). These samples are comprised of students from 15 countries. A large number of qualitative responses in this dataset in languages other than English – including French, Norwegian, Italian, Chinese, Arabic, Spanish, and others – are excluded from this analysis for logistical reasons, but merit additional study.

This paper presents findings from our qualitative analysis of students' survey comments, and seeks to uncover the nuances and inconsistencies of format behaviors. We investigate the questions: Why do students prefer to read in print or electronically? Under what circumstances will they read a text in in their less preferred format? What patterns are found that can assist librarians and educators when deciding upon format policies?

2. Review of the Literature

Studies of students' digital reading behaviors since the early 2000s reflect the evolutions in technology, the proliferation of format choices, and increased access to digital based academic texts and electronic books (e-books). Carol Tenopir (2003) summarized the findings of 200 studies published between 1995-2003 in her report for the Council on Library and Information Resources (CLIR). Among the findings relevant to this paper, she reports that students used electronic resources if they were "perceived as convenient, relevant, and time saving to their natural workflow," (p. iv); that print books were preferred over e-books, whose usage was still in the early stages; and that most users printed out electronic articles they deemed useful.

In his review of research on students' attitudes and use of e-books, Becker (2015) considered 2010 as "Year Zero" for e-books because the iPad went mainstream that year enabling easier access to e-books and other electronic sources. In regards to format preferences, Becker states, "You can confidently expect to see the phrase "students prefer print over digital" in the results section of any study conducted between 2010 and 2015, and likely for many more years to come" (p.232). He notes that studies are just beginning to investigate the factors affecting preferences and behaviors.

Mizrachi's ethnographic study of 41 undergraduates (2010) found an overwhelming preference for reading academic texts in print, but that "their behaviors did not necessarily reflect their preferences," (p. 577). She sought to explore this phenomenon further in two subsequent studies: her 2014 survey of nearly 400 undergrads (2015) on which ARFIS is based, and her case study (2016) of 61 first-year students in a class whose course readings were offered both electronically and in print. Even when afforded the choice of accessing

online readings for free, using print, or any combination thereof, over 70% reported that they read all or most of their texts in print. The sample populations of these studies were all different cohorts of undergraduates at the University of California Los Angeles (UCLA), but results remained consistent. Generally, students believed they learned better with print because it is more conducive to interactive reading and engagement, but liked the convenience of accessing materials online and its perceived lower cost and ecological friendliness. They preferred print for longer and important readings, but many were 'okay' with reading shorter texts on screen, especially when they were pressed for time.

Data from Mizrachi's 2014 study were incorporated into ARFIS, along with the data from 32 other countries (see the full list of ARFIS countries in Appendix 1). Among the several ARFIS partners who published results of their country data, researchers in Finland, Norway, Romania, the United Kingdom, Qatar, and Australia (Kortelainen, 2015; Landøy, Repanovici, & Gastinger, 2015; Amaya & Secker, 2016; Johnston, Salaz, & Alsabbagh, 2016; Johnston & Salaz, 2018) analyzed their students' comments using qualitative methods to reach deeper understandings of their attitudes and behaviors. All findings show consistent coding schemes with Mizrachi (2015), and, like Mizrachi, they found that preferences do not always determine behavior. Many students will use either format depending on contexts and circumstances.

Among the many actions sponsored by the European Cooperation in Science and Technology (COST), is the Evolution of Reading in the Age of Digitisation (E-READ). Involving nearly 200 scholars of reading and literacy from across Europe, this program seeks to "develop new research paradigms, and metrics for assessing the impact of digitization on reading" (COST, 2019). In October 2018, this action resulted in the Stavanger Declaration, which lists among its summary conclusions the consistency of print preference among readers "for longer single texts, especially when reading for deeper comprehension and retention, and that paper best supports long-form reading of informational texts. Reading long-form texts is invaluable for a number of cognitive achievements, such as concentration, vocabulary building and memory" (E-READ, 2019).

This current study analyzes a sample of English language comments from 15 different countries in the ARFIS study to better explain why tertiary readers prefer the formats they do, under what conditions preferences and behaviors vary, and whether patterns are consistent across an international spectrum.

3. Methodologies

The ARFIS survey consisted of 16 Likert-style statements, six demographic questions, one multiple-choice question, and an open remarks field. Twelve of the Likert-style statements pertained to format preference and were validated and included in calculating overall format preference. Every Likert-style question included space for optional explanatory comments. To gather data from

such a large international sample, local researcher partners translated the survey into more than 20 languages and distributed it electronically to student populations in 33 countries between 2014 and 2017. Individual researchers own their country data, and several have conducted and published independent analysis of single-country results.

Response choices to the Likert-style statements on the ARFIS survey ranged from 1 (Strongly disagree) to 5 (Strongly agree). Median scores for each respondent were calculated in order to categorize each participant as overall preferring print or overall preferring e-formats for academic reading. The scores were calculated by assigning each response a score from 1-5. For statements where respondents were asked how well they like or prefer print readings, responses were scored: Strongly Agree = 5; Agree = 4; Neither agree nor disagree = 3; Disagree = 2; Strongly Disagree = 1. For statements where respondents were asked how well they like or prefer e-readings, statements were reverse-scored. The result of this revere-scoring procedure is that, overall, scores closer to 5 always reflect print preference, and scores closer to 1 always reflect e-preference.

The median response across all 12 validated Likert-style scale items for each participant was taken to generate a median scale score for each participant. Participants with scale scores of 1, 1.5, or 2 are considered *e-students* - indicating that at least half of their questionnaire responses indicated agreement or strong agreement with electronic preference. Those with scale scores of 4, 4.5, or 5, are considered *p-students* - at least half of their questionnaire responses indicated agreement or strong agreement with print preference.

Those with scores of 2.5, 3, or 3.5 are considered neutral - meaning that across the questionnaire, their responses were either neutral or fairly well balanced across print-preferring and electronic-preferring expressions.

Across all respondents, the final categorization is:
- E-students - 1,843 out of 21,262 (~8.67%)
- Neutral - 4,309 out of 21,262 (~20.27%)
- P-students - 15,110 out of 21,262 (~71.06%)

Out of 15,110 p-students, 2,005 from 23 countries provided comments in English. We used the case selection function in SPSS to draw a random sample of 328 of these (16.35%) for analysis and compared them to the 325 e-students who provided comments in English (100%).

Demographics of the p-students show 69.8% (n=229) are female; 79.1% are undergraduates (n=260) and 78.5% (n=204) of those undergraduates are first-year students. Their ages range from under 19 to over 40, but 78.3% (n=257) of

this sample are 24 years or younger. About 21% (n=69) state they have a visual impairment. Table 1 lists the countries and their *n* in this random sample.

Country	n	Country	n	Country	n
Australia	30	Lebanon	1	South Africa	193
China	2	Moldova	1	Switzerland	4
Finland	2	Norway	19	United Arab Emirates	5
Hong Kong	27	Qatar	1	United Kingdom	34
Hungary	1	Singapore	1	United States	7

Table 1: P-student countries (n = 328)

The e-students' genders are split evenly: 50.2% (n=163) male and 49.8% (n= 162) female. Over 68% (n=222) are undergrads, 60% of whom (n=133) are first year students. The age range is also under 19 to over 40, but only 65.3% (n=212) are 24 years or younger. 10.2% (n=33) claim a visual impairment. Table 2 displays the countries and numbers of respondents who provided English language comments on their electronic format preference (n=325).

Country	n	Country	n	Country	n
Australia	55	Lebanon	1	South Africa	140
China	1	Moldova	1	Switzerland	1
France	1	Norway	6	United Arab Emirates	3
Hong Kong	41	Qatar	4	United Kingdom	45
Hungary	3	Singapore	3	United States	20

Table 2. E-student group countries (n = 325)

We coded and analyzed the qualitative responses from both samples to the eight statements that relate most directly to the research questions of this paper:

1. I remember information from my course readings best when I read them from printed pages.
2. It is more convenient to read my assigned readings electronically than to read them in print.
3. I prefer to have all my course materials in print format.
4. I prefer electronic textbooks over print textbooks.
5. I prefer to read my course readings electronically.
6. If an assigned reading is 7 pages or more I prefer to read it in print.
7. If an assigned reading is less than 7 pages I prefer to read it electronically.
8. Optional additional comments

Comments were coded using an inductive approach into categories including Affordability; Convenience/Accessibility; Learning engagement; Learning quality; Tactile properties; Physical effects; Ecological friendliness; and Knowledge/Comfort/Habit of format. Comments coded as Both, Depends, and Contradictory reflect circumstances when students might use or prefer either format. Many comments were coded into more than one category.

3.1. Results: Why do students prefer to read in print?

Those who prefer print largely do so for reasons related to perceived ease of learning, although health and ergonomics as well as access and convenience were represented as reasons for preferring print among this population.

Respondents ascribed a sense of better or easier learning and information retention to a variety of qualities and affordances found in print formats. We coded 517 relevant comments from P-students describing the reasons for their preference. Almost 29% (n=151) discussed the ease in which they can interact with print format, specifically highlighting and annotating (learning engagement), and another 22.4% (n=117) reflected their belief that they learn better using print (learning outcomes):

- … you can [actively] read, e.g. highlight and mark pages, move quickly from page to page if you need to refer back.
- I am a person that learns by writing, and so when I read I like to take notes on the sidebars... I can't do this on digital media.
- More visual tags that I remember; i.e. where on the page what I read stood, if it was at the beginning or the back of the book etc.
- I can learn better from a hard copy textbook than from an e-book.

Besides better learning engagement and outcomes, 29 comments (5.5%) discussed their preference for the tangible experience of print over electronic. As one student wrote:

"It takes a different energy to continually read information from your computer; it is more relaxing reading printed pages. You can hold them and quickly go back and forth, there is also something psychological [sic] better about turning pages than scrolling and clicking the computer. I have a different absorption - concentration when reading printed material, it is better."

Only four comments (0.7%) mentioned price as a benefit of print (e.g. "not everyone can afford internet") and nobody noted ecological friendliness as a reason for preferring print, although this was listed by some p-students as a positive feature of digital. Some students (0.96%, n=5) find information in print more believable and permanent: "I feel like it actually exists and notes can't be deleted or corrupted like that of digital base; "I take it more seriously."

Over 11% of the comments stated that print was better for their physical health, and specifically cited their experiences with ergonomic issues, eyestrain, backaches, and headaches when reading for a long time on screen.

Many (17.8%), report issues of inconvenience with digital technology:

- A hard copy [print] is efficient and convenient because you can access it at any time without waiting for it to load. No skills required to use a hardcopy.
- Printed pages are portable.
- You can actually carry a hard copy with you and need no internet connection.
- I am a kinetic learner and need to study while walking around but e-format makes it impossible for me to study as I cannot walk around with my laptop.

3.2. Results: Why do students prefer electronic format?

Of the 509 comments coded as reasons for format preference, e-students most commonly noted the convenience and accessibility of electronic format (34%, n=173).   Comments   include:

- I love electronic format because I can access it from anywhere at any time.
- Printed pages [can] get lost.
- They are more convenient, save time, and can be accessed by any student as long as they have internet access.

These students also discussed how digital features enhance their learning engagement (14.3%, n=73) especially their ability to search for specific information using the 'find' features, the ease with which they can look up references and relevant links, and how they have mastered the electronic highlighting and annotating features.

- Printed resources lack the interactive aspect of learning which makes the learning process challenging at times.
- It is much easier to search for keywords and highlight content in digital form.
- Other favorable aspects of electronic formats:
- Lower costs (7.26%, n=37): "Printed books are over-priced for the amount of time they are used;"
- Environmental friendliness (9%, n=46): "I want to protect the environment," "Save the trees!"

- The inconvenience and possible health issues involved in carrying heavy books (8% n=41): "The weight alone will hinder my mobility," "Print textbooks are large and heavy."

Only 25 comments (4.9%) reflect students' belief that they learn just as well or better with electronic than print.

One student's comment of why he/she prefers electronic format summarizes well the most common responses:

"I don't like books because they are: heavy and bulky (most of the time); easy to forget/not pack into your bag (I never forget my electronic device); expensive when compared to most digital formats; no easy way of doing word searches for assignments. I can't damage/ruin [e-format], even if electronic device breaks, the digital book is still on the cloud. I can easily make notes on [digital], without having to worry about resale value."

To facilitate an easy comparison of the most prevalent reasons reported by students in this study for preferring print or electronic formats we have created Table 3 below.

Code	Print	Electronic
Cost	Minimal	Electronic less expensive
Convenience	No tech/internet needed; more portable; more accessible (e.g. easier to open a book)	Easier access (less time & effort required to gather sources); multiple sources/readings in one device; easier to organize sources
Learning engagement	Easier to highlight, annotate	Easier to find information ('Find' features); online links (for references, relevant information); copying, pasting, notating features.
Learning outcomes	Easier to focus; less distractions; more conducive to deep learning and understanding;	Learn just as well
Tactile aspects	Holding the paper, easier to turn pages than scroll.	Minimal
Health issues	Less eyestrain, headaches	Lighter than heavy books
Environmental concerns	None stated	Less paper=saving trees
Believability	More serious, academic, believable	None stated

Table 3 compares the most common format aspects that students list for preferring print or electronic format.

These findings are consistent with other studies of students' format preferences and support the universality of students' perspectives of using print and electronic formats (e.g. Baron, Calixte, & Havewala, 2017; Kortelainen, 2015; Landøy, Repanovici, & Gastinger, 2015, Johnston & Salaz, 2018).

3.3. Results: Compromises

Qualitative analysis of comments from our sample of 328 p-students and 325 e-students also demonstrates that preferences do not always predict behaviors, nor are they without exceptions. Comments by students in both sample groups acknowledge positive aspects of their less preferred format, and many write of specific circumstances under which they will switch. Therefore, the real behavioral question is not '*Do students prefer print OR electronic*,' but '*WHEN do they prefer print and WHEN electronic*?' To explore our research question, "Under what circumstances do they read a text in in their less preferred format?" we analyzed the comments in Both, Depends, and Contradictory categories. 197 p-students' responses and 192 e-students responses were coded into these categories.

Among the p-students, we find comments such as:

- Depends on the course and content amount.
- There isn't really much difference.
- Some readings are better read in print while others are suited to electronic format.
- Electronic readings are very helpful and they save time and effort, but I still prefer my readings in print.
- I like to use both but I find it difficult to highlight important information when I am online.
- I would save more money (and my back) if it all was on my computer.
- I like to have both options. I retain more information if I read the material in print but I use the time spent in trains and buses to read and revise using electronic copies.

Students in this group are more open to using electronic format when considerations of time, convenience and cost override considerations of learning engagement and desired outcomes of a specific learning task. Their responses to the questions regarding impact on the length of the reading show more format flexibility than the e-students; 47% expressed a willingness to read short texts electronically if they were of less importance, relevance, and difficulty. Some p-students described concerns for ecological issues as well.

E-students also included comments showing the belief that print can be better under some circumstances and for specific purposes. The most prevalent example is the preference of print textbooks over e-textbooks as illustrated by

nearly 16% of the 76 students who commented on the statement "I prefer electronic textbooks." Typical comments included "I normally prefer electronic readings but textbooks are the exception." Another 17 responses to this statement were coded as Both or Depends. While this is the strongest example of when e-students would prefer print, other comments sprinkled throughout the survey indicate some flexibility and willingness to compromise.

For most e-students, the length of reading makes no difference on their preferred format. Only about 27% state conditions in which using print would be 'okay' such as specific types of reading (e.g. handouts or slides), if the digital format is difficult to read (e.g. a blurry pdf), or if it lacks learning engagement features (e.g. highlighting). Among this group are also students who state that shorter readings should be available in print and longer readings online.

4.   What patterns found among the responses can assist librarians and educators when deciding upon format policies?

Two findings among the demographics of these random sample populations are particularly noteworthy. There are an equal number of female and male e-students, whereas nearly 70% of the p-students are female. The latter percentage is representative of the gender distribution among the entire ARFIS population (Mizrachi, et.al 2018), indicating that males may be more prone to preferring electronic format than females. There is also an 11% difference between the numbers of undergraduates: 79.1% of p-students and 68.3% e-students, showing that electronic preference may be more evenly distributed among students of all academic ranks. Male respondents are overrepresented among graduate ranks, so the gender difference may appear because of academic level effects rather than any intrinsic gender differences related to learning or format preference. Additional study is recommended.

Analysis of the comments are consistent with earlier studies showing that students prefer print primarily because they believe print facilitates better learning engagement and outcomes with less detrimental physical effects such as eyestrain and headaches. Electronic format was preferred more for its perceived lower costs, greater accessibility, convenience, and environmental friendliness. Some p-students admit to compromising with electronic for the same reasons, and many demonstrate a willingness to read shorter texts online. We found it common for e-students to prefer electronic format for everything except textbooks.

In general, however, comments from p-students reflect a higher priority for optimal learning engagement and outcomes than convenience and cost. E-students did display enthusiasm for engaging with digital texts using the 'find,' 'search,' and other features not possible with print, but only a minority said they learn better with electronic, and many more stated that format does not make a

difference in their learning. Convenience appears to be the primary factor for their preference. One e-student stated, "If I can find it electronically I read it electronically. If I can't, I often don't read it."

We thus see a schism in which many students must consciously decide between better learning tools or better economics and convenience. These differences carry a potential impact on individual learning outcomes and disrupt efforts for equal educational opportunities. We do not know these students' socio-economic means, academic success levels as measured by course grades and assessments, nor personal circumstances outside of the classroom (e.g. employment, family obligations) that may also affect their behaviors. One student wrote that he/she does not have internet at home for example, and another stated that he/she has a smart phone, but no personal computer or laptop. These circumstances directly affected their format choices. While 21% of p-students noted visual impairments, approximately 10% specifically noted eyestrain, headaches, and other physiological reasons for preferring print over electronic. E-students were more likely to decry the effects of carrying heavy books all day. It thus appears possible that format preferences and behaviors are determined more by individual characteristics and conditions than broad technological or sociological factors.

Results from the research at this time therefore, cannot yet presume to offer general guidelines to librarians and educators seeking to determine collection and format policies. Individual institutions may need to look inward and explore their own their unique learning cultures and the specific characteristics of their student populations in order to determine which policies will serve them best. Landøy and Gastinger (2018) describe their progress in this direction by conducting focus groups and more in-depth surveys of their students and staff in Norway. MacGregor & Salaz (2019) in Qatar are studying the impact of focused training on using e-format learning engagement tools on students' format preferences. We must also consider results from the many studies investigating the effect of formats on learning and cognitive functions. How do we resolve possible discrepancies between a preferred format and a format which facilitates higher quality learning? Understanding our students' preferences and behaviors is just the start on this journey.

Country	n	Country	n	Country	n	Country	n
Australia	582	Germany	128	Mexico	23	South Africa	3230
Brazil	803	Hong Kong	1140	Moldovia	213	Switzerland	170
Bulgaria	237	Hungary	47	Norway	1063	Turkey	214
China	1165	Iceland	674	Peru	208	United Arab	130

						Emirates	
Croatia	232	Israel	135	Portugal	262	United Kingdom	696
Czech Rep	2984	Italy	1007	Qatar	105	United States	373
Estonia	1260	Latvia	1192	Romania	188		
Finland	681	Lebanon	132	Singapore	49		
France	1630	Lithuania	53	Slovenia	260	**Total n=**	**21,266**

Appendix 1: All country participants in the complete ARFIS project.

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