

The Academic Reading Format International Study (ARFIS): Investigating Students Around the World

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Abstract. This paper presents results from the Academic Reading Format International Study (ARFIS), the largest investigation of university students' behaviors and attitudes towards reading their academic texts on electronic screens and print. These questions are examined: 'When engaging with their academic material, do students' format preferences and behaviors vary across cultures?; How do their behaviors and attitudes compare among an international sample?; And how does the language of the reading impact format preferences?' Amalgamated results from nearly 10,000 students in 19 countries show a consistently strong preference for print format, and most respondents do not feel the language of the text impacts their format preference, but an examination of country responses helps illustrate the subtle differences between them. This topic has special relevance to librarians and educators as we search for the correct balance of print and electronic resources in our collections and syllabi.

Keywords: Print reading · Electronic reading · Academic reading · International studies · College students' readings

1 Introduction

Current discussions among many educators, administrators, policy makers, and the media often assume that digital technology will soon replace paper-based media in a historical progression from clay tablets and parchment. However, most studies of students' reading format preferences show that they still prefer print over digital for their

The original version of this chapter has been revised. After publication of the original paper it came to the authors' attention that the Chinese translation of question 10: "I prefer electronic textbooks over print textbooks," was inverted to read "I prefer print textbooks over electronic textbooks." Therefore, Figure 3 and the related discussions on pages 220–221 and 227, were incorrect. The erratum to this chapter is available at DOI: [10.1007/978-3-319-52162-6_72](https://doi.org/10.1007/978-3-319-52162-6_72)

academic readings. They believe their comprehension and retention of the subject matter are greater when they read their assignments in print, but generally like the convenience and accessibility of electronic.

This study investigates whether students' reading format preferences vary or maintain consistency across multi-national student populations. It presents results from the first round of the Academic Reading Format International Study (ARFIS 1) which includes responses from 9,279 graduate and undergraduate students in all fields of study from 19 countries on four continents. Researchers in over a dozen additional countries are currently collecting data for an expanded study (ARFIS 2) to be analyzed in 2017.

This study investigates the following research questions:

- When engaging with their academic material, do students' format preferences and behaviors vary across cultures?
- How do their behaviors and attitudes compare among an international sample?
- How does the language of the reading impact format preferences?

2 Review of the Literature

There are many studies in the literature on students' reading format preferences at individual institutions. This section reviews some of the international comparative studies, and the background to the current study.

Liu and Huang explored gender differences of format attitudes among Chinese students in their study of 203 graduate and undergraduates in various disciplines [1]. They found that both males and females preferred print, but females' print preference was much stronger – 73.2% to 51.3% respectively. They also found that both genders annotated their print documents much more often than electronic documents. They then compared their results to Liu's earlier study of American students [2] and found that while both cultural groups preferred print over electronic, the Americans' preference was more pronounced (89.4%), than the Chinese (64.5%) [1].

Content analysis was applied to essays produced by a sample of 24 graduate students at the University of Udine, Italy, on the advantages and disadvantages of reading and writing in print and electronically [3]. Students described several facets of paper's advantages: easier to focus, easier to annotate, produces less eyestrain, is more portable and allows "more freedom of movement and postures" [3, p. 47]. A major advantage of reading electronically is the ease of searching and locating specific terms and topics within the text. Overall, students reported that reading on paper is a much more multi-sensorial experience than reading electronically.

Aspects of Fortunati and Vincent's study [3] were replicated in Finland [4], Germany, and the United Kingdom [5] with very similar results. These studies do not look exclusively at academic reading but include a very broad definition and context for reading and writing. All authors suggest that format preference is dependent on the purpose of the specific task and therefore caution against adopting a "dichotomy of paper vs. screen or pen vs. keyboard" [5, p. 419]. Acknowledging this observation, the current study looks specifically at format preferences and behaviors when reading materials for *academic tasks*.

Linguistics Professor Naomi Baron has written extensively on the impact of modern technologies on reading and educational practices, most comprehensively in her book *Words onscreen: The fate of reading in a digital world* [6]. She reports results from her surveys of American students in 2010 and in 2013, and compares them to data collected on the attitudes of students in Japan and Germany. Across all samples she found preferences for reading in print when doing schoolwork, reading for pleasure, and reading long texts (academic and pleasure) [6, pp. 84–85]. When asked for their preferences if cost were not a factor, results showed an overwhelming preference for print among students in all three countries [6, p. 86]. When asked how likely they were to multi-task when reading digitally and in print, again, results showed tendencies for more effective focus when reading print [6, p. 88].

The current study is based on earlier research performed by Mizrachi. Her interviews of 41 UCLA students in 2009 revealed that most, if given a choice, preferred academic texts in print rather than online. They felt they could focus and learn better when reading in print, but they liked the convenience and often the lower cost of accessing the material electronically [7]. Five years later she created an online survey based on these findings to test whether attitudes had changed in light of more advanced technologies [8]. Nearly four hundred undergraduates at UCLA indicated that format preference could depend on specific contexts and circumstances, and they were more likely to prefer print when the reading was over five pages long, particularly complex, or important to the course. Students also showed a tendency to engage more actively with material in print format through their highlighting, note-taking, annotating, and reviewing behaviors. Overall, results again showed a very strong preference for reading academic texts in print rather than electronically.

3 Methodology

After Mizrachi presented her original study at ECIL 2014 there was a great interest in replicating it internationally. Mizrachi, Boustany, and Kurbanoglu, the study coordinators, slightly modified the original survey instrument to include seventeen five-point Likert-style statements on preferences and behaviors with the possible responses of Agree, Strongly Agree, Disagree, Strongly Disagree, and Neither Agree nor Disagree. There are also six demographic questions and a prompt for further comments. Researchers for the ARFIS team were recruited from an existing multinational network and professional contacts¹. Each researcher was responsible for the accuracy of their translated questionnaire and its local distribution. Qualified participants were recruited either through targeted or random emails depending on the institution. LimeSurvey, an online survey tool, was used to collect the data. To simplify analysis and preserve uniformity, all students' majors and fields of study were categorized according the Web of Science subject list². UCLA's Office of Human Research Protection Program reviewed and approved the research plan. This paper reports on the amalgamated results and compares country results – individual researchers may report their own country data

¹ <http://tinyurl.com/ARFISteam>.

² http://incites.isiknowledge.com/common/help/h_field_category_wos.html.

Table 1. The ARFIS sample distribution by country and research team members

Country	n	%	Contact researcher(s)	Institution(s)
Bulgaria	476	5.1	Tania Todorova	ULSIT, Sofia
China	1163	12.5	Pan Yantao; Jiuzhen Zhang	Sun Yat-Sen University; Peking University
Croatia	231	2.5	Daniela Živkovic	University of Zagreb
Finland	666	7.2	Terttu Kortelainen	Oulu University
France	1520	16.4	Joumana Boustany	Université Paris Descartes - IUT
Israel	134	1.4	Judit Bar-Ilan	Bar-Ilan University
Italy	876	9.4	Elena Collina	Università di Bolognà
Latvia	1186	12.8	Liga Krumina	Latvijas Universitate
Lebanon	125	1.3	Hanady Geagea	Lebanese University
Moldova	212	2.3	Silvia Ghinculov	Academy of Economic Studies
Norway	1007	10.9	Ane Landoy; Almuth Gasting	Bergen University; University of Science and Technology
Peru	204	2.2	Aurora de la Vega	Catholic University of Peru
Portugal	261	2.8	Ana Lúcia Terra	Oporto Polytechnic Institute
Romania	184	2.0	Angela Repanovici	Transylvania University
Slovenia	256	2.8	Polona Vilar	University of Ljubljana
Switzerland	156	1.7	René Schneider	Haute Ecole de Gestion
Turkey	212	2.3	Serap Kurbanoglu	Hacettepe University
UK	44	0.5	David Bawden	City University
US	366	3.9	Diane Mizrachi	University of California Los Angeles
Total	9,279	100.0		

as they wish. Table 1 lists all of the participant countries, their sample size and percentage, the contact researchers, and their institutions.

Most of the respondents were female ($n = 6248$; 70.1%), and though ages ranged from under 19 to over 40, more than half (55%) were 20–24 years old. Distribution of student status was fairly even among first through third year undergraduates (19.5, 19.1, and 18.3% respectively), with another 12.8% fourth year students, even though not all undergraduate programs include a fourth year. The sample also included 21.7% masters students, 5.6% doctoral students, and another three percent who listed ‘other.’ Social Science students were the largest grouping by major ($n = 5,061$, 54.5%). About a third of the respondents were science students ($n = 2,929$, 31.6%), and 13.9% were arts and humanities or other.

4 Results

Statements on this questionnaire are in random order and cover four categories: Format preferences (eight questions); Learning engagement (five questions); Language impact (three questions); and Devices used for e-reading (one question). Below are the amalgamated results and country answers. Chi-squared tests were performed on each question by the country variable and indicated the possibility of an association between country and many of the results. However, the ratio of sample sizes to total student populations must be taken into account before generalizations can be made, and these analyses will be done later. For the sake of space, we are illustrating selected descriptive highlights and have collapsed responses into three categories: Disagree/Strongly disagree, Agree/Strongly agree, and Neither Agree or Disagree.

4.1 Devices Used for E-Reading

Question 16 of the survey asked students to mark all of the devices they use for reading their electronic course material, and laptop computers ($n = 7441$, 80.2%) was the most common response. This preference was true across all countries. It was followed by mobile phones ($n = 3535$, 38.1%), desktop computers ($n = 2900$, 31.3%), iPads/tablets ($n = 2605$, 28.1%), e-readers ($n = 699$, 7.4%), and audio application ($n = 203$, 2.2%). Three hundred eighty-nine respondents (4.2%) stated they do not read course material electronically. Table 2 displays the ranges by percentage of individual country samples. For example, even though students in all countries reported using laptops more than any other device for reading their e-course material, students in the United States showed the highest percentage of laptop use, Moldova the lowest percentage, and all other participant countries fell in between.

Table 2. Electronic reading devices (ranges in percent)

Device	Highest (Country) %	Lowest (Country) %	Median %
Laptop	89.3 (U.S.)	59.4 (Moldova)	81.8 (Croatia)
Phone	73.9 (China)	21.3 (Norway)	36.0 (Finland)
Desktop	53.9 (Moldova)	16.1 (U.S.)	32.7 (Latvia)
i-Pad/Tablet	50.0 (U.K.)	14.8 (Slovenia)	27.0 (U.S.)
E-reader	23.7 (China)	2.6 (Finland)	5.6 (Croatia)
w/Audio	7.7 (China)	0.0 (Portugal, Switzerland, U.K.)	1.05
Don't read e-format	10.1 (France)	0.0 (U.K.)	3.8 (U.S.)

4.2 Format Preferences

Questions 3 and 13 specifically ask about format preference for course readings. Amalgamated results for both show that approximately two-thirds of all the students prefer their material in print over electronic. Country responses show less uniformity; for example, only 44.5% of the Finish students agreed/strongly agreed they preferred print for all their course material and 40.4% disagreed/strongly disagreed. In the radial graphs

below, countries are listed clockwise in alphabetical order, and their results are graphed along the concentric circles which represent a percentage range from 0–100. Comparisons among country results for the same responses can be gleaned by following the circumferences. The radial graphs also allow comparisons of opposing responses (Agree/Strongly agree and Disagree/Strongly disagree). Figures 1 and 2 below list amalgamated results on the left side, and the radials illustrate country responses by percentage for Question 3 (I prefer to have all my course materials in print format), and 13 (I prefer to read my course readings electronically).

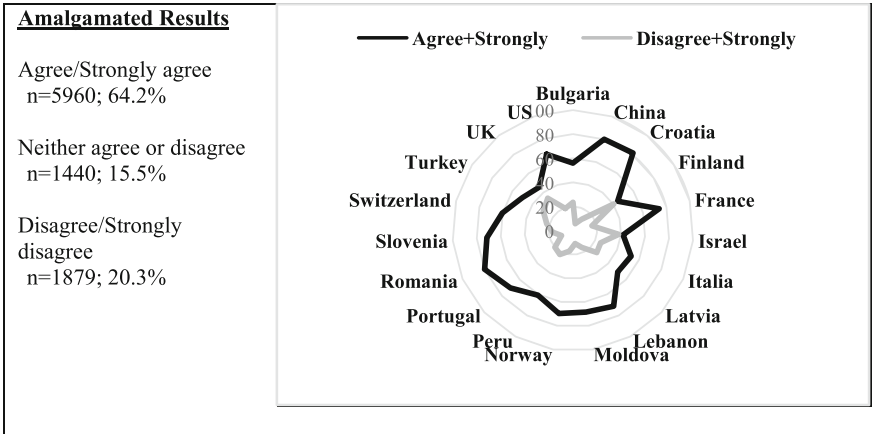


Fig. 1. I prefer to have all my course materials in print format

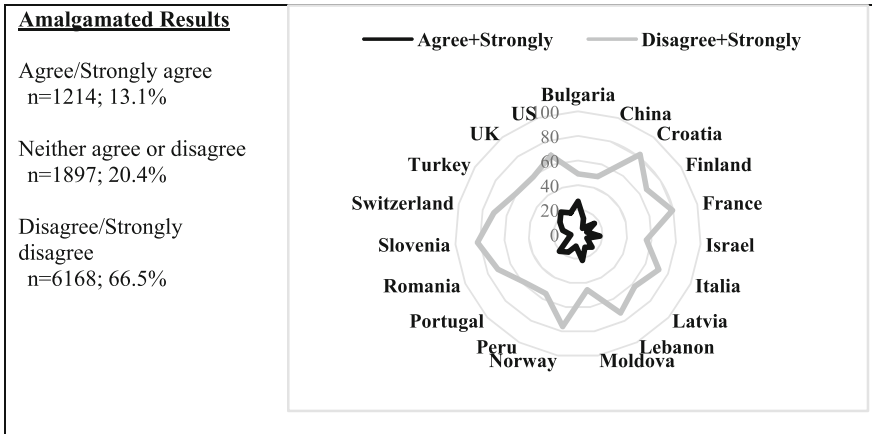


Fig. 2. I prefer to read my course readings electronically

Electronic textbooks. With more libraries investing in electronic textbooks, it is important to understand our students’ attitudes towards using them. Overall, nearly 69%

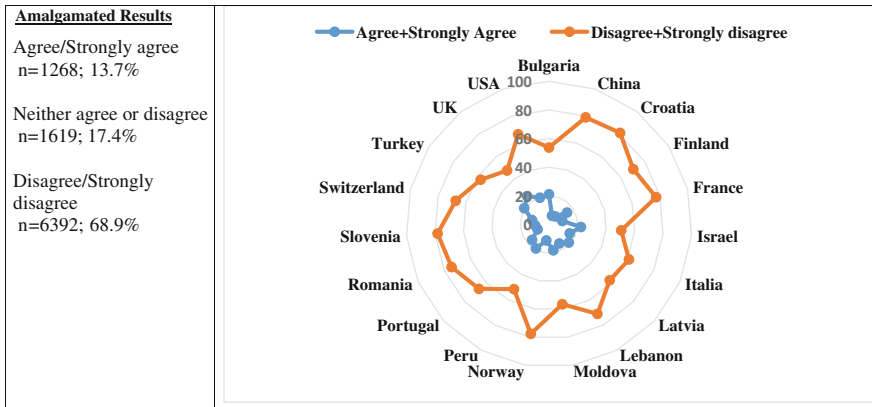


Fig. 3. I prefer electronic textbooks over print textbooks

of the students disagreed with preferring e-textbooks. Figure 3 shows amalgamated results and country percentages for Question 10.

Printing Out Readings; Digitizing Material. Printing out material for reading rather than reading them on screen adds another step, and possibly an expense to the studying process, but 68.9% of the students agreed that they prefer to do so, very close to the 67.1% median of country responses. Figure 4 show amalgamated results and country percentages for this question.

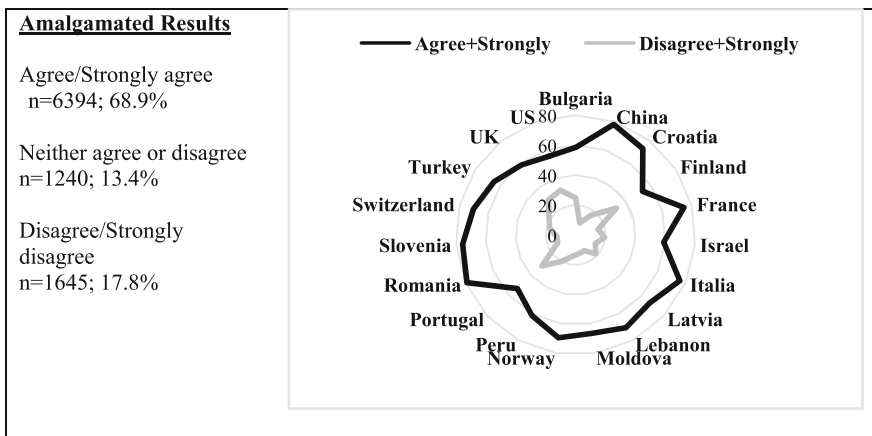


Fig. 4. I prefer to print out my course readings rather than read them electronically

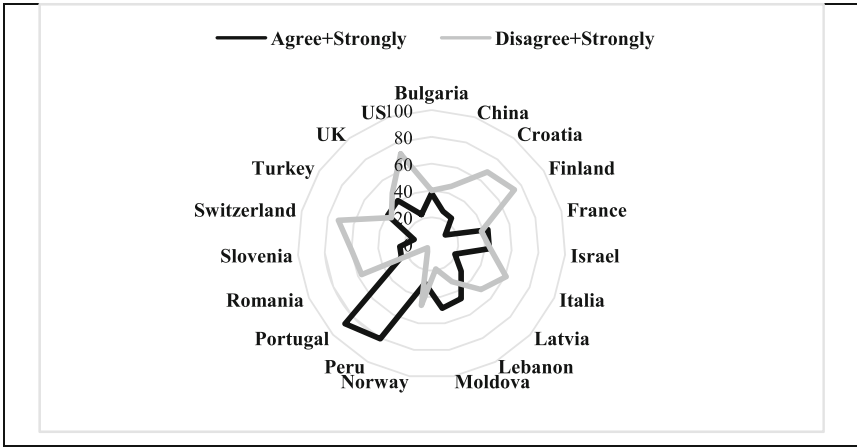
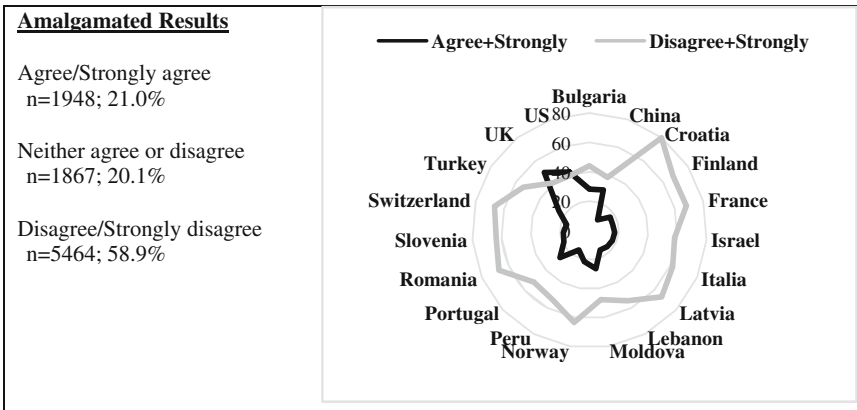


Fig. 5. I like to make digital copies of my printed course materials.

Students may digitize material for reading or archival purposes. Amalgamated responses to this inquiry were the most evenly distributed of any question: 31.9% agreed/strongly agreed; 47.8% disagreed/strongly disagreed; and 20.3% replied neither. Figure 5 displays answer percentages by country to Question 6.

Convenience. Students in many studies comment on how much more convenient it is for them to access and read their academic material on their electronic devices. However, most of the respondents to this survey disagreed/strongly disagreed with this statement. As seen in Fig. 6, all country responses were under 50% except for the U.K., and the Chinese students’ replies were fairly even.



Amalgamated Results

- Agree/Strongly agree
n=1948; 21.0%
- Neither agree or disagree
n=1867; 20.1%
- Disagree/Strongly disagree
n=5464; 58.9%

Fig. 6. It is more convenient to read my assigned readings electronically than on print.

Impact of Length on Format Preference. Based on comments from students in earlier studies who stated that their format preference depended on the length of the reading, Questions 4 and 8 sought to quantify this idea. As shown below in Figs. 7 and 8, most students prefer print when the material is seven pages or more (63%), but students do not show preference for e-format when material is under seven pages either.

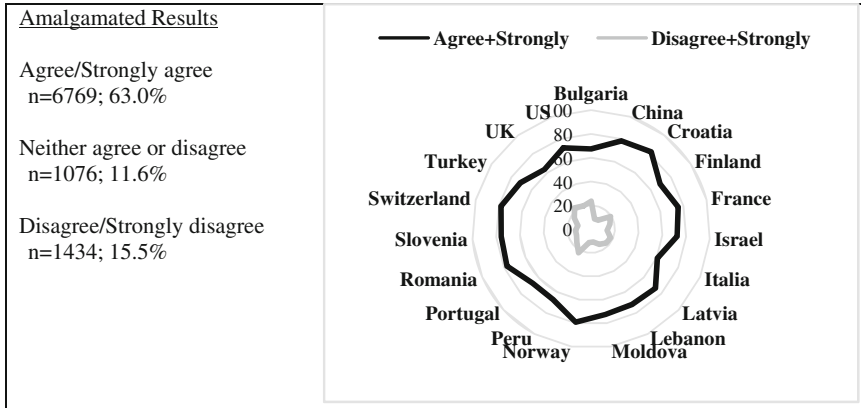


Fig. 7. If an assigned reading is 7 pages or more, I prefer to read it in print

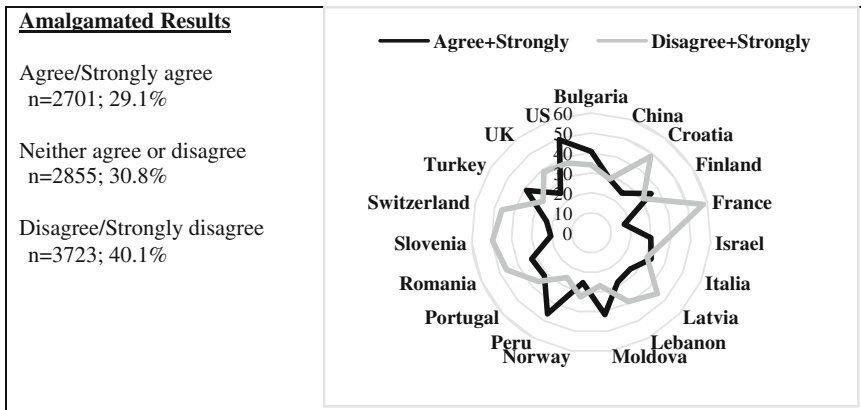


Fig. 8. If an assigned reading is less than 7 pages, I prefer to read it electronically

4.3 Learning Engagement

Five questions asked students about the degree of their learning engagement and learning behaviors in electronic and print formats. Responses to Question 12 overwhelmingly show that students feel they can focus best using print material (81.5%, median country score 80.4%). Over 70% also believe they remember material best in print (median country score 74.4%). Highlighting and notating are important learning engagement

behaviors and 83.1% agreed that they do so with print material, but only 24.7% agreed that they highlight and notate their electronic readings. Over 70% of the students agreed that they are more likely to review material in print than e-format. Figures 9, 10, 11, 12 and 13 show results of the learning engagement questions and percentages of country responses.

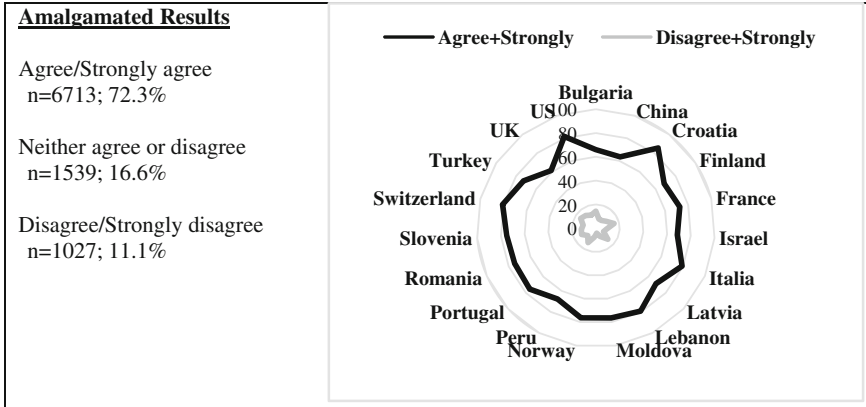


Fig. 9. I remember information best when I read course readings from printed pages.

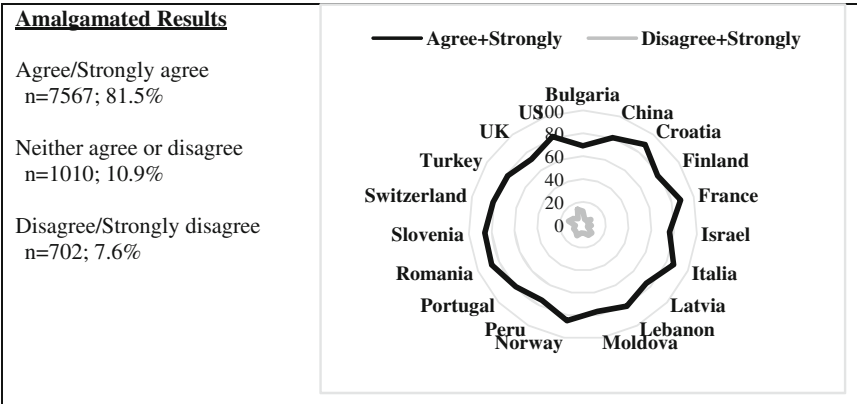


Fig. 10. I can focus on the material better when I read it in print

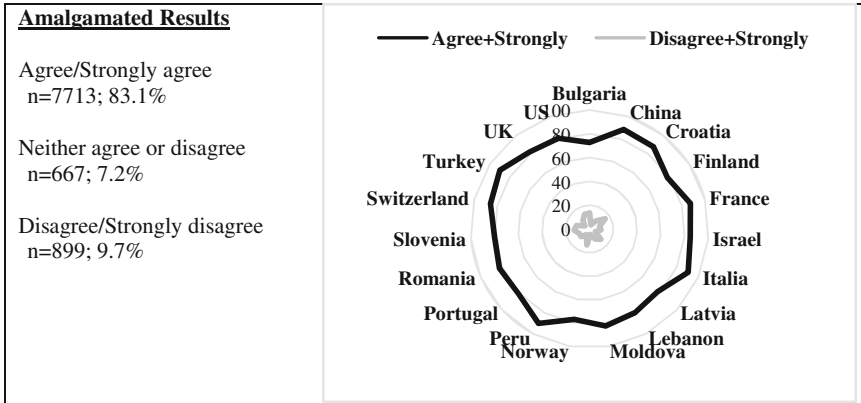


Fig. 11. I usually highlight and notate my printed course readings

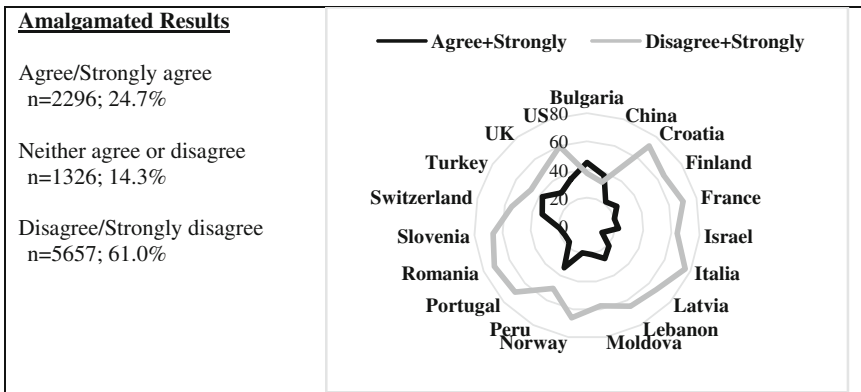


Fig. 12. I usually highlight and annotate my electronic readings

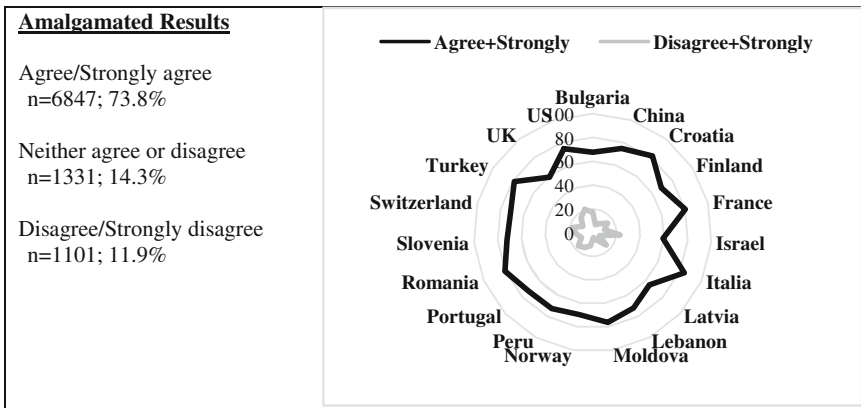


Fig. 13. I am more likely to review my course readings when they are in print

4.4 Impact of Language

Course readings in many countries and institutions are not always in the language of instruction or the students’ native language. Three questions sought to discover if the language of the material impacted students’ format choice. Responses to Questions 14 and 15 (*I prefer to read course readings which are in my native language electronically rather than print; I prefer reading foreign language material in print than electronic*) indicate that students prefer print for their native language, but this may just be a reflection of their overall print preference, not an indicator of language impact. Question 17 inquires specifically about language impact and results show that for most students (57.3%), the language of the material does not impact their format preference. These questions were not included in the original U.S. survey, therefore there are no U.S. data and the total sample here is n = 8913. Figure 14 displays amalgamated results and country percentages for Question 17.

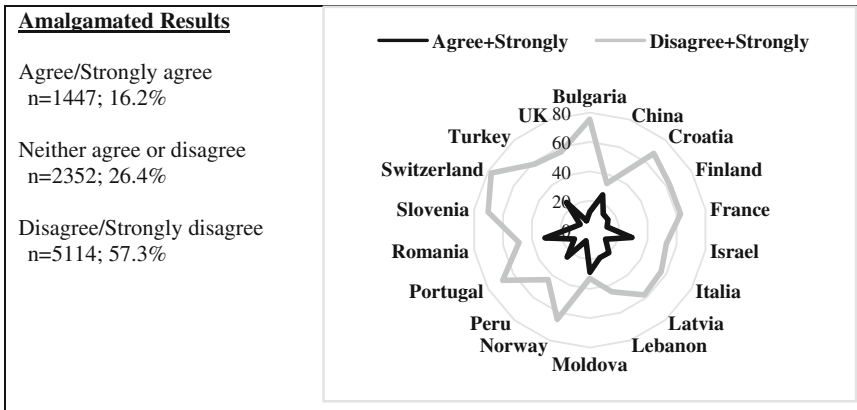


Fig. 14. My preferred reading format depends on the language of the reading

5 Discussion

This international study is currently the most expansive performed on college and university students’ reading format preferences and behaviors. Nearly 10,000 students in 19 countries responded to the survey, and the amalgamated results indicate a *general preference for print*. Results of the learning engagement inquiries show particular agreement that print format is more conducive for focusing and remembering material, and students across the globe are more likely to engage in their print material through highlighting, notating, and reviewing. It also appears that the language of the reading does not impact students’ format preferences. More students in this international sample use laptops for reading digital material than any other device, with a difference of only 7.5% points between the country with the highest response and the median. Phones and desktops are also commonly used, but the disparity is much more pronounced. When students are asked about their preference for reading in print or e-format, there is general

agreement for print preference. This includes textbooks as seen by the majority of responses by students in all countries to this inquiry. Most students in all countries also agree that they would rather read an assignment of seven pages or more in print.

Academic libraries and educators everywhere face the question of how, and how much, to integrate electronic resources into their collections and syllabi. Results from this study show that even though students in general prefer print for their academic readings, the degree to which e-readings should be utilized can vary among countries. Thus policy decisions should be based on data collected at the country or institution level in order to distinguish these variances and nuanced differences.

The data generated from this study provides an abundance of opportunities to explore further the commonalities and varieties among students' attitudes and behaviors. This paper highlights the general trends from the findings and answers the research questions, but more revelations will become available as statistical analysis is continued. Incorporating the data analysis from ARFIS 2, the second stage of this study, with a number of additional countries, will further the depth of our understanding of this phenomenon.

References

1. Liu, Z., Huang, X.: Gender differences in the online reading environment. *J. Documentation* **64**(4), 616–626 (2008)
2. Liu, Z.: Print vs. electronic resources: a study of user perceptions, preferences, and use. *Inf. Process. Manage.* **42**, 583–592 (2006)
3. Fortunati, L., Vincent, J.: Sociological insights on the comparison of writing/reading on paper with writing/reading digitally. *J. Telematics Inform.* **31**(1), 39–51 (2014)
4. Taipale, S.: Bodily dimensions of reading and writing practices on paper and digitally. *J. Telematics Inform.* **32**, 766–775 (2015)
5. Farinosi, M., Lim, C., Roll, J.: Book or screen, pen or keyboard? A cross-cultural sociological analysis of writing and reading habits basing on Germany, Italy and the UK. *J. Telematics Inform.* **33**, 410–421 (2016)
6. Baron, N.: *Words Onscreen: The Fate of Reading in a Digital World*. Oxford University Press, New York (2015)
7. Mizrachi, D.: Undergraduates' academic information and library behaviors: preliminary results. *J. Ref. Serv. Rev.* **38**(4), 571–580 (2010)
8. Mizrachi, D.: Undergraduates' academic reading format preferences and behaviors. *J. Acad. Librarianship* **41**, 301–311 (2015)