

## Reading on Screens versus Print: A Study of Cognitive Load and Focus Span at MS (Postgraduate) Level

**Saba Ashraf**

*MS Scholar, Department of English, University of Sialkot, Punjab, Pakistan*

*Email ID: [sabaashrafsh19@gmail.com](mailto:sabaashrafsh19@gmail.com)*

**Ahmed Mashail**

*MS Scholar, Department of English, University of Sialkot, Punjab, Pakistan*

*Email ID: [ahmedmeshail27@gmail.com](mailto:ahmedmeshail27@gmail.com)*

**Muhammad Sabbor Hussain**

*Professor, Department of English, University of Sialkot, Punjab, Pakistan*

*Email: [dr.muhammadsabboorhussain@uskt.edu.pk](mailto:dr.muhammadsabboorhussain@uskt.edu.pk)*

### **Keywords**

*Screen vs Print reading, MS, Postgraduate, Digital literacy, Intrinsic, Extrinsic, Germane load, Pakistan*

### **Abstract**

*In the era of digitalization, a rapid and significant shift has been observed among postgraduate students in academic reading. Instead of relying on traditional reading habits, students are increasingly using digital devices for convenient online reading because study materials are unavailable or inaccessible. This study specifically highlights the persistent cognitive load among students, including Intrinsic, Extrinsic, and Germane load, in MS Humanities at the University of Sialkot. In the initial phase of this research, the researchers used a quantitative descriptive survey design to collect data from postgraduate students through a closed-ended questionnaire. This study finds that in Sialkot, MS students at the postgraduate level experience greater cognitive load while reading on screens. Therefore, based on these findings, the study suggests that academia should design pedagogical strategies that balance digital accessibility with print-based deep reading techniques to reduce cognitive load and support further improvement.*

## **1. INTRODUCTION**

### **1.1 Background of the Study**

In the modern academic landscape, the rapid digitalization of academic resources has significantly transformed reading practices in higher education. Postgraduate pupils, in particular, rely on digital devices such as mobile phones, tablets, and laptops for reading. Pupils find it convenient to read on screens rather than print because it is easier to carry a smartphone than heavy books. It also provides a broader range of textual availability, but increasing concerns have been raised about its impact on cognitive load and focus span. (Singer & Alexander, 2017). Print, on the other hand, is often associated with deeper engagement and reduced cognitive strain, despite its limitations and the discomfort of carrying it. Therefore, it is important to grasp the influences of these two approaches on postgraduate academic reading.

## 1.2 Scope and Significance of the Study

This study focuses on MS-level postgraduate students to examine how reading on-screen versus in print affects cognitive load and focus span. Due to the large extent of this area, this study is the initial phase of understanding the strain on students' cognition, with a boundary condition that narrows the scope to a single university's postgraduate cohort. The significance of this study lies in the importance of choosing the right medium in postgraduate studies. As universities switch to digital materials, it is important to understand the long-term effects of screen reading on human cognition and focus span. The purpose of this study is to provide valuable insights to help universities design curricula in the digital age by using appropriate resources to reduce students' cognitive load.

## 1.3 Statement of Problem

In academic settings, minimal attention has been paid to the impact of screen-based reading on cognitive load and sustained attention span among postgraduate students. In this area, existing research has focused on comparing screen and print reading modes but has not addressed cognitive load as a central factor. In the Pakistani context, recent studies have focused solely on elementary school learners to assess their screen exposure during academic reading. Therefore, the lack of focused research reveals a clear gap in the literature and highlights the urgent need to examine the impact of cognitive load on MS postgraduate students, as postgraduates are the most affected in Pakistan due to limited resources.

## 1.4 Aim and Objectives of the Study

The primary aim of this study is to compare cognitive load and sustained focus between screen-based and print-based academic reading among MS-level postgraduate students. In an era in which digital technologies are continually replacing traditional print media in higher education, it is crucial to understand and highlight how different reading media influence students' cognitive engagement and reading efficiency.

To achieve the aim, the study is guided by several interrelated objectives. Firstly, it seeks to identify the dominant reading modes being used by MS students in their academic journeys. In addition, it explores the reasons students choose between screen and print reading, including convenience, familiarity, preference, and perceived effectiveness. Furthermore, the study examines the duration of focus students can maintain during academic reading tasks, separately for print and screen reading. Finally, it compares the extent of cognitive load experienced by screen- and print-based readers to highlight differences between the two modes. These objectives provide a structured framework for understanding how the reading medium affects students' postgraduate academic journey. This study at the University of Sialkot will provide valuable insights for educators and institutions in Pakistani universities, specifically in Punjab, to design more effective academic resource strategies.

## 1.5 Research Questions

1. Which mode of academic reading is dominantly used by postgraduate students?
2. Based on what factors do students choose to screen or print reading?
3. How long can postgraduate students maintain their focus on their chosen medium?
4. Which of the two modes is producing a higher cognitive load?

## 1.6 Limitations and Delimitation of the Study

### Limitations

Despite its significance, this study has certain limitations. Data collection relies solely on self-reported responses, and the research is conducted within a single university context. Therefore, the findings may not generalize to all MS students in Punjab.

### Delimitation

This study is delimited to MS-level postgraduate students with the same educational background who are studying at the University of Sialkot. By setting this boundary, the study maintains a clear scope, enabling more precise analysis and interpretation.

## 2. LITERATURE REVIEW

All across the world, digital reading has become a dominant academic practice. Nowadays, students are relying more on screen reading due to accessibility, availability, and convenience. This shift from traditional to modern approaches has raised concerns about their impact on students' reading habits and cognitive load, including Intrinsic, Extraneous, and Germane loads.

### 2.1 Recent Studies

In the emerging fields of digital platforms, researchers are gradually examining how reading on screens compares with traditional print in terms of learning outcomes. A lot of research has been conducted on differences between print and screen reading, but not particularly on cognitive load as a whole.

- **MYrberg & Wiberg (2015)** conducted research comparing screen and paper reading, highlighting that while digital reading provides convenience and accessibility, it also encourages skimming and superficial reading, leading to weaker comprehension and less deep reading than with paper reading.
- **Taky-eddine and Madaoui (2022)** investigated Moroccan EFL university students' attitudes toward reading on-screen versus in print using a descriptive survey design. The study presents findings that students' shift toward onscreen reading is increasing rapidly and that their attitudes toward it are positive. As a result, Moroccan university English department students are increasingly replacing classical reading with digital reading, especially when reading short texts such as poems, news, academic articles, and short stories. "Overall, this study revealed five positive and negative factors affecting students' attitudes toward onscreen and print reading. These include practical factors, psychological factors, economic factors, cognitive factors, and health factors" (Taky-eddine & Madaoui, 2022).
- **Konukati (2025)**, in his study, explored the differences between digital and print reading. He found that digital reading improves accessibility but reduces deep comprehension and leads to lower retention compared to traditional print reading. "Findings indicate that while digital reading enhances accessibility and convenience, it may lead to reduced deep reading and lower retention rates due to screen fatigue, cognitive overload, and the tendency for skimming rather than in-depth reading" (Konukati, 2025).
- Another study, conducted by **Belhida et al. (2025)**, examines the shift from digital to print reading and its effects on students' performance in literature courses. The study utilized a quasi-experimental quantitative research design and conducted pre- and post-tests to



evaluate the significance of differences in academic outcomes before and after exposure to both (Belhida et al., 2025).

- **Jan, Ambreen, and Abbas (2024)** conducted a specific study on germane cognitive load exploring how the format of instructional materials—printed versus digital—affects the germane cognitive load of elementary-level students learning General Science. Germane cognitive load refers to the mental effort directed toward meaningful learning and schema construction (Jan, Ambreen, & Abbas, 2024). This study has explained the single aspect of cognitive load – Germane – among elementary-level students in Pakistan.
- Another study conducted in the Pakistani context, comparing screen vs. print reading, highlights the uses and effects of e-resources among graduate students from five departments of the Faculty of Economics and Management Sciences at the University of the Punjab, Lahore, Pakistan (**Qutab & Iqbal, 2017**). Researchers have examined graduate students' screen-reading habits and use of e-resources among postgraduate students enrolled in the Faculty of Economics and Management Sciences. The research findings highlight that while students increasingly rely on e-resources for academic purposes due to accessibility and convenience, many still report issues such as eye strain, reduced concentration, and difficulties with deep reading compared to print (Qutab & Iqbal, 2017).

Overall, the literature above provides an extensive study of the differences between print and screen reading. However, there remains a dearth of examination of both mediums (print vs screen) regarding Cognitive Load Theory as a whole, including all the loads – Intrinsic, Extraneous, and Germane - specifically among MS Humanities' Postgraduate students studying at the University of Sialkot.

## 2.2 Research Gaps

This research is conducted for MS students in the Humanities departments (English literature, Linguistics, Urdu, and Islamic studies) at the University of Sialkot who experience cognitive overload when reading on screens. In contrast, the existing literature addresses only differences, impacts, effects, eye-tracking, and mental and physical fatigue, as well as social, economic, and health factors related to screen and print reading. In Pakistan, only a single study examined ESL levels among school students, focusing on a single aspect of Germane Cognitive Load (CLT) while ignoring intrinsic and extrinsic loads. Therefore, this study highlights a significant research gap in Pakistani higher education regarding the thorough application of Cognitive Load Theory (CLT) among MS Postgraduate Humanities students at the University of Sialkot.

### 2.2.1 Methodological Gaps

Although the above-mentioned literature employs quasi-experimental, non-experimental, and descriptive survey designs, a significant methodological gap persists in the triangulation of specific CLT loads, distinguished as Intrinsic, Extraneous, and Germane, using a specialized survey instrument. The existing studies also lack the statistical rigour provided by a Post-positivist Quantitative Approach. In a nutshell, this study provides a standardized framework by using a structured Likert-scale model administered via Google Forms to a specific population of MS Humanities students at the University of Sialkot.

### 2.2.2 Conceptual Gaps

Cognitive Load Theory (Sweller, 1988) has been widely applied to traditional learning worldwide. But not explicitly in a higher-order academic context at the MS level in Pakistan. This study

addresses a gap in the application of higher-order academic reading habits among postgraduate students in South Asian contexts, specifically at the University of Sialkot.

### **2.3 Theoretical Framework**

This study is purely grounded in Cognitive Load Theory (CLT), developed by John Sweller in the late 1980s. Cognitive load theory suggests that the format of information presentation can affect learners' cognitive processing and learning outcomes (Sweller, 1988). "According to Sweller et al. (2011), cognitive load is categorized into three distinct types: intrinsic load, which relates to the complexity of the material; extraneous load, created by the way information is presented (such as on a screen); and germane load, which refers to the mental effort required for deep learning and schema construction." It provides a theoretical framework for understanding why screen reading often results in lower comprehension scores and higher cognitive load than traditional print reading among postgraduate students. In these searches, intrinsic, extraneous, and germane loads are assessed by incorporating variables to test reliability and validity using construct validity (Creswell, 2014).

### **2.4 Conceptual Framework**

The research paradigm of this conceptual framework is Postpositivism. "Postpositivism holds a deterministic philosophy in which cause determines outcomes" (Creswell, 2014). Creswell (2014) further emphasizes the importance of aligning data collection tools with the postpositivist paradigm. This conceptual framework ensures that, in this research, the researchers remain grounded in a solid theoretical framework while remaining flexible and objective throughout the empirical and evidence-based statistical analysis.

### **2.5 Analytical Framework**

The analytical framework for this study was Descriptive Statistics to evaluate cognitive load in relation to the reading mediums. It followed the following approaches:

#### **Variable Determination**

The reading medium (screen vs print) was the independent variable, and the dependent variable was cognitive load, comprising Intrinsic, Extraneous, and Germane components.

#### **Descriptive Analysis**

A frequency distribution was used to determine the reading mode (RQ1), and the factors for the chosen medium (RQ2) were analyzed using percentages. Moreover, the focus span in the chosen reading mode was determined by the standard deviation. Likert-scale items for determining cognitive load were calculated by mean and standard deviation. (RQ4)

#### **Comparative Analysis**

To address the central hypothesis, the mean scores of screen and print readers were compared, enabling the researcher to assess cognitive load for each group.

#### **Thematic Analysis of CLT**

The results were mapped back to Sweller's Cognitive Load Theory to interpret the relationship between the reported decrease in sustained focus and the high extraneous load.

## **3. RESEARCH METHODOLOGY**

### **3.1 Research Design**

A Quantitative Descriptive Survey Design was used in this study to examine patterns and relationships among the study variables systematically. Using a survey approach, data are efficiently collected from MS-level postgraduate students on their academic reading modes and

perceived cognitive load. Moreover, the objective measurement and statistical analysis were enabled by the design's quantitative nature, which supports the clarity, consistency, and transparency of the findings. Overall, this research design provides a structured and reliable framework for addressing the research objectives in an objective and generalizable manner.

### **3.2 Research Instruments (Tools and Items)**

An Online Google Form questionnaire was spread among the MS students of Humanities, including:

- Reading mode (screen/print)
- Reason for choice (preference/availability)
- Focus duration categories
- Cognitive load Likert-scale items

A pilot study was conducted to ensure the credibility of the research. (Creswell, 2014).

### **3.3 Population and Sampling**

#### **Population**

The study was conducted among MS Postgraduate students at the University of Sialkot. The participants in the study were MS students from various Humanities departments at the University of Sialkot.

#### **Sampling**

The study employed a Simple Random Sampling technique to ensure that every member of the MS Humanities had an equal chance of selection. Due to the small number of qualified students enrolled in the program, the population size was limited. The simple random method minimizes selection bias and enhances the statistical power of the results, even within a specific institutional population (Acharya et al., 2013).

### **3.4 Data Collection Procedure**

To collect data, a quantitative data collection tool was used. Specifically, the Google Form questionnaire was distributed online, and responses were collected digitally from our selected population. Hence, all the data were collected systematically and statistically.

### **3.5 Ethical Consideration**

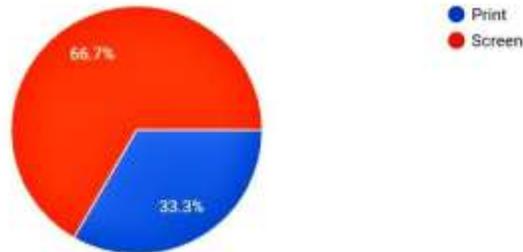
Ethical considerations were also of top priority before and during data collection. In addition, institutional consent and approval were obtained prior to data collection. Students were also informed about our objectives and the purpose of the research. Validity was ensured.

## **4. DATA ANALYSIS AND FINDINGS**

In this study, the data were analyzed using a Quantitative Descriptive Statistical Design. The data were collected from more than 50 MS students in Humanities at the University of Sialkot. The Google Form was distributed to USKT students using a closed-ended questionnaire to collect numerical data. The data were categorized as screen versus print reading, and charts, percentages, and diagrams were used to present the statistical results, accompanied by an elaborate description.

### 4.1 Screen vs. Print Readers

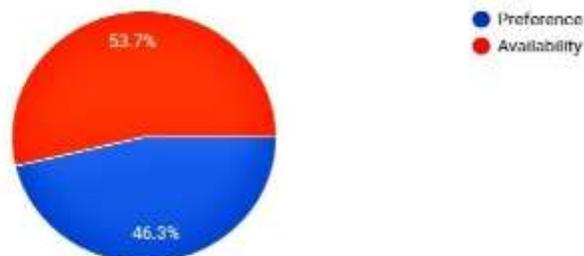
For your MS exams (mid or final), on which medium do you usually study?  
54 responses



The students were asked which medium they most often use for academic reading, and 66.7% said they read on screens, while the remaining 33.3% read in print. Of 54 students, 36 reported reading primarily on screens, highlighting the shift in reading mode among Gen Z MS scholars in the current era. A closed-ended question also asked for the reason, and the answers were quite interesting.

### 4.2 Reason for Choosing Their Usual Reading Mode

What is the reason of your choice?  
54 responses



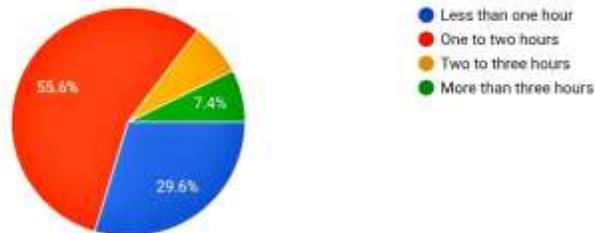
Now, when the students were asked about the reason for their choice, 53.7% said that they chose screen/print because of the availability of reading materials. The rest, 46.3%, said they preferred reading on-screen or in print. Now, these statistics were vague and unclear because we could not tell whether the screen readers chose availability or the print readers. To overcome this problem, we categorized the entire dataset into two major groups: Print Readers and Screen Readers. 66% of print readers said they read print because of their preference, and the remaining 33% said they choose print because of availability.

On the other hand, in the second category, Screen Readers, 64% said that they choose to read on screens because the material is available in soft form. Moreover, only 36% prefer reading on screen. Now, this clearly shows that most screen readers were forced to read on screens due to availability concerns, whereas most print readers prefer print. So, the answer to the research question was that the screen readers are larger, but they generally do not have a choice. However, researchers still needed to assess the cognitive load, and to that end they first asked about their focus span.

### 4.3 Focus Span

How long can you keep your focus before taking a break?

54 responses



Researchers asked readers about their focus span and how long they can maintain focus on their chosen medium without taking a break. Most of them answered (about 55%) between one and two hours; others, 29.6%, said less than an hour; and the rest, more than two hours. Again, it was a general response, and researchers needed to analyze these responses according to their category (screen/print). So, first, researchers skipped the normal one-to-two-hour category and categorized readers as having either a short focus span (less than an hour) or a long focus span (more than two hours).

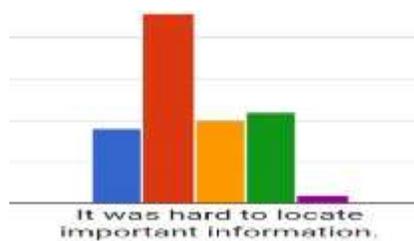
As a result, 31% of screen readers and 28% of print readers could not maintain their focus for an hour without taking a break. On the other hand, 17% of screen readers and 11% of print readers can maintain their focus for more than two hours, and even three. These findings were interesting, but the researchers had already assumed this might happen, as most of the MS scholars were employed. It was natural that their focus span was reduced due to handling jobs and studies simultaneously.

### 4.4 Cognitive Load

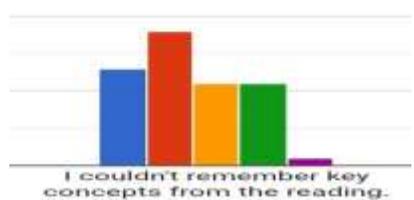
In the final step of data collection and analysis, after calculating the focus span for both categories, the next step was to analyze their cognitive load. Using Sweller's Cognitive Load Theory as the framework for this research, the researchers decided to collect data via a Likert Scale. Researchers created various questions about all aspects of cognitive load, including Extraneous, germane, and intrinsic, and developed a Likert Scale for students to complete. The students were given marks based on their answers, and those marks were interpreted as high or low cognitive load. High marks (above 15 out of 25) indicated low cognitive load, whereas low marks (below 15 out of 25) indicated high cognitive load. The results are as follows,



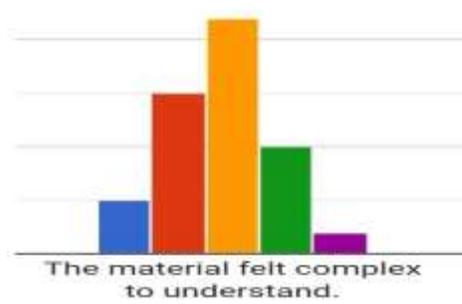
EXTRANEOUS



GERMANE



INTRINSIC



The Screen Readers and Print Readers were analyzed separately. After calculating their total marks, it was observed that 61% of Print Readers reported low cognitive load, whereas 69% of Screen Readers reported higher cognitive load. In a nutshell, it is a clear indication that screen reading causes mental stress, especially in academic reading.

## 5. DISCUSSION AND SUGGESTIONS

### 5.1 Findings

The findings of this study indicate that more students prefer screen reading to print reading. Screen reading was chosen mainly for its convenience and the availability of digital resources. On the other hand, print reading was chosen primarily for personal preference, reflecting a traditional comfort. However, 60% of both groups struggled to maintain focus for more than 1 hour, primarily due to busywork routines. Consequently, screen readers reported a higher cognitive load, suggesting that digital reading imposes greater mental effort. These results align with John Sweller's Cognitive Load Theory, which suggests that the increased visual and navigational demands of prolonged screen use raise extraneous cognitive load (Sweller, 1988). Therefore, readers experience greater mental effort to maintain focus and understand information effectively. These findings suggest that certain steps should be taken to ensure the educational journey is free of any mental stress. Overall, universities at the MS level need to design more effective

pedagogical strategies for students and ensure that they have access to print sources for quality learning.

## 5.2 Implication and Conclusion

In a nutshell, these findings provide important insights into how postgraduate students respond to their chosen mediums. While digital reading enhances accessibility, print reading supports more effective cognitive engagement. Therefore, educators and policymakers must consider these cognitive demands and ensure a balanced approach that supports both digital comfort and cognitive well-being. In this case, faculty departments should also collaborate with higher education to ensure the easy availability of printed academic materials for MS postgraduate students.

## 5.3 Future Recommendation

In light of the above findings, future researchers can expand their research by using longitudinal approaches and examining diverse populations to generalize their results.

## REFERENCE

1. Belhida, B. J., Mosqueda, A. R. Z., Anoba, R. A., Camilo, R. S., Montañez, M. C. A., & Cutillas, A. L. (2025). Comparing the impact of printed versus digital reading materials on student performance in literature courses: A quantitative study. *ICRRd Quality Index Research Journal*, 6(3), 131–145.
2. Ben-Yehudah, G., & Eshet, Y. (2020). Print versus digital reading comprehension tests: Does the congruency of study and test medium matter? *British Journal of Educational Technology*, 51(6), 2135–2149.
3. Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.
4. Dixon, T. (2023, January 30). Screen vs. print reading: Which one is better? *Themantic Education*. [www.themantic-education.com](http://www.themantic-education.com)
5. Jan, A., Ambreen, M., & Abbas, Q. (2024). Effect of printed and digital instructional materials on the germane cognitive load of students in general science at the elementary level. *Global Regional Review*, 9(1), 15–24.
6. Konukati, P. (2025). The impact of digital reading on comprehension and retention: A comparative study. *International Journal of English Research*, 11(1), 23–26.
7. Larhmaid, M. (2018). The impact of print vs. digital resources on Moroccan university students' reading habits, uses, and preferences [Paper presentation]. Faculty of Education, Mohammed V University, Rabat, Morocco.
8. Mangen, A., Walgermo, B. R., & Brønnick, K. (2013). Reading linear texts on paper versus computer screen: Effects on reading comprehension. *International Journal of Educational Research*, 58, 23–35.
9. Mangen, A., Walgermo, B. R., & Brønnick, K. (2013). Reading linear texts on paper versus computer screen: Effects on reading comprehension. *International Journal of Educational Research*, 58, 23–35.
10. Myrberg, C., & Wiberg, N. (2015). Screen vs paper: What is the difference for reading and learning? *Insights*, 28(2), 49–54.
11. Nichols, M. (2015). Reading and studying on the screen: An overview of literature towards good learning design practice. *Journal of Open, Flexible and Distance Learning*, 20(1), 33–50.



ISSN E: 2709-8273

ISSN P: 2709-8265

JOURNAL OF APPLIED  
LINGUISTICS AND  
TESOL

JOURNAL OF APPLIED LINGUISTICS AND TESOL

Vol.9. No.1.2026

12. Qutab, S., Iqbal, S., & Shafi-Ullah, F. (2017). Screen-reading habits and use of e-resources of faculty of economics and management sciences' students: A study of postgraduate students. *Library Philosophy and Practice (e-journal)*, 1–17.
13. Sarkar, B., & Chatterjee, B. (2024). The impact of technological advancement on the study habits of PG students. *International Journal of Research Publication and Reviews*, 5(12), 3109–3113.
14. Singer, L. M., & Alexander, P. A. (2017). Reading across media: Effects of reading digital and print texts on comprehension and calibration. *The Journal of Experimental Education*, 85(1), 155–172.
15. Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, 12(2), 257–285.
16. Sweller, J., Ayres, P., & Kalyuga, S. (2011). *Cognitive load theory*. Springer.
17. Taky-eddine, O., & Madaoui, R. (2022). Reading on screen vs. print: An investigation into the attitudes of Moroccan EFL university students. *International Journal of Language and Literary Studies*, 4(2), 265–282.
18. Tanner, M. J. (2014). Digital vs. print: Reading comprehension and the future of the book. *SLIS Student Research Journal*, 4(2).