INFORMATION OVERLOAD & ITS EFFECT ON HIGH SCHOOL STUDENTS

TARA ZIMMERMAN

College of Information, University of North Texas

3940 North Elm St., Denton, TX 76201

E-mail: taradz37@gmail.com

Information overload is a phenomenon which likely has existed since Gutenberg invented the printing press; however, sources, types, and sheer volume of information have increased exponentially over the past three decades, making the term more relevant today than ever before. Regardless of age, occupation, or social status, most people experience information overload daily. Huge quantities of digital information are always available via ubiquitous mobile technology. While this seems to be a great advantage on the surface, it can also lead to feeling overwhelmed, confused, and unable to make a decision. High school students are particularly susceptible to information overload because of their strong reliance on smartphones as well as their designation as "digital natives," or those having grown up using and understanding digital technology. The focus of this exploratory study is how high school students experience information overload, as well as their specific physical, emotional, and mental reactions. Students of Piedmont High School in Piedmont, Oklahoma are the population for this study. Qualitative data will be collected from participants using questionnaires, interviews, and diaries, and then analyzed to identify themes and patterns. Results of this research will result in greater understanding of how high school students' experiences information overload and will give teachers, parents, and healthcare providers guidance in dealing with teenagers in this situation.

1. Introduction

Information overload is a growing problem for almost everyone today, but high school students are a particularly vulnerable group. They not only communicate with friends and family via smartphones, they also seek out new relationships, engage with culture and society, and even use them at school for educational purposes. People generally assume teenagers have grown up being comfortable with constant bombardment by digital stimuli, but not much has been done to verify this scientifically. Therefore, this study will examine how high school students experience information overload, as well as their reactions to it. This is an important area of study because understanding how young people process information overload has vital implications for their development into healthy, fully functioning adults as well as for the development of systems targeted toward this group.

The term "information overload" was first used in academic literature in the 1960s but became increasingly popular in the new millennium due to the ubiquity of the Internet (Benselin & Ragsdell, 2016, p.284). To date, no formal definition of information overload has emerged in the literature, but Bawden, Holtham, and Courtney (1999) summarized it well, saying it occurs when "information received becomes a hindrance rather than a help when the information is potentially useful' (p. 250). This study will explore how information becomes a hindrance to high school students even when it could be helpful. Specific research questions are: 1) How do high school students experience information overload?; and 2) What are their most common physical, mental, and emotional reactions to information overload?

2. Literature Review

From the 1960s through the 1980s the term "information overload" referred to the plethora of news, journal articles, and consumer information increasingly available to the public. Beginning in the 1990s though, the Internet, World Wide Web, email, and mobile technology brought an even greater onslaught of information to everyday users. Levy (2008) asserted that this explosion of technologies caused increased experiences of information overload, bringing the term to more prominent significance and use (p. 47). People today are experiencing information overload not only because information is more accessible, but because it is being created at a rate previously inconceivable. Jackson and Farzaneh (2012) write that the information created every two days in this new era is equivalent to that created from the beginning of time until 2003 (p.524).

While Internet search engines and email are responsible to a large degree for information overload in adults, these technologies are not as relevant to teenagers. Instead, their primary source of information is the smartphone. According to the Pew Research Center (2015), 73% of teens have access to a smartphone, 15% to a basic phone (most with texting capability), and only 11% of teens do not have access to a mobile phone at all. With its Internet connectivity and boundless amounts of both incoming and outgoing information, the smartphone is the primary technology by which most teens suffer information overload (Benselin & Ragsdell, 2016, p.285).

Human interaction with information has changed in response to this abundance of availability. For example, Internet and smartphone users now scroll and move between pages quickly, a behavior identified as "horizontal information seeking" by Rowlands, Nicholas, and Williams (2008). Additionally, users' attention is divided between the physical task at hand and their desire to stay connected with their devices, resulting in stress (Bawden & Robinson, 2009, p. 183). Stress is experienced at work and school, but also during leisure time. Smartphones are used by teens continually throughout the day to access social media sites and communicate with friends. Consequently, they are continually bombarded with new information and social messages, either overt, implied, or assumed. In this way, information overload is experienced during leisure time, negatively affecting the users' general sense of wellbeing (Tildine, 1999), leaving them feeling overwhelmed, confused, and unable to make thoughtful decisions (Rudd & Rudd, 1986).

Although the circumstances and primary delivery method of information have changed over the years, the consequences of information overload have not changed significantly (Benselin & Ragsdall, 2016, p.286). The phenomenon known as "paralysis of analysis," identified by Jacoby in 1977 (p. 572), is still widely observed, referring to the decrease in decision-making ability experienced during information overload. Even helpful information can seem overwhelming and cause the person to "freeze up." Another common reaction to stress, which is defined as the "adverse reaction people have to excessive pressures or other types of demand placed on them at work" (HSE, 2017). For students, school is their work, and they are increasingly receiving communication from teachers and school officials on their smartphones around the clock. This kind of stress can lead to anxiety, depression, high blood pressure, insulin resistance, and heart disease (HSE, 2017).

3. Method

The methodological approach to this study will be exploratory, seeking to explain and describe the phenomenon of information overload, specifically as it relates to high school

students. It will examine the perception and understanding of information overload by high school students, as well as their physical, mental, and emotional reactions. Qualitative data will provide direct experiences and descriptions of information overload, while quantitative data will reveal patterns in the students' behavior. The population for this study is the high school students in the small town of Piedmont, Oklahoma, where there are approximately 1,000 students in grades 9 through 12. The population is roughly equal among the four grades, about 250 students per grade level. A sample size of 278 students is needed to ensure 5% confidence in the study results and to be able to project the results onto the entire population. This school is a particularly interesting setting in which to study information overload because each student is issued a Chromebook to use throughout the school year, and teachers tailor their instruction to include this technology whenever possible. A Chromebook is a small laptop which runs Google's Chrome operating system without any other programs or software, reducing viruses, glitches, and software updates experienced with other computers. The students use Google Drive for creating, storing, and sharing their documents and assignments, and even use the Chromebooks for reading library books. This population of students is plugged into technology to a slightly higher degree than the average high school student, but since a growing number of schools are using a 1:1 technology format, this study provides a glimpse into the near future.

Questionnaires, interviews, and diaries will be used in this study, triangulating data collection to enhance the validity of results (Bell, 2010). A pilot study of these instruments will be done with a small group of students to ensure the clarity and effectiveness of questions, time required for students at each step, and efficiency of classroom procedures for teachers. A full roll-out of the survey will be done by working with classroom teachers to obtain signed authorizations from parents for student participation in all levels of the study and offering students bonus points for participation. The final questionnaire will consist of 15 to 20 multiple choice questions focused on recognition, definition, and frequency of information overload as well as physical, emotional, and mental responses.

Students will be asked if they would be willing to be informally interviewed or keep a short diary for one week regarding their experience of information overload. These two instruments will provide rich, qualitative data to enhance the quantitative data gathered from the survey. One-on-one interviews will be carried out in the classroom and consist of five or fewer questions, focusing on each student's experience of information overload and reactions to it. These semi-structured interviews will be recorded and transcribed.

Diaries will be used as a third data collection instrument because this method has been proven to help "identify patterns of behavior [and] ascribe meanings to actions and events" (Alaszewski, 2006, p. 37). Teachers will give five minutes each day to students who volunteer to write in their journals about their experiences of information overload over the past 24 hours. If they cannot think of anything to write about, prompts will be provided to target their journaling responses. For example, "Think of a time recently when you felt overwhelmed with information. How did your body feel? What emotions did you experience? What were you thinking as you experienced this?" Students will be given freedom to expound on their experience of information overload and encouraged to describe it in as much detail as possible. Diaries will be written electronically.

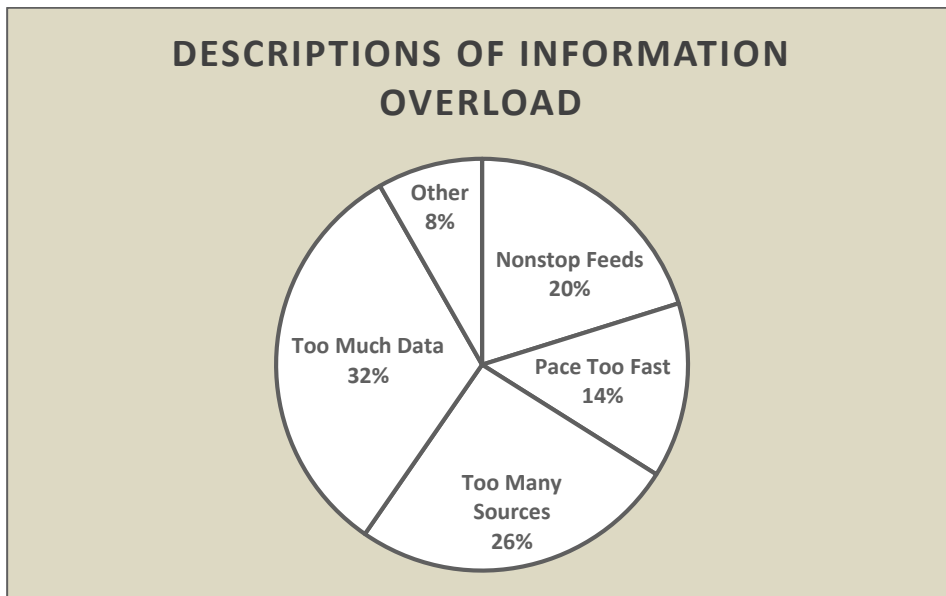Table 1. Planned student participation by grade.

Grade	Freshman	Sophomore	Junior	Senior	**Total**
Survey	70	70	70	70	280
Interview	5	5	5	5	20
Diary	5	5	5	5	20

4

Table 1 shows student participation by grade level in the three data collection methods. Data gathered from each instrument will be coded using the variables of definition, recognition, frequency, physical response, emotional response, and mental response. Then, trends and patterns may be compared across the three data collection instruments.

4. Data Analysis and Results

All collected data will be coded based on how it relates to the study's research questions. First, answers relating to how high school students recognize or define information overload will be identified. Then, experiences of information overload will be put into sub-categories of physical, emotional, and mental reactions. Specific examples of information overload shared by students will be noted. Questionnaires will be distributed via Google Forms, with responses automatically dropped into a spreadsheet for analysis. A written transcript of each interview will be created, and resulting data will be coded into a second spreadsheet. Student diaries will be coded into a third spreadsheet. The three spreadsheets can then be viewed separately or combined based on the shared coding scheme.

Data will be analyzed by reviewing and identifying patterns that emerge. First, data relating to how students experience information overload, including time and location, will be examined, synthesized, and displayed in pie charts. See Figure 1 for examples.

DESCRIPTIONS OF INFORMATION OVERLOAD

Other 8%
Nonstop Feeds 20%
Pace Too Fast 14%
Too Many Sources 26%
Too Much Data 32%

WHERE INFORMATION OVERLOAD OCCURS

No Specific Location 13%

Home 18%

8% Recreation

School 29%

Job 32%

WHEN INFORMATION OVERLOAD OCCURS

Ongoing 9%

Morning 10%
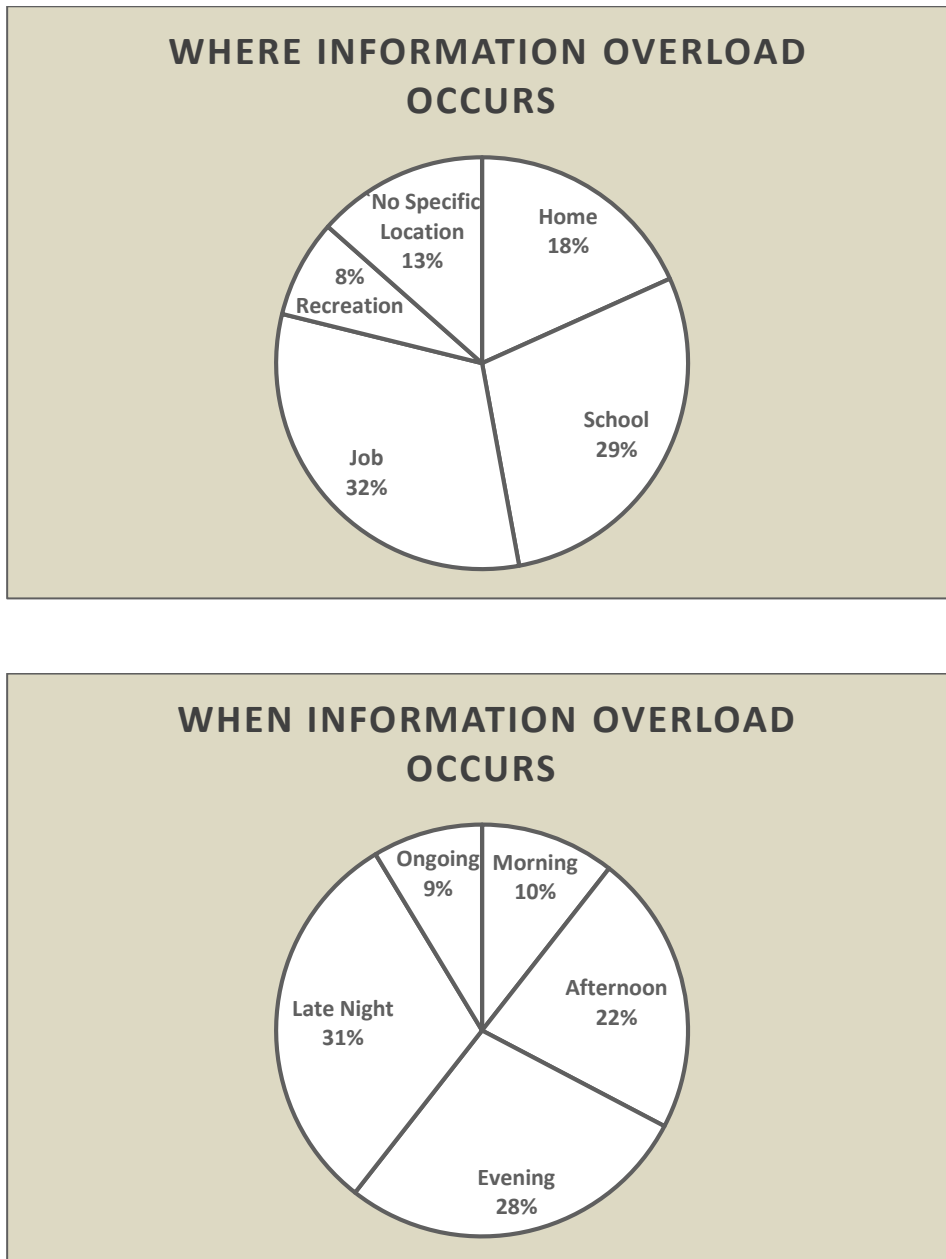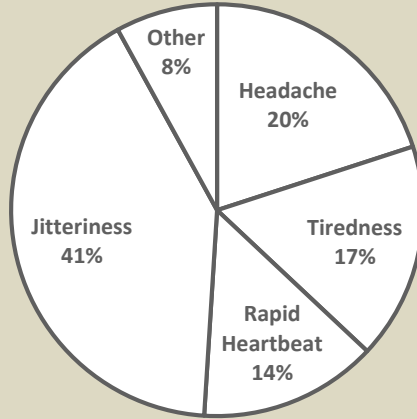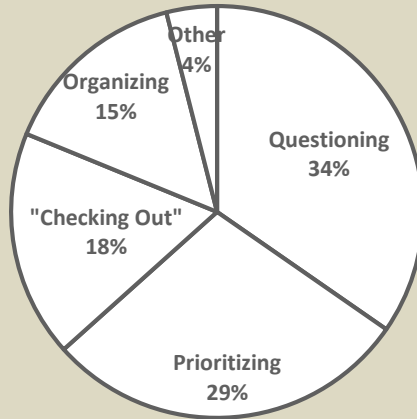
Afternoon 22%

Late Night 31%

Evening 28%

Figure 1. Sample Description Pie Charts

Next, responses to information overload will be examined in three sub-categories: physical, emotional, and mental. These results will be displayed in the same pie chart format. See Figure 2 for examples. As part of the agreement with the school in which the study was conducted, a report will be compiled for the teachers and administrators. This will detail procedures of the study as well as coded data and data analysis; however, all student responses will be anonymized, and original data will not be turned over to the school, remaining the sole property of the researcher.

PHYSICAL REACTIONS TO INFORMATION OVERLOAD

Other 8%

Headache 20%

Jitteriness 41%

Tiredness 17%

Rapid Heartbeat 14%

MENTAL REACTIONS TO INFORMATION OVERLOAD

Other 4%

Organizing 15%

Questioning 34%

"Checking Out" 18%

Prioritizing 29%

EMOTIONAL REACTIONS TO INFORMATION OVERLOAD

Other 5%

Anxiety 35%
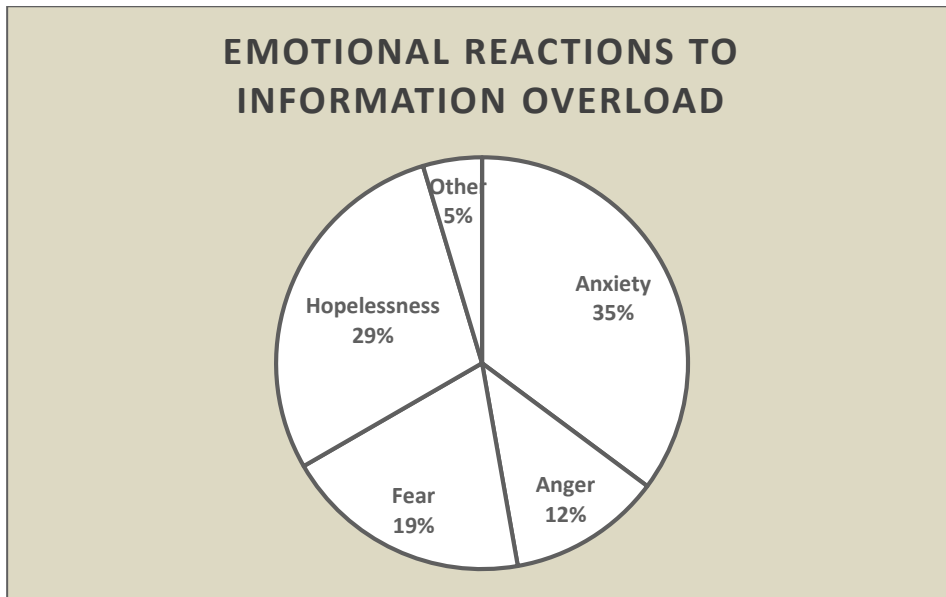
Hopelessness 29%

Fear 19%

Anger 12%

Figure 2. Sample Reaction Pie Charts

5. Schedule

The schedule for this study begins with the Planning Phase in which background research will be completed, details of the study will be outlined, IRB approval will be obtained, and negotiation with the school district and teachers involved will be completed. During the Instrument Development Phase, the three data collection instruments will be created, making sure to align questions for later comparison. A short Pilot Study of all three instruments will be conducted to ensure effectiveness of the tools, ease of use, and data coding reliability. Next, during the Data Collection Phase, approximately 300 questionnaires will be distributed to participants, 20 face-to-face interviews will be done, and 20 five-day diaries will be collected. The Data Analysis Phase will consist of coding all data, creating spreadsheets, and examining the results for patterns and themes. Finally, during the Reporting Phase, background research, study procedures, data, and analysis will be written up into a final report for the school as well as an academic journal article. See Table 2 for the study timeline.

Table 2. Project Schedule

Phase	Start Date	End Date	Duration
Planning	Jul 1	Aug 1	4 weeks
Instr. Dev.	Aug 1	Aug 15	2 weeks
Pilot Study	Aug 15	Sep 8	3 weeks
Data Collection	Sep 8	Sep 15	1 week
Data Analysis	Sep 15	Oct 15	4 weeks
Reporting	Oct 15	Nov 15	4 weeks
Total			**18 weeks**

6. Budget

The budget for this study has been broken down by phases. Minimal cost will be incurred during the Planning Phase, and there will be no expenses during the Instrument Development Phase. During the Pilot Study, gift cards will be purchased as incentives for the five student participants at a cost of $5 each, and during the Data Collection Phase $20

Amazon gift cards will be purchased for each of the six participating teachers. During the Data Analysis Phase, transcription of the 20 face-to-face recorded interviews will be necessary, at a cost of $20 per hour. Finally, two expenses will be incurred during the Reporting Phase, eight copies of a full-color report will be printed for school teachers and administrators, and one trip will be made to the school to present findings and wrap up the project.

Table 3. Project Budget

Phase	Expenses	$ Amount
Planning	Gas for travel to school for meetings (2 trips @$15/each)	30
Inst. Dev.	None	0
Pilot Study	Five $5 Sonic gift cards for student participants	25
Data Collection	Six $20 Amazon gift cards for teachers	120
Data Analysis	Transcription of 20 interviews @ $20 per hour	400
Reporting	Printing eight full-color reports for school officials ($25) and gas for travel to school for final presentation of findings ($15).	40
Total Cost		**$615**

7. Conclusion

Gaining a better understanding of information overload and its effects on young people is critical as the pace of communication and the amount of information in our world continues to increase. This study will reveal how, when, where, and why students experience information overload. With this understanding, researchers can help find ways to combat negative physical, emotional, and mental effects. This will result in healthier and happier individuals and will inform system designers in creating information and communication systems that minimize the experience of information overload for users.

In addition, this research could have profound impacts on educational design and instructional technology, not only for teenagers, but for students of all ages. Currently the trend is to include as much technology as possible in the education process to prepare students for the perceived realities of life, work, and continuing education. However, if this mindset is contributing to students' experiencing information overload, it may be confusing, stressing, and overwhelming them more than teaching the intended subjects. Findings from this exploratory study will inform future research into the experience of information overload by high school students, and the secondary research could in turn have extensive effects on how we view and treat information overload as a society

9
References

Alaszewski, A. (2006). *Using diaries for social research*. London: SAGE.

Bawden, D., & Robinson, L. (2009). The dark side of information: Overload anxiety and other paradoxes and pathologies. *Journal of Information Science 35*(2): 180–191.

Bawden, D., Holtham, C., & Courtney, N. (1999). Perspectives on information overload. *Aslib Proceedings: New Information Perspectives 51*(8): 249–255.

Bell, J. (2010). *Doing your research project*. Berkshire: Open University Press.

Benselin, J.C., & Ragsdell, G. (2016). Information overload: The differences that age make. *Journal of Librarianship and Information Science 48*(3), 284-297.

HSE (2017). Work-related stress and how to handle it. Retrieved from: http://www.hse.gov.uk/stress/what-to-do.htm. Accessed May 1, 2018.

Jackson, T.W., & Farzaneh, P. (2012). Theory-based model of factors affecting information overload. *International Journal of Information Management 32*(6): 523–532.

Jacoby, J. (1977). Information load and decision quality: Some contested issues. *Journal of Marketing Research 14*(4): 569–573.

Jacoby, J. (1984). Perspectives on information overload. *Journal of Consumer Research 10*(4): 432–435

Levy, D.M. (2008). Information overload. In: Himma K and Herman T (eds) *Handbook of information and computer ethics*. Hoboken, NJ: John Wiley & Sons, p. 497–515

Pew Research Center. Teens, social media & technology overview 2015. Apr. 8, 2015. Accessed April 18, 2018. http://www.pewinternet.org/2015/04/09/teens-social-media-technology-2015/pi_2015-04-09_teensandtech_06/

Rowlands, I., Nicholas, D., & Williams, P. (2008). The Google generation: The information behaviour of the researcher of the future. *Aslib Proceedings: New Information Perspectives 60*(4): 290–310.

Rudd, M.J., & Rudd, J. (1986). The impact of the information explosion on library users: Overload or opportunity? *Journal of Academic Librarianship 12*(5): 304–306.

Tildine, T.J. (1999). The mythology of information overload. *Library Trends 47*(3): 485–506.