Personal Viewpoint Ethnography Utilizing GoPro™ Cameras to Capture Student Information Seeking in Libraries

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This exploratory study investigated supports and services academic libraries currently provide that assist in the fulfillment of information needs. Utilizing wayfinding, think-aloud protocol (TAP), retrospective think-aloud protocol (RTAP), and a GoPro™ camera, the actions, thoughts, and feelings of an autistic college freshman and a neurotypical peer were recorded as they navigated their campus library in search of materials. The library website, virtual maps to resource locations, and library workers served equally as enablers and barriers to both students in their information seeking. This proof-of-concept study demonstrates that participant viewpoint ethnography is a viable methodology that can be applied in school library research, with specific adaptations and examples provided.

Introduction

Considerable research on students' information-seeking has centered on librarians but not on the students themselves. Utilizing wayfinding, think-aloud protocol (TAP), retrospective think-aloud protocol (RTAP), and a wearable GoPro™ camera, the actions, thoughts, and feelings of students, even the very young, can be captured as they navigate libraries in search of materials (Everhart & Escobar, 2018). Although the present study was conducted in an academic library, its methodology holds promise for school library research. School libraries are places of self-directed learning. When students are engrossed in a topic or have a question, they navigate the school library in search of answers. Teachers have been encouraged to foster self-directed learning (Petro, 2017), a tenet of the standards of the American Association of School Librarians (2017). For over a decade, there have been advocates to transform school libraries into learning commons whereby students are free to explore their interests in flexible places (Kompar, 2015; Koechlin et al., 2008; Waskow, 2011) and incorporate makerspaces as a means of self-expression (Fontichiaro, 2019). As these changes occur, it will be important to document student success to accumulate evidence on the effectiveness and impact of these approaches on student achievement. Documenting student information seeking with cameras and think-alouds may prove a useful method for school library researchers.

Statement of the Research Problem

Current literature regarding students' information-seeking lacks first-person accounts. This

exploratory study investigated, through the first-person perspectives of an autistic student and a neurotypical peer, supports and services academic libraries currently provide that assist in the fulfillment of information needs and was framed by the following research questions:

1. What wayfinding cues aid in decision-making within academic library environments for a student with autism compared to a neurotypical peer?
2. What barriers hinder wayfinding in academic library environments for a student with autism compared to a neurotypical peer?
3. How are decisions classified for a student with autism compared to a neurotypical peer in academic library environments?
4. How do the resulting behaviors during the execution of a plan of action in information-seeking relate to success for a student with autism compared to a neurotypical peer?

In extending the original study, additional discussion has been added to address:
How might participant viewpoint ethnography be successfully employed as a viable research tool in school libraries?

Review of Literature

Wayfinding theory, identified by Lynch (1960) and modified by Passini (1981), states that human wayfinding behaviors are influenced by different factors of the physical environment in the navigation of large buildings such as libraries and shopping malls, including differentiation of the environment, visual access, and complexity of the spatial layout (Li & Klippel, 2017). A researcher may observe a user in an environment but not understand the thought processes involved in reaching the user's destination, nor the paths they took to get there (Mandel, 2013).

One method that has accurately captured the user experience of college students in the academic library employed a wearable unobtrusive camera (GoPro™) strapped to the subjects, to capture both their navigational experience and thought processes, while they completed tasks such as finding specific periodicals and reference books (Kinsley et al., 2016). GoPro™ cameras and other personal viewpoint devices allow the subject to "own" their view while capturing multiple aspects of an environment (Chalfen, 2014). Research outside of library and information science using this methodology, participant viewpoint ethnography (PVE), include Chrysanthi, et al.'s (2016) observing archaeologists "in the wild;" Ghekiere et al.'s (2015) study using GoPro™ cameras to record environmental elements children encounter while cycling for transportation; and Wilhoit and Kisselburgh's (2016) examination of PVE as a method of data collection.

In addition to recorded observations, to fully comprehend how an individual navigates or wayfinds in their physical environment, it is necessary to understand their thought processes and what information they use to make decisions. Think-aloud protocol (TAP) is a method that prompts users to articulate the thoughts and reasons behind how they approach a certain task (Battleson et al., 2001). Although some studies have used TAP with disability populations (Chandrashekar, et al. 2006), until recently, there had been no research involving students on the autism spectrum (Everhart & Escobar, 2018). As persons with disabilities may compensate cognitively for their deficit, modifications such as encouraging subjects to speak aloud and prompting them each time they are silent for more than 15 seconds have been found to be successful with this population (Chandrashekar et al., 2006).

Retrospective think-aloud protocol (RTAP) permits the user to revisit their experiences after the observation, giving them the option to elaborate further on thoughts or emotions that

they did not feel they adequately expressed in the moment. It further enriches studies of navigating the library environment. Burbank et al. (2018) found "the video captured by the chest-mounted Go-Pro cameras is particularly illuminating when analyzed in the context of the post-visit interview data" with young children (p. 311). Given that characteristics of autism can include difficulty in conversational pragmatics and social communication, as well as challenges in turn-taking while simultaneously writing, the use of RTAP allows subjects to clarify what they may not have been able communicate in real-time when completing their task (Paul et al., 2009).

Application to School Library Research

Like libraries, it has been opined that research conducted on children's experiences in museums has been focused on what children are, or should be learning, rather than what they themselves seek or value (Johanson & Glow, 2012). A noteworthy exception is an ethnographic study with children aged three to six using chest-mounted GoPro™ cameras to capture their experience in a participatory children's museum (Burbank et al., 2018). As part of a larger study designed to compare the utility of GoPro™ technology versus photo and drawing elicitation, it concluded that the unobtrusive GoPro™ camera yielded more powerful results than the other methods (Burbank et al., 2018). In the photography method, there was pervasive parental involvement in the children's photography, with the camera influencing how they interacted in the museum. Numerous relevant details were overlooked in post-visit drawings where children were asked to draw what interested them (Burbank et al., 2018).

Think-aloud protocol is also a predominant method of evaluating accessibility of library websites and other digital resources (Kous et al., 2020) but little was found in the literature about using this protocol with students in K-12. A notable exception is a study conducted by Branch (2000) who utilized think-alouds and think-afters (retrospective think-alouds) to ascertain how students interacted with a CD-ROM encyclopedia when performing a variety of information-seeking tasks. It was determined that the data collected provided support for the use of verbal protocol analysis to uncover information-seeking processes of students within the behavioral, cognitive, and affective realms.

Methodology & Research Design

This study engaged two students, one neurotypical (pseudonym: Thomas) and one with Autism Spectrum Disorder (ASD) (pseudonym: Elliot), in completing five information-seeking tasks in an academic library: 1) locating a journal article on the shelf in bound periodicals; 2) finding a book; 3) checking out a laptop; 4) reserving a study room; and 5) printing out a specific article from the library's databases.

Research Protocol

Upon entering the library and meeting the researcher individually, each student signed their consent form and were fitted via chest strap with a GoPro™ camera. The students were instructed to affix the device to themselves in the manner most comfortable for them. Once they were comfortable with the camera, each subject pressed the record button to test recording their experience. Both subjects only required about two minutes of practice to feel comfortable with the equipment. This procedure was also pilot tested to ensure success. It could be posited that

secondary school students, and perhaps even younger students, would be similarly comfortable with this familiar device.

Participants were told that the researcher would be accompanying them on their searching experience and would prompt them to think-aloud, expressing their thoughts and feelings as they accomplished each information seeking task. The students were also informed that their performance, in terms of success of their wayfinding, were not being judged, and that the research was more focused on their thought process during information seeking, especially whether supports in place in the academic library environment were helping or hindering their pursuits. Throughout their wayfinding activities, the students were accompanied by the researcher, who handed them slips of paper with a task printed on each one. The researcher took handwritten notes, throughout the wayfinding event, to gather any thoughts or ideas prompted by the observation of the participants. The remaining data was captured in its entirety with the GoPro™ camera.

Think-Aloud Protocol

TAP was employed to ascertain participants' thoughts and feelings while they searched for the items. As the subjects navigated through the wayfinding activities, the researcher solicited verbalization of their thought processes and emotions conjured by prompts such as but not limited to:
1. How are you feeling at this moment?
2. You appear _____. Tell me what you are thinking right now?
3. What did you decide to start with?

Retrospective Think-Aloud Protocol

Because one subject self-disclosed being autistic, a diagnosis hallmarked by communication impairments, subjects were encouraged to talk about their experiences if they fell silent for an extended period, for example, when their executive functioning thought process was focused on the completion of the wayfinding tasks versus verbalization. Once the subjects completed their tasks, the researcher then played back the GoPro™ footage collected by the subject on a laptop computer screen. Using RTAP, and questions developed by Hahn and Zitron (2011) as a context, the researcher prompted responses from the participants, asking questions such as:

1. What were you thinking/feeling in that moment that you did not express?
2. What would have helped you find the items easier?
3. What was the most challenging part of finding the items?
4. What helped you locate the items?
5. You seemed _____at this moment. Tell me more about what you were thinking/feeling?

In addition to the notes taken during the TAP and RTAP, the GoPro™ camera footage also yielded dialogue which was transcribed. Qualitative thematic coding was employed, allowing the researcher to interpret the data collected within the framework of this study's research questions. Analysis of the first-person experiences recorded by the GoPro™ device revealed which wayfinding elements of cues and decision-making were selected by the autistic college student when attempting to navigate the academic library, in comparison to his neurotypical peer.

Findings

For the purposes of this discussion, the focus will be on tasks that can also be performed in most secondary school libraries: the tasks of finding a book on the shelf (task 2) and printing out a specific article from the library's database (task 5).

      The students approached task 2 very differently (Table 1) although both applied skills acquired during task 1 (locating a journal article on the shelf in bound periodicals). Thomas was confident in searching for the book using OneSearch as he had been previously directed on its use by a student worker. OneSearch is a search platform that combines searching for all of a library's print and electronic sources at the same time. Elliott, having also built a rapport with the student worker in the first task, felt comfortable immediately approaching her again with the citation given in task 2. Both students found the call number to be more helpful to them in finding the book on Darwin than the title of the volume itself, and both students did not encounter barriers that prevented them from finding the book relatively quickly. Thomas was more self-sufficient in his search for the resource and followed the directions he found via the map on OneSearch without issue. Interestingly, while Thomas wrote the directions to the book on his task slip, Elliot took pictures of the location information on the computer screen with his smartphone. Both students completed task 2 in a similar amount of time.

Table 1. Task 2, Find a book: *A Calendar of the Correspondence of Charles Darwin, 1821-1882, Frederick Burkhardt and Sydney Smith*. **1993. Cambridge University Press, New York: NY. Call Number: QH31.D2 C15.**

	Thomas (NT)	**Elliot (ASD)**
Cues	• Article title search on computer • "Find it at [redacted]" for finding the book location in university library • Previous experience with finding articles in main library • Book citation • Call number of book • Title of book • Map of resource location	• Book citation • Call number of the book
Barriers		• Student worker can't direct him to the exact location
Decisions	• Decides to search for book by call number versus title • Asks for help from student worker	• Asks for help from student worker • Decides that the student worker has provided sufficient information to begin search • Decides to accept help from special collections librarian who offers it
Behaviors	• Relies on student worker to find resource on the website and its exact location (row number, etc.)	• Relies on student worker to find resource on the website and its exact location (row

	• Follows directions to the resource provided by the map	number etc.) but accepts that they cannot find it • Takes a photo of computer screen with library floorplan • Accepts help from librarian
Time to Completion	**4:30 minutes**	**5:30 minutes**

In task 5, both Thomas and Elliot used the library computers to find the relevant article to download and print but faced different barriers (Table 2). For Thomas, the cost of printing was a deterrent that did not appear to worry Elliot. While Thomas found the correct article straightaway, Elliot's search was confused by multiple resources appearing in his search with the same title. Wayfinding cues and barriers experienced by the neurotypical student, and the autistic student were very similar for this task. Both were aided in their wayfinding by prior personal experience with the library computers and the library website.

Signs also aided the students on their journey, especially those situated within their line of sight, in agreement with Hahn and Zitron's (2011) affirmation that existing signage assists students in navigating the library. For example, Thomas noticed that he could not use the same computer for task 5 (to download and print) he had been using before for task 2, as a sign was affixed to the computer monitor saying, "Catalogue Use Only." Elliot found signage helpful on the same task when he noticed instructions for printing affixed to the carrel hosting the printing computer and the printer. Both students felt that they would have been assisted in their wayfinding by maps posted on the various floors of the library even while they were guided by maps found online through OneSearch.

Table 2. Task 5, Find a journal article on the library website in .pdf format: Pastor, S., Semikoz, V. B., & Valle, J. W. F. (1998). Low-energy anti-neutrinos from the sun. *Physics Letters B, 423*(1), 118-125. **Call Number: 530.5 P578, pt. B. Print this article on one of the available library printers.**

	Thomas (NT)	Elliot (ASD)
Cues	• Previous experience with the library website • Previous experience with library computers • Print dialog box	• Previous experience with the library website • Previous experience with library computers • Print dialog box • Signage with printing instructions posted next to printing computers • Previous experience printing at the library
Barriers	• Sign on the computer: "For Catalog Only" • Concern over cost of printing	• Multiple entries per resource in OneSearch
Decisions	• Decides to use the library website to find the resource • Decides not to print the article	• Decides to use the library website to find the resource • Decides to print the article

Behaviors	• Goes to printers where article would be printed	• Goes to the printers to show he knows where printed article would be accessed and goes through the motions
Time to Completion	5:09 minutes	3:00 minutes

Discussion

Both students used different resources but were ultimately successful in completing the five tasks. Librarians and student workers were found by Jim Hahn and Lizz Zitron (2011) to be a useful resource for students as they navigated the stacks. Student workers seated at the circulation desk were also wayfinding cues for the students in this study. However, they were used more readily by Elliot, the autistic student, than they were by the neurotypical student, Thomas. Thomas waited longer to initially consult the student workers for assistance as he seemed to enjoy the challenge of searching for resources assigned via the tasks by using the library website and OneSearch. His consultation with the student workers was last resort in nature and used only when he was certain that he could not find the resources on his own. Initially, Elliot also took time to extensively search the library website and OneSearch while completing task 1, yet once he found the student worker to be helpful and trustworthy, he returned for their assistance on subsequent tasks, without hesitation.

"Social communication challenges constitute a major concern in postsecondary educational environments where individuals are expected to communicate effectively and comfortably with their peers and college faculty without supervision" (Zager & Alpern, 2010, 151). Previous autism-related studies contend that autistic college students may exhibit difficulty engaging in reciprocal social interaction, issues and anxiety associated with maintaining real-time/face-to-face conversations, and difficulty interpreting nonverbal cues as such traits are core diagnostic features of autism (Barnhill, 2016; Pinder-Amaker, 2014; Zager & Alpern, 2010). In this study, Elliot did not hesitate to engage the student worker with his friendliness and was not ashamed to admit that he needed help in his wayfinding. This openness to interaction, contrary to literature about autism characteristics, was unexpected yet aided Elliot immensely in his wayfinding experience in the academic library. Use of the student workers also highlights the differences in the students' decision-making processes with Elliot deciding to trust and seek the assistance of the workers early on in his wayfinding experience, while Thomas preferred to wade through the library website, seek signage, and rely on previous library experiences as information resources.

Another wayfinding aid which differed between the cases was the use of a smartphone to capture information. While Thomas relied on his supplied pen and paper to take down the locations of the volumes in tasks 1 and 2, Elliot made use of his phone's camera to capture the information provided to him by the student workers. Elliot made repeated use of these captured images as he searched the stacks, referring to them almost repetitiously as an information resource. Persons with autism use smartphones to assist them in various tasks (Vlachou & Drigas, 2017) and this may have been a natural extension of previous activities or a previously taught coping mechanism.

Barriers in wayfinding were also discovered to be similar between the cases. Most notable was the enormity of search results presenting in task 5. Searching for the journal article on the shelf, as well as an electronic version of the same article for printing, proved overwhelming for

Thomas and Elliot as many different versions of the same article presented themselves in OneSearch (eg. conference proceedings, bound volume of periodical on the shelf, versions hosted by different subscription databases). Finding the exact version of the article to fulfill the wayfinding task required strict attention to detail, which was equally problematic for both students. This difficulty corresponds to Battleson et al.'s (2001) assertion that "the staggering amount of information available via these sites can produce a kind of 'information overload' that can bewilder, confuse, and even discourage users" (p. 189). A barrier to wayfinding expected to be more challenging for the student with ASD, was the high volume of students using the library computer stations. For many students with autism who value familiarity and routine, the need to change course and find another available computer could have been traumatic, yet Elliot determined the availability of additional computers by using signage. Knowing the schedule for the computer classroom, and the times the computers were reserved, gave him the confidence needed to resume wayfinding.

Conclusions

Students' wayfinding in an academic library was aided by prior knowledge, transfer of knowledge, signage, computer cues, and library staff. The major differences between the neurotypical student and the autistic student were that the autistic student used library staff, photos, and talking himself through tasks for information seeking, while the neurotypical student relied more on the library's website.

A signification contribution of this study is the inclusion of an autistic student. This aligns with the website banner of the Autistic Self Advocacy Network (2021), "Nothing about us without us" including participation in research studies. It also conveys the thoughts and feelings of a young adult with ASD, which is important according to Cox et al. (2015):

> Although recent efforts to break the silence about Autism (e.g., Autism awareness day/month, "Autism Speaks" website), the voices of individuals with ASD—particularly those who have the interest in and ability to succeed in college—have been drowned out by the overwhelming emphasis (both in the general public and the scholarly literature) on early identification and intervention for young children with autism. By giving voice to a growing population of students who have strong potential for postsecondary success, research empowers autistic individuals to self-advocate as they consider opportunities for continued educational advancement" (p. 28).

PVE employing a wearable camera to record information seeking, as well as clarifying thoughts responsible for decisions and behaviors via TAP and RTAP, demonstrated that this is a viable research methodology for both neurotypical college students and those with ASD. Because there is relatively little empirical literature available on ASD students' success in academic libraries or libraries in general, this study contributes to an essential knowledge base that can inform policies and practices. Such an expanded knowledge base is critical, as the development of effective interventions is dependent upon researchers' comprehensive understanding of the varied and complex set of factors that facilitate or impede the information seeking success of autistic individuals.

Applications to Research in School Library Settings

Students involved in this study reported enjoying the experience immensely. They felt "important" contributing to research and had no issues with wearing the GoPro™ camera and liked the unique approach. Such devices have become ubiquitous in the daily lives of young adults and children and are being used more frequently – even with toddlers (Caton & Hackett, 2019). There is no reason to suspect this would not be feasible with children in school libraries.

It would be straightforward to develop tasks related to school assignments or student interests. Some examples are a) the evaluation of online sources, b) detecting fake news, browsing behavior, c) citing sources and citation management, d) working in teams, d) personal information seeking, and f) transfer of skills to a public library setting, among others. These suggestions would be more relevant to school library activities, as the tasks in this study were isolated and mechanical to provide a proof-of-concept of the methodology. As in this study, the method could be used to compare variables such as achievement level, gender, age, and technology proficiency. There have been reports of these techniques being used with children as young as six (van Someren, et al., 1994) often in studies of usability (Charoenpruksachat & Longan, 2021) or self-regulated learning (Vandevelde et al., 2015). Even so, researchers need to determine the developmental level of student subjects when considering think-aloud and retrospective think-aloud techniques.

Applications to Practice in School Library Settings

School libraries are typically smaller and less complex than academic libraries but some of the same enablers and barriers found in this study could also be encountered or employed. Useful signage, maps that are integrated with the online catalog, successful past experiences, and helpful staff were found to be enablers in locating a book on the shelf and printing a specific periodical article. Likewise, discerning a relevant citation from a large number of search results, as well as the cost of printing may also be barriers in primary and secondary schools. Teacher-librarians teach students how to discern relevancy and could instruct them how to save relevant articles to a management system rather than printing. Or school libraries can choose not to impose economic barriers such as printing fees (American Library Association, 2006).

Smartphones can be useful learning tools for students such as when the autistic student in this study took photos to remember locations. School policies often restrict the use of smartphones but perhaps this is an area where teacher-librarians can educate faculty and administrators on the benefits of smartphones and their use as an educational tool. Both students were more successful when they enlisted the help of library staff. Teacher-librarians could provide a great service to college-bound students by serving as a role model of helpfulness, educating students on the role of college librarians, and encouraging them to ask for help when needed. Enlisting trained student aides in secondary school libraries would also facilitate information-seeking due to the reliance on peers.

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