



Scavenging for evidence: A systematic review of scavenger hunts in academic libraries

Rachel Keiko Stark^{a,*}, Eugenia Opuda^b, Jenessa McElfresh^c, Kelli Kauffroath^a

^a California State University, Sacramento, 2000 State University Drive East, Sacramento, CA 95819-6039, United States of America

^b University of New Hampshire, Dimond Library 18 Library Way, Durham, NH 03824, United States of America

^c Clemson University, 116 Sigma Drive, Clemson, SC 29634-3001, United States of America

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ABSTRACT

Introduction: Scavenger Hunts have longstanding popularity as an outreach and instruction learning tool in academic libraries. This systematic review examines the implementation and assessment of scavenger hunts in academic library settings to determine trends in implementation and effectiveness.

Methods: A systematic literature search in multiple databases was performed to identify studies that assessed academic library scavenger hunts. Results that did not include some physical aspect of a scavenger hunt in a library building, and results that lacked some form of assessment of the scavenger hunt were excluded.

Results: Thirteen case studies utilizing various forms of formal and informal assessment were included. Only four articles explicitly stated the population involved in the assessment, and one article provided a decisive timeframe for the scavenger hunt. The most commonly stated desired outcome was for students to have fun and/or be engaged. Assessment tools reported in the included articles were rarely reviewed or tested for validity.

Discussion: The available literature on scavenger hunts in academic libraries does not provide enough evidence to make an evidence-based decision on utilizing this modality. Recording participant demographic data, and focus on assessing the scavenger hunt as an effective tool are suggestions for improving future library-based scavenger hunts.

Introduction

Creating engaging and informative outreach and instruction sessions is a hurdle most academic libraries face. With fears of perpetuating stodgy reputations or being unable to engage students, libraries are motivated to develop and implement exciting, new information literacy encounters, and following the tenets of evidence based practice, they look to the published literature for inspiration. Academic libraries often choose to disrupt traditionally severe connotations of libraries with active learning and play-based exercises, particularly when first introducing groups to the library setting. Variations on scavenger hunts have a long association with library outreach, especially amid the higher education setting. These activities often serve as an introduction to how a participant might use the library over a period of years, including conducting research or completing schoolwork. Scavenger hunts in higher education take many forms, though the most common is seen in orientations for programs, classes, or cohorts in order to enhance engagement with a particular resource or learning objective. When used

in libraries, scavenger hunts tend to serve the dual purpose of introducing new users to library resources while demonstrating the library as a welcoming place on campus.

While scavenger hunt activities are popular approaches in library settings, there has been no systematic investigation into the efficacy of the intervention. This systematic review contributes to a dearth in the literature examining the quality of methods in which libraries create, implement, and assess scavenger hunts, and seeks to appraise the effectiveness of scavenger hunts based on author reported objectives. For the purposes of this systematic review, the authors defined scavenger hunt as an outreach or instruction activity in which participants physically travel throughout a defined library space in order to encounter new information relevant to their future use of the space. For consistency, this review regarded any activity that self-identified as a scavenger hunt as potentially eligible for inclusion in the systematic review and did not seek to explicitly include activities that did not use the term scavenger hunt in their research.

* Corresponding author at: University Library, 2000 State University Drive East, Sacramento, CA 95819-6039, United States of America.

E-mail address: stark@csus.edu (R.K. Stark).

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Literature review

The appeal of utilizing scavenger hunts as an outreach tool lies in the application of student-centered active learning principles to enhance engagement with desired learning objectives in a creative and fun manner. Scavenger hunts have a particular draw for libraries who seek to increase outreach and engagement with students on college and university campuses, specifically as ways to highlight library spaces, services, resources, and technologies. Despite this broad appeal and a large number of documented uses of scavenger hunts, there is a limited recent body of literature that thematically explores scavenger hunts in academic library settings.

Literature on the topic of scavenger hunts in higher education, and in particular libraries, largely consists of practitioner-focused case studies, or an article that focuses on a singular example at a specific library. This preponderance of case studies reflects the unlimited creativity to customize these learning tools as libraries continue to develop new and innovative ways of offering scavenger hunts to their campus populace. Some libraries express this creativity through themes and pop culture references (Bailin, 2015; Boss, Angell, & Tewell, 2015), while others customize their experience through digital components and emerging technologies (Lu, Chao, & Parker, 2015). The limitless potential to customize a scavenger hunt to a particular institution and/or library emerges throughout these case studies as a recurring theme.

As this systematic review will demonstrate, the assessment of scavenger hunts is lacking in the scholarly literature, though assessment of library workshops and orientations is essential to proving the efficacy of a chosen library instruction method in relation to student learning outcomes. As academic libraries develop more innovative outreach and instruction methods, librarians and program coordinators seek to “learn more about what messages we are sending to our students and whether or not what we are doing is working” (Brown, Weingart, Johnson, & Dance, 2004). Assessment techniques, ranging from complex assessment plans or one-shot strategies to measure session efficacy, are numerous and customizable, as demonstrated in Bowles-Terry and Kvenild’s *Classroom Assessment Techniques for Librarians* (Bowles-Terry & Kvenild, 2015). Perhaps because of the lack of prescriptive application of assessment techniques for library instruction sessions, including those provided during orientations, many library and information science researchers rely on observations and informal feedback to determine the success of their programs, as is often seen in case studies examining academic library scavenger hunts. Additional challenges to library instruction assessment may include difficulty isolating and demonstrating a relationship between variables.

Even without formal assessment evidence, scavenger hunts in academic libraries are a popular instruction and outreach tool. Benefits of the scavenger hunt include not only exposure to vital resources but social engagement with peers and tone-setting for the overall experience with the organizer, whether it is a classroom or a campus resource (Jones, Smith, & Royster, 2017). The case studies on scavenger hunts examined tend to report that the choice in a scavenger hunt for their library stems from a desire to showcase the library as fun or a place of enjoyment, coinciding with the trend of gamification in libraries.

A substantial benefit of the development and application of scavenger hunt exercises in academic libraries is the ability to employ gamification principles to create a more engaging experience. Employing gamification techniques, or the application of game elements to the instruction activity, has documented outcomes including the “ability to capture people’s attention, to engage them in a target activity, and even to influence their behavior” (Kim, 2015). In particular, gamification has a unique draw for academic libraries in “improving the pedagogical efficacy of library instruction as well as both raising library patrons’ awareness of available library services and resources and promoting their use” (Kim, 2015).

As Walsh (2014) reports, gamification and incorporating elements of play to library settings is crucial as these techniques “can help us feel we

are in a safe environment to experiment and to learn new things that we may otherwise be reluctant to do,” which is crucial in library orientation settings. In their case study of a gamified library orientation program, Reed and Miller (2020) found that gamification especially appealed to undergraduate students, particularly in, “acclimating users to the library, as well as encouraging their future use of the physical library.” For academic libraries designing original orientation activities, particularly for incoming undergraduate students, the appeal of gamification cannot be overlooked as a motivating factor for selecting a scavenger hunt methodology.

Despite the intended positive outcomes of scavenger hunts in libraries, there are drawbacks. As identified by McCain (2007), deterrents from library-based scavenger hunts have been noted from as early as the 1940s. While these early publications on scavenger hunts lack the modern expectations for library-based research, and therefore lack structure and evidence, they are worth considering within the history of scavenger hunts in academic libraries. In a discussion of the role of teacher and librarian collaboration in orienting students to library research, Baker and Dobson (1948) warns against inviting large crowds of students to the library for orientation sessions as it “produces the same effect on library materials that a swarm of locusts can create in a field of wheat.” (311). A 1957 conference paper similarly advises against these activities, “to avoid mutilation of reference materials in the library when they are used for ‘scavenger hunts.’” (“The Library Research Paper in the Freshman Course,” 194).

Despite certain fundamental shifts in the role of academic libraries from these reports from the mid-20th century, current research also identifies many drawbacks to library scavenger hunts. Lack of relation to teaching outcomes, difficulties in planning and execution, and high staff demand have been identified as detractors to library implementation of scavenger hunt assignments (Jones et al., 2017; Rugan & Nero, 2013). In a 2007 study of college and university library websites, McCain identified ninety-eight library-affiliated websites that had negative comments or suggestions about library scavenger hunts, though many of these were anecdotal comments from librarians and appeared to be posted on blogs or informal communication, rather than based on research (McCain, 2007).

To help mitigate the impact of these drawbacks, Rugan and Nero (2013) recommend that libraries collaborate with teaching faculty, utilize emerging technologies, and prepare “canned” scavenger hunts on common topics to prevent the creation of inapplicable scavenger hunt assignments. Collaboration, gamification, and greater assessment of scavenger hunt activities may very well be the vital combination for ensuring the success of an academic libraries’ scavenger hunt.

Despite the long anecdotal history of scavenger hunts in academic libraries, the research on this teaching and outreach tool is scant, particularly from library and information science scholars. This systematic review seeks to examine the existing literature to ascertain the extent to which scavenger hunts in academic libraries have been implemented and assessed, in the hopes of identifying trends and areas of growth for future academic library scavenger hunts.

Methods

The following section outlines the methods undertaken to explore and systematically review existing evidence on the implementation and efficacy of academic library scavenger hunts for contribution to the LIS knowledge base. The investigators were initially interested in ascertaining how often a librarian was involved in the planning, whether the library’s physical space was used, and if scavenger hunts that involved librarians increased student awareness and use of the academic libraries. Due to lack of research that explored the original research question, the author adjusted their research questions to match the available data. The investigators identified the following three research objectives to guide this systematic review (Fig. 1):

To specify the stated objectives and methods of this systematic

- Objective 1: To explore the available examples for library-based scavenger hunts.
- Objective 2: To investigate the methodological quality of research on the use of scavenger hunts in academic library settings.
- Objective 3: To determine the effectiveness of the scavenger hunt as an instruction or active learning tool.

Fig. 1. Research objectives.

review the team devised and documented, in advance, explicit and relevant protocol criteria using the PRISMA-P guidelines in conjunction with recommendations in the Cochrane Handbook. While the protocol was not registered, it records the investigators’ methods for extracting information related to the defined objectives of the review and included selection and screening through pre-defined eligibility criteria outlined in the systematic review protocol: language written, timing, study design, setting, planned participant, intervention, control, and outcome (PICO). The systematic review team selected SPICE and PICO frameworks for defining the concepts in the research question. PICO is the dominant framework applied in Evidence-Based Practice and is commonly used in the fields of healthcare and health sciences librarianship. SPICE introduces more nuance to the research question by considering study setting and evaluation. The PICO and SPICE frameworks complemented one another to provide an appropriate match for the team’s research question (Fig. 2).

No publication date, or publication status restrictions were imposed, but non-English language publications and virtual-only library scavenger hunt activities were excluded. Qualitative, quantitative, and mixed methodology studies: Randomized controlled trials, quasi-experimental designs, multiple-baseline designs, single-case experimental designs, case studies, proceedings, posters, theses, dissertations, and paper presentations outlining research findings on scavenger hunts in the physical space of academic, university, or college libraries were considered eligible for inclusion. It was determined that “hybrid” (virtual and physical combination) models utilizing library space and/or resources would also be included in data collection. The participant population was made up of prospective and enrolled university and

college students (Fig. 3).

An iterative approach was used to search for relevant publications on academic library scavenger hunts. Investigators devised a systematic search strategy to identify all studies meeting the eligibility criteria defined in the protocol. Pertinent databases, Open Grey, conference proceedings, and Google Scholar were selected, agreed upon (Fig. 4), and searched using the formulated search string (Fig. 5).

When searching different databases, search strings were modified and combined with database specific search terms and controlled vocabulary. In addition, the team reviewed the bibliographies of all eligible studies to ensure that all relevant literature was included in the review. Per protocol, the searches were re-run prior to final analyses and there were no newly published articles that met the inclusion criteria for this systematic review.

To determine article inclusion, the researchers developed a 4-staged article screening and selection criteria framed in the Preferred-Reporting of Items for Systematic Reviews and Meta-Analyses Statement (PRISMA) protocols. Searches were recorded per protocol and were conducted in June 2019 and updated in November 2020 (Fig. 6).

All articles retrieved from searching were merged into Zotero citation management tool. The articles were then deduplicated and arranged in folders delineating the phases of the article review process: Title/Abstract and Full Text Review. Titles were divided equally between the researchers to ascertain eligibility for full-text review. After initial screening of titles and abstracts, researchers utilized the SPICE method (setting, population, intervention, context, evaluation) to capture the applicable data that corresponded with the four identified objectives of the systematic review. Full-text article eligibility screening

<p>SPICE</p> <p>Setting</p> <ul style="list-style-type: none"> ● Individuals in a physical academic library setting <p>Population or Perspective</p> <ul style="list-style-type: none"> ● College or University students <p>Intervention(s)</p> <ul style="list-style-type: none"> ● Any assessment, intervention, or use of a library-based scavenger hunt <p>Context</p> <ul style="list-style-type: none"> ● Studies conducted around the world and published in English will be included <p>Evaluation</p> <ul style="list-style-type: none"> ● Did the library scavenger hunt improve student ability to use the library or find better quality materials for their research/assignments
<p>PICO</p> <p>Population or Perspective</p> <ul style="list-style-type: none"> ● College or University students <p>Intervention(s)</p> <ul style="list-style-type: none"> ● Any assessment, intervention, or use of a library-based scavenger hunt <p>Context</p> <ul style="list-style-type: none"> ● Studies conducted around the world and published in English will be included <p>Outcome(s)</p> <ul style="list-style-type: none"> ● Any outcome will be considered for inclusion

Fig. 2. SPICE and PICO.

Inclusion and Exclusion Criteria	
Condition or domain being studied: Academic Library Scavenger Hunts	
<u>Inclusion Criteria</u>	
<ul style="list-style-type: none"> • Academic university or college Libraries • Scavenger hunts in the library’s physical space • Hybrid (virtual and physical combination) scavenger hunts utilizing library space and/or resources • Prospective/enrolled students at a university or college • Must be a study design with a population and a measurement to assess outcomes related to the scavenger hunt 	
<u>Exclusion Criteria</u>	
<ul style="list-style-type: none"> • Non-English Language Publication • Virtual only (no physical actions or components located in the library’s space) scavenger hunts 	

Fig. 3. Inclusion and exclusion criteria.

Selected Databases and Sources of Grey Literature

Academic Databases and Search Engines	<ul style="list-style-type: none"> • Education Full Text • Eric • PubMed • CINAHL • Web of Science • Library Literature and Information Science • Library Information Science and Technology • Dissertations and Theses Full Text • PsycInfo • Google Scholar
Grey Literature and Professional Organizations	<ul style="list-style-type: none"> • GreySource • Open Grey • American Library Association • Association of College and Research Libraries • Medical Library Association

Fig. 4. Selected databases and sources of grey literature.

Librar* AND (Academic OR college OR “higher education” OR universit*) AND “Scavenger hunt”

Fig. 5. Search string(s).

was established using a Scavenger Hunt Article Analysis Rubric designed by the authors, to extract, examine, and evaluate the information from each publication identified in the title/abstract review. The data collected included study population, research design, goals/outcomes, execution and analysis, author identified limitations and investigator identified limitations. Researchers met virtually to discuss article inclusion for full-text review.

After title/abstract article eligibility screening, researchers designed

and implemented a data collection checklist to efficiently extract pertinent data from each eligible full-text article (Appendix A: [Blank Data Extraction Form](#)). The checklist included data for demographic information, study length, desired outcomes, method of data collection, measurements used for data collection, validation (if any) of the measurements used, scavenger hunt methodology, findings, and author identified limitations (Fig. 7: Data extracted). Reviewer assessment of study limitations was also included here. In the first phase of this

- o **Searches** in agreed databases and will be performed, along with hand searching in order to present all members of the team with the relevant search results.
- o **Initial screening of titles and abstracts** by all of the investigators. All articles that are relevant will be pulled by this stage.
- o **Full paper screening.** Includes all papers identified as being possibly relevant by at least 2 of the reviewers. Papers will be read by the investigators and evaluated for inclusion into the systematic review. Independent reviews of the selected publications by all of the investigators will be analyzed using the SPICE framework. If disagreement about inclusion and/or ranking of a publication occurs, the majority consensus will dictate the outcome.
- o **Pre-submission search** Before submission of systematic review for publication, all databases will be searched again to ensure no relevant research is overlooked.

Fig. 6. Stages of study selection, data extraction, selection.

1. Study populations (including the number of participants, age of participants, distribution of participants, study location, library type, if available)
2. Research Design
3. Is a librarian involved with the design, execution, or analysis of the library scavenger hunt?
4. What is the goal of the scavenger hunt (information literacy, orientation, etc)?
5. Describe how the scavenger hunt was conducted
6. Is the library scavenger hunt a primary or secondary outcome as identified by the authors?
7. What are the author identified limitations, as related to outcomes tied to library scavenger hunts?
8. What do the investigators (us) see as limitations to this study (reproducibility, validated measurements, sample size, research methodology)?

Fig. 7. Data extracted.

process, the publications were divided equally among the researchers to be independently reviewed and assessed and article data was extracted and recorded into the checklist. In the second part of this process the researchers were assigned a different group of articles so that each eligible article was reviewed by two researchers.

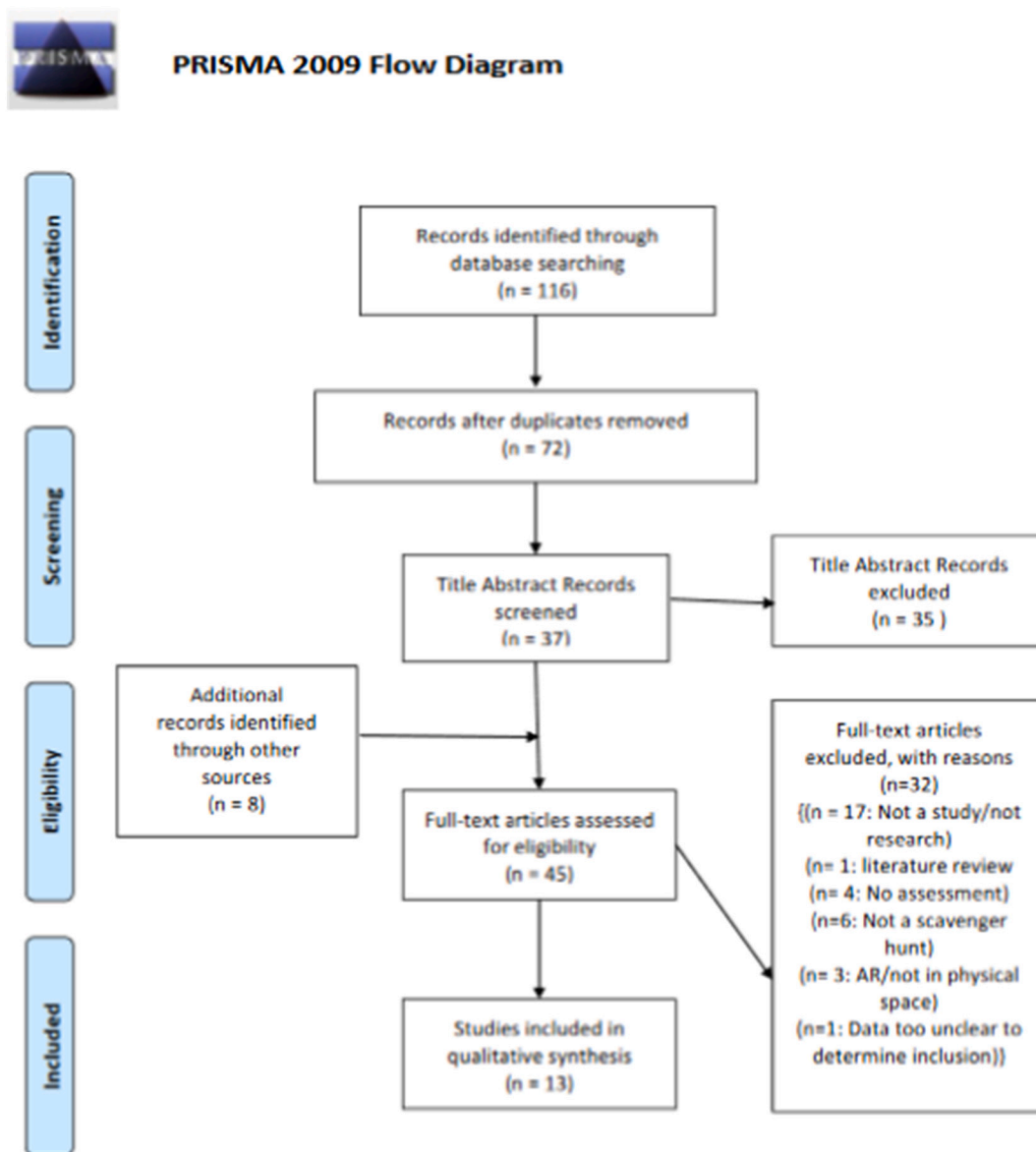
The data extracted assisted the investigators in analyzing the publications for the stated objectives and PICO question. Once selected publications were independently reviewed and recorded on the checklists by two reviewers, the investigators met virtually to consider as a group inclusion criteria outlined per protocol (Fig. 9). The papers were presented in alphabetical order to avoid selection bias and the investigator assigned to the article enumerated their decision for inclusion/exclusion to the team. It was pre-determined in the protocol that at least two of the reviewers must agree on whether a study met the inclusion criteria before it was added to the systematic review. If consensus wasn't reached, a third researcher reviewed the article and majority vote determined the final decision on inclusion to the final systematic review.

The process of data collection and management was designed to be consistent using pre-defined methodology. Methodical adherence to the documented protocol helped to mitigate issues of bias. The protocol's eligibility criteria facilitated the empirical identification and selection of

articles. Independent assessment and review by each investigator reduced reporting and selection bias. The multi-institutional team members brought with them diverse backgrounds and a spectrum of experiences that contributed to a multi-perspective review. For example, one team member is new to the library field, thereby providing an objective viewpoint for the systematic review process. Grey and unpublished literature were specifically included to offset issues of publication bias. Combined, these processes served to strengthen reliability and validity of the systematic review (Figs. 8).

Results/analysis

The authors analyzed the results of thirteen articles selected for final inclusion. Table 1 outlines the general information of the included articles. Of the thirteen, all were case studies utilizing various methods of formal and informal assessments. Four explicitly noted the population number of students who participated in the scavenger hunts (Bailin, 2015; Bailin, Jahre, & Morris 2018; Boss et al., 2015; Donald, 2008). Eight articles described the population that participated in the scavenger hunts (Bailin, 2015; Boss et al., 2015; Davis, 2019; Donald, 2008; Kasbohm et al., 2006; Marcus & Beck, 2003; Vrbancic & Byerley, 2018;



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For more information, visit www.prisma-statement.org.

Fig. 8. PRISMA 2009 flow diagram.

Wells, 2012) and just one explicitly detailed the length of the scavenger hunt (Marcus & Beck, 2003).

Table 2 explores the desired outcomes that each of the selected articles explicitly identified prior to conducting scavenger hunts. Outcomes included students having a fun and engaging experience during the scavenger hunt activities, becoming oriented to library spaces, learning information literacy skills, using technologies in the library, becoming oriented to library materials and resources, learning about library policies, and engaging with other campus partners. The top three identified learning objectives were 1) space orientation, 2) materials & resources orientation, and 3) use of library technologies. Having fun and

engaging through the scavenger hunt was another common outcome. Fewer authors identified information literacy, policies, and campus partners as a desired outcome of scavenger hunts.

Each article took unique approaches to the design of the scavenger hunt. The authors identified six elements of the scavenger hunts (shown in Table 3) including use of technology, inclusion of a theme, formation of teams, inclusion of timed activities, revision of the scavenger hunt design, and review of assessment tools prior to the activity. Twelve articles utilized technology in some form during the scavenger hunt. Ten included a themed hunt and eleven of them formed teams of students to conduct the hunt. Just over half of articles included a time element or

- Bailin, K. (2015). From “The Research Games” to tours: The evolution of first year orientation activities. *College & Research Libraries News*, 76(11), 586–589.
<https://doi.org/10.5860/crln.76.11.9413>
- Bailin, K., Jahre, B., & Morris, S. (2018). Hunger to change the game: Using assessment to continually evolve a library orientation. In *Planning Library Orientations* (pp. 293-302). Chandos Publishing. <https://doi.org/10.1016/B978-0-08-102171-2.00030-1>
- Bielat, V., Zedan, G., & Remenapp, S. (2018). Connecting new freshmen with the library: People, places, and problem solving. In *Planning Library Orientations* (pp. 65-74). Chandos Publishing. <http://doi.org/10.1016/B978-0-08-102171-2.00007-6>
- Boss, K., Angell, K., & Tewell, E. (2015). The Amazing Library Race: Tracking student engagement and learning comprehension in library orientations. *Journal of Information Literacy*, 9(1), 4-14. <http://dx.doi.org/10.11645/9.1.1885>
- Davis, R. C. (2019). Introducing first-year and transfer students to a college library with a historical mystery from the special collections. *College & Undergraduate Libraries*, 26(4), 278-300. <http://doi.org/10.1080/10691316.2019.1695034>
- Donald, J. W. (2008). The 'Blood on the Stacks' ARG: Immersive Marketing Meets Library New Student Orientation. https://digitalcommons.trinity.edu/lib_faculty/46
- Kasbohm, K. E., Schoen, D., & Dubaj, M. (2006). Launching the library mystery tour: A library component for the “first-year experience”. *College & Undergraduate Libraries*, 13(2), 35-46. https://doi.org/10.1300/J106v13n02_03
- Marcus, S., & Beck, S. (2003). A Library Adventure: Comparing a treasure hunt with a traditional freshman orientation tour. *College & Research Libraries*, 64(1), 23–44.
<https://doi.org/10.5860/crl.64.1.23>
- Pike, C., & Alpi, K. (2015). Hunting for knowledge: Using a scavenger hunt to orient graduate veterinary students. *Issues in Science and Technology Librarianship*.
<https://scholarworks.iupui.edu/handle/1805/11553>

Fig. 9. Articles included in systematic review.

race in the scavenger hunt. Over half of articles revised their scavenger hunt at some point in the middle of the case study. Few assessment tools were reviewed or tested for validity prior to the scavenger hunt activities.

Articles discussed more stated findings of the scavenger hunt than identified desired outcomes. Additional findings included the use of library space, materials, resources and services, feelings of confidence and comfort among students using the library, and the improvement of scavenger hunt methods. Table 4 below outlines the findings of each article. The additional findings could be a result of conducting informal observations and using methods for unstructured, informal feedback.

Additionally, self-reflection from the author(s) on the success of the scavenger hunts seemed to be an informal finding that reflected the interest to create a sustainable, fun, and useful activity to orient students to the library. All articles noted that students became familiar with library materials, resources, and services, and nine articles described that students became more familiar with the library’s space, technologies, and thought that the scavenger hunt was fun and engaging. Eight noted the confidence and comfort levels of students who participated in scavenger hunts and six articles described ways to improve scavenger hunts in the future.

A number of articles reflected on the scavenger hunt planning and

- Smith, A., & Baker, L. (2011). Getting a clue: Creating student detectives and dragon slayers in your library. *Reference Services Review*, 39(4), 628–642.
<https://doi.org/10.1108/00907321111186659>
- Vrbancic, E. K., & Byerley, S. L. (2018). High-touch, low-tech: Investigating the value of an in-person library orientation game. *College & Undergraduate Libraries*, 25(1), 39-51.
<https://doi.org/10.1080/10691316.2017.1318429>
- Wells, V. A. (2012). Hunting for QR codes: Linking students to the music collection. *Music Reference Services Quarterly*, 15(3), 137-148. <http://doi.org/10.1080/10588167.2012.700831>
- Zitron, L., & Drew, C. (2011). Get a clue: Partnering with student affairs on student-centered outreach. *College & Research Libraries News*, 72(11), 636–641.
<https://doi.org/10.5860/crln.72.11.8669>

Fig. 9. (continued).

facilitation from the librarian and library staff perspective. Many of the articles identified that communication between library workers and scavenger hunt creators and leaders was a challenge and required a bit of effort to coordinate when designing the library scavenger hunts (Bailin et al., 2018; Kasbohm et al., 2006; Pike & Alpi, 2015; Vrbancic & Byerley, 2018). In some instances, library workers were not all aware of the hunt or were aware but too understaffed to help a large number of students or guide them in their hunt (Kasbohm et al., 2006; Pike & Alpi, 2015). Additionally, several articles reflected that designing and creating scavenger hunts was time and resource consuming—requiring a lot of work to plan, prepare, and run scavenger hunts (Bailin et al., 2018; Davis, 2019; Kasbohm et al., 2006; Pike & Alpi, 2015; Vrbancic & Byerley, 2018). However, Davis (2019) describes the library's partnership with another campus department, Student Academic Success Programs, as a major factor in relieving some of the burden of preparation on library workers. Similarly, Zitron, Drew, and Zitron (2011) note the reduced burden due to sharing resources and staffing with the student affairs department. Authors also noted their concern with scalability (Bailin, 2015; Vrbancic & Byerley, 2018). These internal perspectives highlight the barriers to planning and coordinating scavenger hunts and the impacts to timing and staffing resources that should be considered when exploring these activities.

Discussion

The original intention of the authors of this paper was to use a systematic review approach to investigate whether a librarian led library scavenger hunt was an effective method of orienting university students to the library and explore if there was any available literature on the effectiveness of scavenger hunts as a means of information literacy instruction. After the initial search resulted in insufficient literature to address the research question, the authors decided to broaden the question to investigate if library-based scavenger hunts are an effective means of orienting students to the library and if library scavenger hunts can be an effective form of instruction. Specifically, we examined if the authors who facilitated the scavenger hunts were able to achieve their desired outcomes. The literature presented in this systematic review is not able to provide clarity regarding the effectiveness of library-based scavenger hunts for orienting students to university libraries, nor does the data collected from the articles provide enough evidence to determine if library-based scavenger hunts can effectively introduce students

to library services or information literacy. Articles presenting library scavenger hunts as a method of orientation and/or as a form of instruction are not only scarce but have methodological weaknesses and inconsistencies between objectives and findings. Many factors contribute to the weak quality of research on this much-discussed topic, including but not limited to poor research design, unclear reporting, and lack of consistent data collection.

In general, there is a lack of published research on scavenger hunts in academic libraries with a rigorous methodological design, however this systematic review's inclusion criteria, as outlined in Appendix A, specifically required that articles included for analysis meet standards that describe a basic human subject based study design. There is much room for improvement in the literature, as many of the publications included in this systematic review only met a few of the requirements for well-designed human subject based research. Only Marcus & Beck (2003) provided a stated research time frame and explicitly covered a single intervention and a specific population. Some articles included multiple years of data and/or made a methodological change within those years but did not specify what data belonged to what years. Some authors combined pilot data with non-pilot data, and ultimately presented incomplete or mixed data, making it challenging to separate the data sets for meaningful analysis. This lack of clarity made analysis even more difficult.

Few articles provided a true *n*, meaning the number of students who participated in the scavenger hunt. In fact, none of the articles included have a stated *n* in combination with a stated length of study. While Bailin (2015), Bailin et al. (2018), Boss et al. (2015), Donald (2008), and Pike and Alpi (2015), provide the number of students that participated, they do not provide the study length, preventing true analysis of the participation information. None of the articles listed above reviewed provided demographic data beyond the year enrolled in school. This is highly problematic as it provides a limited understanding of the effectiveness of implementing scavenger hunts across a broader population. While Well (2012) states that participating students are in a music course, and Pike and Alpi (2015) specifically state that participants are veterinary students, it would be helpful to have more complete demographic information. There are many demographic data points that are needed in order to consider whether students found scavenger hunts to be helpful and if scavenger hunts were truly effective, as such how previous familiarity with libraries might impact students or if students would have benefitted more if the instructions had been in a language other than English or

Table 1
General information of articles selected for inclusion

Article	Assessment type/ instruments used	Explicitly states population number	Explicitly describes population	Explicitly states study length
Bailin (2015)	Single survey, observation, informal feedback	2013- 41 participants 2014- 47 participants	First year students	-
Bailin et al. (2018)	Single survey, informal Feedback	84 in 2015, 77 in 2016, 70 in 2017	-	-
Bielat et al. (2018)	Informal Feedback, follow up email	-	-	-
Boss et al. (2015)	Observation, worksheet	185 in 2013, 227 in 2014	First year students	-
Davis (2019)	Single survey, worksheet	-	First year and transfer students	X (no details)
Donald (2008)	Single survey	42 first years, 14 residents	First year students and resident mentors	-
Kasbohm et al. (2006)	Pre-post survey, single survey	-	First year experience students	-
Marcus & Beck (2003)	Observation, single survey, informal feedback, worksheet	-	Incoming freshmen	One 50-minute session; 26 classes 21.66 h
Pike & Alpi (2015)	Worksheet, single survey	2012 is stated as N = 92. 2013, n is not stated	-	-
Smith & Baker (2011)	Observation, single survey	-	-	-
Vrbancic & Byerley (2018)	Single survey, worksheet	-	Incoming freshmen and transfer students	-
Wells (2012)	Worksheet, single survey	-	Freshmen in music course	-
Zitron et al. (2011)	Single survey	-	-	-

created with accessible technology in mind.

None of the articles utilized a validated measure; all of the articles in this review utilized in-house created measurements to assess student outcomes. Only Boss et al. (2015), Pike & Alipi (2015), and Wells (2015), indicated that the measurement used was pretested for logic and usability before being used for the scavenger hunt. These measurements

Table 2
Author-identified desired outcomes of scavenger hunts.

Article	Fun/engagement	Space orientation	Information literacy	Technology	Materials & resource orientation	Policies	Partners
Bailin (2015)		x		x	x		x
Bailin et al. (2018)	x	x			x		
Bielat et al. (2018)	x	x		x	x		x
Boss et al. (2015)	x	x		x	x		
Davis (2019)	x	x		x	x		x
Donald (2008)		x		x			
Kasbohm et al. (2006)	x	x	x	x	x		
Marcus & Beck (2003)	x	x	x	x			
Pike & Alpi (2015)		x		x	x		
Smith & Baker (2011)		x		x	x		
Vrbancic & Byerley (2018)	x	x		x	x		
Wells (2012)		x	x		x		
Zitron et al. (2011)	x			x	x		x

covered a wide variety of objectives, but the most common was familiarity with materials, resources, and/or services offered at the library. While every article in this systematic review indicated that increasing student knowledge of materials, resources, and/or services offered at the library was part of the findings, these same articles did not necessarily have those specific elements listed as stated objectives of the research. As an example, promoting fun and engagement in the scavenger hunt was listed as desired outcome for eight out of the thirteen included articles (Balin et al., 2018; Bielat, Zedan, & Remenapp 2018; Boss et al., 2015; Davis, 2019; Kasbohem et al., 2006; Marcus & Beck 2003; Vrbancic & Byerley 2018; and Zitron et al., 2011), and recorded as a finding in nine out of thirteen (Balin 2015; Balin et al. 2018; Boss et al., 2015; Davis, 2019; Kashbohem et al. 2006; Marcus & Beck 2003; Smith & Baker, 2011; Vrbancic & Byerley, 2018; and Wells, 2012). Not only do these numbers not align, but promoting fun and engagement was reported as being measured in some of the articles that reported this outcome. This is just one example of the great divide between the stated objectives of the published literature on scavenger hunts and the items that were assessed by the article authors. Further complicating the matter is the fact that many objectives were not explicitly stated in the articles, but rather implied, often in the results sections.

The available published literature on library-based scavenger hunts does not provide enough evidence for the authors of this systematic review to make clear determinations about the effectiveness of library-based scavenger hunts for library instruction and orientations. Based on the findings of this systematic review, it is clear that publications on this topic are focused on describing the creation and implementation of scavenger hunts, rather than on providing analysis on the outcomes of scavenger hunts. While it is often helpful to have non-experimental literature to describe what others have done, scavenger hunts have long been a topic of discussion among academic librarians, and the need for experimental literature is evident to demonstrate the value of these library activities. Without stronger research, it is not possible to make an evidence-based decision regarding whether to engage in a scavenger hunt in an academic library, especially considering the amount of time, resources, and energy creating a scavenger hunt requires. The lack of sound literature on this topic emphasizes possible missed opportunities for a new and interesting form of orientation and/or instruction, and delays library workers from understanding if a scavenger hunt would be an appropriate and effective use of library resources.

Conclusion

The findings of this systematic review indicate that the question of whether a scavenger hunt is an effective tool remains unanswered, as there needs to be well designed and well documented research on scavenger hunts in libraries produced before any progress can be made in understanding the effectiveness of the methodology. Future research should focus on elevating the research methodology and fulfilling the basic standards for reporting human subject research methodology.

Table 3
Included elements of scavenger hunts.

Article	Used technology	Included a theme	Team-based	Time Element	Revised SH method in middle of study	Measurement reviewed/tested
Bailin (2015)	x	x	x	x	x	
Bailin et al. (2018)			x	x	x	
Bielat et al. (2018)	x	x	x			
Boss et al. (2015)	x	x	x	x		x
Davis (2019)	x	x	x		x	x
Donald (2008)	x	x	x			
Kasbohm et al. (2006)	x	x	x	x	x	
Marcus & Beck (2003)	x	x		x	x	
Pike & Alpi (2015)	x		x			x
Smith & Baker (2011)	x	x		x	x	
Vrbancic & Byerley (2018)	x	x	x		x	
Wells (2012)	x		x	x	x	x
Zitron et al. (2011)	x	x	x	x		

Table 4
Article findings.

Article	Fun/engaging	Space familiarity	Information literacy	Technology familiarity	Familiarity with materials, resources, and services	Familiarities with policies	Familiarity with partners	Use of space, materials, resources, and services	Confidence and comfort using the library	Improve SH
Bailin (2015)	x				x				x	
Bailin et al. (2018)	x	x			x				x	x
Bielat et al. (2018)		x		x	x		x	x	x	
Boss et al. (2015)	x		x		x					
Davis (2019)	x	x	x	x	x					x
Donald (2008)		x	x	x	x			x	x	
Kasbohm et al. (2006)	x	x		x	x			x	x	x
Marcus & Beck (2003)	x	x		x	x			x	x	
Pike & Alpi (2015)		x		x	x	x		x		x
Smith & Baker (2011)	x	x		x	x				x	x
Vrbancic & Byerley (2018)	x			x	x				x	
Wells (2012)	x	x			x					
Zitron et al. (2011)				x	x		x	x		x

To better determine if scavenger hunts are effective for student learning in libraries, future research should include the following: 1) more meaningful participant demographics should be collected and clearly provided in the published literature; 2) the number of participants should always be recorded and reported in each iteration of the scavenger hunt and assessment activities 3) research design must be replicable and methodologically sound, utilizing control groups and blinding if possible; 4) the same measurement should be used throughout the research data collection period of a scavenger hunt; 5) outcome measures and forms of assessment should relate to the stated research questions; 6) data from one scavenger hunt design must be clearly and separately reported, avoiding mixing multiple interventions in one publication; 7) there should be an assessment of both short and long term benefit for participants. Realistically, there are numerous challenges and barriers for future researchers to meet all of these suggestions including the inability to collect meaningful demographic data,

the difficulty with creating control groups and blinding studies, and the difficulty creating validated or consistent measurements. The above suggestions should be taken with considerations for the available resources and abilities of librarians conducting future research on this topic.

Declaration of competing interest

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Appendix A. Blank data extraction form

Article title:	Check	Page/notes
Article information		
Explicitly states population number		
Explicitly describes population		
Orientation style		
Explicitly states study length		
Desired outcomes of scavenger hunt		
Fun/engagement		
Space orientation		
Information literacy		
Technology		
Materials and resources orientation		
Policies		
Partners		
Method of data collection		
Pre-post survey		
Single survey		
Observation/description		
Informal feedback		
Worksheet		
Comparison		
Other		
SH method		
Used technology		
Included a theme		
Team-based		
Time element		
Revised scavenger hunt method in the middle of the study		
Findings (only mentioned in the results section)		
Fun/engaging		
Space familiarity		
Information literacy		
Technology familiarity		
Familiarity with materials, resources and services		
Familiarity with policies		
Familiarity with partners		
Use of space, materials, resources and services		
Confidence and comfort using library		
Improve SH		
Study limitations (author identified)		
Lack of validated tool		
Difficulty replicating study		
Population size unclear/too small		
Tech limitations/difficulties		
SH-focused weaknesses (timing, challenging, unclear)		
Research methodology weakness (inconsistent, flawed, unclear)		
Study limitations (reviewer identified)		
Lack of validated tool		
Difficulty replicating study		
Population size unclear/too small		
Technology access and usability not considered or described		
SH-focused weaknesses (timing, challenging, unclear)		
Research methodology weakness (inconsistent, flawed, unclear)		

References

- Bailin, K. (2015). From "the research games" to tours: The evolution of first year orientation activities. *College & Research Libraries News*, 76(11), 586–589. <https://doi.org/10.5860/crln.76.11.9413>
- Baker, O. J., & Dobson, A. (1948). The teacher's part in fostering the student's use of the library. *The Journal of Higher Education*, 19(6), 307–312. <https://doi.org/10.1080/00221546.1948.11775752>
- Bailin, K., Jahre, B., & Morris, S. (2018). Hunger the change the game: Using assessment to continually evolve a library orientation. In *Planning library orientations* (pp. 293–302). Chandos Publishing. <https://doi.org/10.1016/B978-0-08-102171-2.00030-1>.
- Bielat, V., Zedan, G., & Remenapp, S. (2018). Connecting new freshmen with the library: People, places, and problem solving. In K. Bailin, B. Jahre, & S. Morris (Eds.), *Planning library orientations* (pp. 65–74). Chandos Publishing. <https://doi.org/10.1016/B978-0-08-102171-2.00007-6>.

- Boss, K., Angell, K., & Tewell, E. (2015). The amazing library race: Tracking student engagement and learning comprehension in library orientations. *The Journal of Information Literacy*, 9(1), 4. <https://doi.org/10.11645/9.1.1885>
- Bowles-Terry, M., & Kvenild, C. (2015). *Classroom assessment techniques for librarians*. Association of College and Research Libraries.
- Brown, A. G., Weingart, S., Johnson, J. R., & Dance, B. (2004). Librarians don't bite: Assessing library orientation for freshmen. *Reference Services Review*, 32(4), 394–403. <https://doi.org/10.1108/00907320410569752>
- Davis, R. C. (2019). Introducing first-year and transfer students to a college library with a historical mystery from the special collections. *College & Undergraduate Libraries*, 26(4), 278–300. <https://doi.org/10.1080/10691316.2019.1695034034>
- Donald, J. W. (2008). The 'blood on the stacks' ARG: Immersive marketing meetings library new student orientation. In A. Harris, & S. E. Rice (Eds.), *Gaming in academic libraries: Collections, marketing, and information literacy* (pp. 189–221). American Library Association.
- Jones, J. A., Smith, S., & Royster, M. (2017). The scavenger hunt as an active learning technique. *NACTA Journal*, 61(1), 94–95.
- Kasbohm, K. E., Schoen, D., & Dubaj, M. (2006). Launching the library mystery tour: A library component for the "first-year experience". *College & Undergraduate Libraries*, 13(2), 35–46.
- Kim, B. (2015). Gamification in education and libraries. *Library Technology Reports*, 51(2), 20–28.
- Lu, Y., Chao, J. T., & Parker, K. R. (2015). HUNT: Scavenger hunt with augmented reality. *Interdisciplinary Journal of Information, Knowledge, and Management*, 10, 021–035.
- Marcus, S., & Beck, S. (2003). A library adventure: Comparing a treasure hunt with a traditional freshman orientation tour. *College & Research Libraries*, 64(1), 23–44. <https://doi.org/10.5860/crl.64.1.23>
- McCain, C. (2007). Scavenger hunt assignments in academic libraries. *College & Undergraduate Libraries*, 14(1), 19–31. https://doi.org/10.1300/J106v14n01_02
- Pike, C., & Alpi, K. M. (2015). Hunting for knowledge: Using a scavenger hunt to orient graduate veterinary students. *Issues in Science and Technology Librarianship*, 81. <https://doi.org/10.5062/F41834HP>
- Reed, K., & Miller, A. (2020). Applying gamification to the library orientation. *Information Technology and Libraries*, 39(3).
- Rugan, E., & Nero, M. (October 1, 2013). Library scavenger hunts: The good, the bad, and the ugly. *The Southeastern Librarian*, 61(3). <https://digitalcommons.kennesaw.edu/seln/vol61/iss3/4>.
- Smith, A., & Baker, L. (2011). Getting a clue: Creating student detectives and dragon slayers in your library. *Reference Services Review*, 39(4), 628–642. <https://doi.org/10.1108/00907321111186659>
- Vrbancic, E. K., & Byerley, S. L. (2018). High-touch, low tech: Investigating the value of an in-person library orientation game. *College & Undergraduate Libraries*, 25(1), 39–51. <https://doi.org/10.1080/10691316.2017.1318429>
- Walsh, A. (2014). The potential for using gamification in academic libraries in order to increase student engagement and achievement. *Nordic Journal of Information Literacy in Higher Education*, 6(1), 39–51.
- Wells, V. (2012). Hunting for QR codes: Linking students to the music collection. *Music Reference Services Quarterly*, 15(3), 137–148. <https://doi.org/10.1080/10588167.2012.700831>
- Zitron, L., Drew, C., & Zitron, L. (2011). Get a clue. *College & Research Libraries News*, 72(11), 636–641. <https://doi.org/10.5860/crln.72.11.8669>