

Use of Systematic Search and Review to Examine School Library Learning Environment Concepts

Barbara Schultz-Jones¹, Michelle Farabough² and Cynthia Ledbetter³

¹University of North Texas

²University of North Texas

³University of Texas at Dallas

Abstract: To examine the use of the term *learning environment* by the school library community we conducted a rigorous review of publications in 2015 and a confirmatory review in 2018. Since library and information science (LIS) in the United States has no professionally accepted tiered or ranked list of journals, a broad critical literature review was proposed using systematic search and review. The resulting dataset of 45 publications were appraised and synthesized for research evidence about how primary and secondary school libraries have defined and implemented various factors, toward describing and evaluating a learning environment. A content analysis was performed using message ideas as the unit of analysis on words used to explicitly describe the concept of learning environment. Element categories were proposed and syntaxes were reviewed until 10 mutually agreed-upon elements of school library learning environments were determined as supported by the literature. Few evaluation methods were identified. Challenges with employing the systematic search and review process to LIS concepts are discussed.

Keywords: learning environment, school library, systematic search and review, content analysis, message ideas

1. Introduction

The school library as a learning environment has been described as a dynamic domain where dedicated professionals and students engage collaboratively in an active and evolving educational climate. According to the American Association of School Librarians [AASL] (2016):

Effective school libraries are dynamic learning environments that bridge the gap between access and opportunity for all K–12 learners. Under the leadership of the school librarian, the

school library provides students access to resources and technology, connecting classroom learning to real-world events. By providing access to an array of well-managed resources, school libraries enable academic knowledge to be linked to deeper, personalized learning. The expanded learning environment of the school library ensures the unique interests and needs of individual students are met. In this way, effective school library programs prepare students for college, career, and community.

A learning environment can be viewed from a variety of perspectives. According to the Glossary of Education Reform (Great Schools Partnership, 2013), **learning environment** “refers to the diverse physical locations, contexts, and cultures in which students learn”; “the term is often used as a more accurate or preferred alternative to *classroom*, which has more limited and traditional connotations.” The term incorporates the presiding ethos and characteristics of the environment, including how individuals interact with each other, how the educational setting is organized to facilitate learning, and overarching factors such as school policies and governance structures. The elements of a learning environment are complex and interconnected. At the core, learning environments have a definite purpose, defined by the direction of education and theories of learning. And it is the nature of the shift from content-driven and teacher-centered education to a constructivist model of learning that is centered on students and their experiences, needs, and abilities that has focused the school library profession on providing a student-centered learning environment.

In 2015, Schultz-Jones, Farabough, and Hoyt examined how the educational community used the term *learning environment* in relation to the school library. Through the use of a systematic search and review and an iterative and rigorous content analysis, a set of 10 elements or “themes” were identified:

Related concepts were identified through careful examination of the context within which the concepts were presented or discussed. For example, the commonly used word “new” emerged into a category aptly “progressive” to reflect authors’ descriptions of the dynamic, forward-thinking and transitional nature of school libraries, as evidenced by the transformation of the use of the term “learning environments” over the timeline of 1967 to 2015. (p. 7)

The 10 elements are presented in Table 1.

Table 1. Learning environment elements in alphabetical order

Elements	Related Concepts Included
Collaborative	social, participate, discusses, networks, community, together, collaboration, team, commons, connect, cooperative, build, society, system, share
Creative	make, ideas, concept, develop, create, thinking, build
Evidence-based	improve, successful, quality, effectively, like, independent, choice, skills, achievement, development, better, goals, enhance, solve, strategies
Flexible	access, open, informal, comfortable, various, choice, multiple, different, types, individual, methods, variety
Progressive	modern, change, innovation, future, build, changing, responsive, emerging, new
Pedagogical	curriculum, learning/learn, classroom, students, teachers, read, activities, skills, research, librarian, science, knowledge, education, program, evaluating, acquisition, work, educational, problems, thinking, study, inquiry, strategies, system, teaching, enhance, development, guidance, professional, role, methods, structure
Resources	multimedia, books, digital, access, available, use, rich, visuals
Spaces	places, seating, quiet, atmosphere, design, area, media, structure, virtual
Supportive	safe, staff, teachers, librarians, services, inviting, comfortable, offer, welcoming, connect, active, appropriate, learner-centered, enable, positive, meeting needs, available, cooperative, society, provide, help, together, centered, share, guidance
Technology	web, access, virtual

To advance the current focus of national school librarians, AASL “began a multi-layered survey, data, and research process to revise and remodel its learning standards and school library program guidelines” (p. 9) in September 2015. The results of this process culminated in a new set of National School Library Standards for Learners, School Librarians, and School Libraries (2018). In these new national standards “school libraries staffed with qualified professionals provide an approachable, equitable, personalized learning environment necessary for every learner’s well-rounded education” (p. 11) and operate as a domain “providing an engaging learning environment that supports innovative and ethical use of information and information technologies” (p. 113). Elements of the school library learning environment are recognized throughout these standards.

In an effort to confirm and further investigate the elements of the school library learning environment, and to recognize the evolution of school libraries impacting learning outcomes, we conducted a confirmatory and updated systematic search and review to answer three research questions:

RQ1: What are the components or elements of a school library learning environment?

RQ2: Are the 2015 systematic search and review results replicable?

RQ3: To what extent do the 2018 systematic search and review results confirm the 2015 results?

Review articles are designed to help researchers and practitioners “keep up-to-date, define the boundaries of what is known and what is not known, and avoid knowing less than has been proven” (Booth & Brice, 2004, p. 111). In terms of “proven” evidence-based librarianship (EBL) was first introduced in 1997 (Eldredge) and expanded to library and information studies (LIS) in 2000 (Eldredge, 2000a,b; Booth, 2000). Although awareness of review articles is growing, primarily in medical librarianship (Xu, Kang, & Song, 2015), “one of the main difficulties in transferring the clinical systematic review model to LIS is the different knowledge base” (Urquhart, 2010, p. 2).

As we challenge the traditional use of school libraries, an understanding and assessment of the elements of an effective learning environment becomes an essential aspect of our ability to provide evidence-based practice. By employing recognized meta-research processes and reporting our findings in a systematic search and review, we aim to inform not only about learning environments in primary and secondary schools, but also about the use of review articles to advance research rigor in LIS.

2. Methodology

To assess the use of the term *learning environment* by the school library community, we conducted a rigorous review of publications in 2015 and again in 2018, ensuring our research is as up-to-date as possible (Cochrane, 2018, p. 17). Four different types of reviews, explained by Grant and Booth (2009), were considered during the examination of the literature: a standard literature review, a critical review, a systematic review, and a systematic search and review. A standard literature review in the broader sense was abandoned in favor of a more rigorous review. The critical review was eliminated because it falls short of adhering to a structured search strategy and does not explicitly present methodology for search, validation, synthesis, and analysis. We eliminated the systematic review because we did not restrict literature inclusion based on application of empirical evidence to provide insights about effectiveness of practice; rather we were looking at the relevance of the article. The type of review selected was the systematic search and review, described by Grant and Booth as useful because it “combines strengths of critical review with comprehensive search process [and] typically addresses broad questions to produce ‘best evidence synthesis’” (p. 95).

EBSCOhost, an online discovery technology, was used to systematically and simultaneously search 72 databases in 2015 and 95 databases in 2018 for relevant literature based on specific inclusion criteria (EBSCO Industries, 2018).

Formation of a search hedge was completed using an iterative process designed to translate the research questions into a format required by the EBSCOhost database search engine (Gillespie & Gillespie, 2003). A search strategy was employed to strike a balance between precision and sensitivity (Lefebvre, Manheimer, & Glanville, 2011), ensuring relevant citations were captured, while excluding an overwhelming number of irrelevant citations. The authors performed three different types of preliminary searches: phrase search, near operator, and within operator. The search terms were determined by the authors' background knowledge and research in school libraries and learning environments.

A comprehensive topic search (free-text searching) was first conducted using the phrase “learning environment” to determine the scope of the literature available. Date ranges and other search filters were not employed. When quotes are placed around multiple words, it alerts the retrieval system to search for the terms in tandem to one another, rather than searching for each one individually. The returned results lacked precision in the context of school libraries. After the phrase search, the authors conducted proximity searches using a *near operator* (*n*) search with specific terms to identify the “nearness” of terms and narrow the scope of literature for a content analysis. Again, search filters were not employed. Using the *near operator* search created a more precise number of relevant articles. The search hedge used was: *learning n1 environment n8 school n1 library*. We also tried using different combinations of these words within quotation marks (e.g., “learning environment” n8 “school library”) for a *search phrase* and *near operator* combination search hedge. However, the results returned were too precise and retrieved too few publications for consideration.

The third search method was the proximity search of *within operator* (*w*) that returns results of words or phrases within a specified number of words or phrases of each other and in the same order as they are entered into the search database, for example: “learning environment” w8 “school library.” Of the three different searches performed, the near operator search was the most effective in creating a comprehensive collection of records that balanced precision and specificity to determine a description of a school library learning environment and identify methods used for evaluation. Explicit inclusion and exclusion criteria related to context and publication type were developed, according to the aims of the study. These criteria were discussed, refined, and agreed upon by the researcher team; they are outlined below.

Inclusion criteria:

- Publications, including full-text articles and book chapters in peer- and non-peer reviewed literature.
- Use of the term “learning environment” by the K-12 school library community (primary and secondary libraries).

Exclusion criteria:

- Reports, book reviews, article reviews, advertisements, letters to the editor, full book publication formats.
- Use of the term “learning environment” in academic, public, and other libraries.

The finalized, highly sensitive search hedge was executed on March 26, 2015 and returned 106 records for all databases indexed in EBSCOhost. After discarding duplicates, titles and abstracts of 42 articles were reviewed by three authors (BS-J, MF, and RH). An additional five articles were excluded because they did not meet inclusion criteria (See Figure 1). Minor discrepancies were resolved through discussion and consultation. Full text of 38 publications was appraised by all authors and one additional article was excluded.

A constant comparison content analysis of 37 full text publications aided in synthesizing research evidence about how primary and secondary school libraries have defined and implemented various factors, toward describing and evaluating a learning environment. Interested readers can view final results in Schultz-Jones, Farabough, & Hoyt (2015).

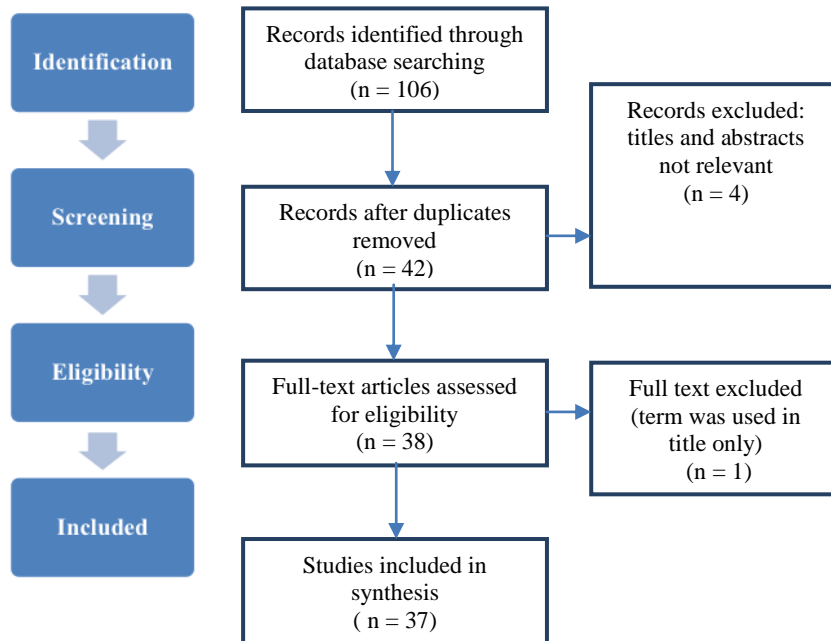
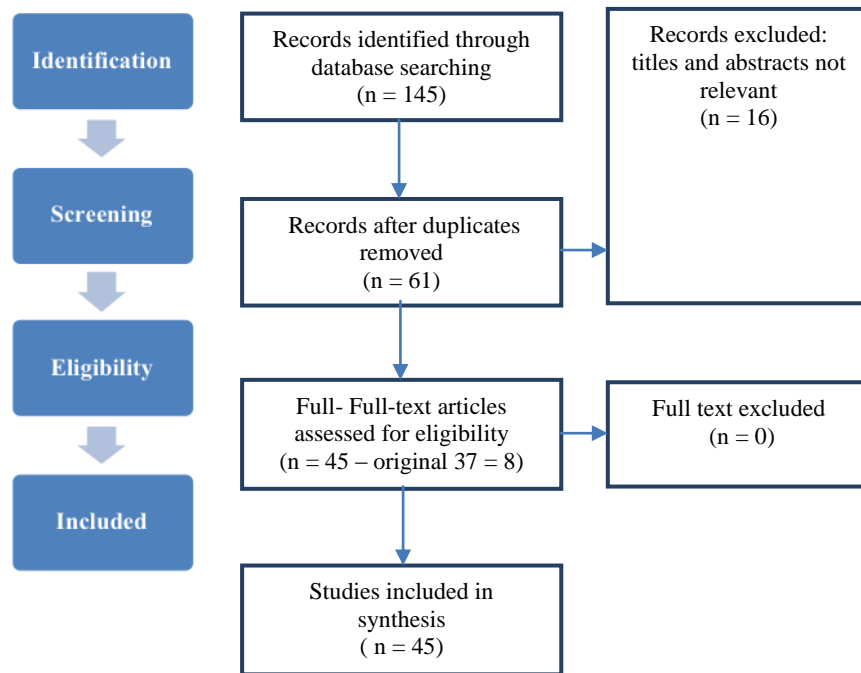


Figure 1. PRISMA flowchart for 2015 Systematic Search and Review.

A confirmatory search was performed in 2018, using the same search hedge as executed in 2015. Results from EBSCOhost’s now 95 databases totaled 145 records. After 84 duplicates were removed, the titles and abstracts of 61 articles were reviewed by three authors (BS-J, MF, and CL). Sixteen were excluded (See Figure 2). In addition to the same 37 publications previously incorporated into the 2015 systematic search and review, eight articles were assimilated into the 2018 after full text was read by two authors (BS-J and MF).

In both the 2015 and 2018 studies, words used to explicitly describe the concept of learning environment were extracted using the notion of “message ideas.” McKenzie and Murphy (2000) (as cited in Hew & Cheung, 2003) described this unit of analysis as the discrete ideas or narrative relating to a specific topic. Therefore, text surrounding the term *learning environment* in each source document was analyzed for its direct relatedness. Glaser and Strauss’ (1967) grounded theory approach guided an iterative process of constant comparison. Element categories were proposed by one researcher (BSJ) and syntaxes were reviewed until 10 mutually agreed-upon elements of learning environments were determined as supported by the literature. Few evaluation methods were identified; most articles shared anecdotal information.

Figure 2. PRISMA flowchart for 2018 Systematic Search and Review.



In 2018, the 10 elements were reviewed again and substantiated, with the additional eight publications contributing a few additional terms to the elements (see Table 2), but not contradicting or refashioning any of the original 10 elements. One element, Supportive, is expanded to become Supportive and Engaging to recognize the social interaction and activation of student learning through personal connections. With a clearer definition of the school library learning environment dimensions, evaluation of school libraries as places where librarians and teachers transform and influence student lives and learning could be more effective.

Table 2. Learning environment elements in alphabetical order with added related concepts

Elements	Related Concepts Included
Collaborative	social, participate, discusses, networks, community, together, collaboration, team, commons, connect, cooperative, build, society, system, share
Creative	make, ideas, concept, develop, create, thinking, build; explore
Evidence-based	improve, successful, quality, effectively, like, independent, choice, skills, achievement, development, better, goals, enhance, solve, strategies
Flexible	access, open, informal, comfortable, various, choice, multiple, different, types, individual, methods, variety
Progressive	modern, change, innovation, future, build, changing, responsive, emerging, new
Pedagogical	curriculum, learning/learn, classroom, students, teachers, read, activities, skills, research, librarian, science, knowledge, education, program, evaluating, acquisition, work, educational, problems, thinking, study, inquiry, strategies, system, teaching, enhance, development, guidance, professional, role, methods, structure
Resources	multimedia, books, digital, access, available, use, rich, visuals; collection
Spaces	places, seating, quiet, atmosphere, design, area, media, structure, virtual, fluid, variety, evolving functionality
Supportive and Engaging	safe, staff, teachers, librarians, services, inviting, comfortable, offer, welcoming, connect, active, appropriate, learner-centered, enable, positive, meeting needs, available, cooperative, society, provide, help, together, centered, share, guidance; interactive, personalization, social, services
Technology	web, access, virtual; devices, multimedia, integrated

3. Challenges and Limitations

A number of challenges affect success in performing a systematic search and review in the field of LIS. Chief among them is the lack of standardization of research protocols and reporting mechanisms (Xu, Kang, and Song, 2015). The use of checklists, agreement on recommended databases or journals, required

use of grey literature and hand-searching, awareness about formulating search hedges and using search filters, and defined protocol for search process documentation could aid in mitigating some of the most common challenges. Furthermore, issues with metadata plague systematic reviews in all fields, not only LIS.

Checklists. Although there are accepted guidelines to determine quality of quantitative study designs, assessing quality for literature and studies in LIS is difficult (Brettle, 2009; International Centre for Allied Health Evidence, n.d.). A checklist for methodological rigor should address the following questions (Cochrane, 2018):

1. Is the specific purpose (question to be answered) stated?
2. Are the sources and search methods used to find evidence stated?
3. Is the search strategy for evidence reasonably comprehensive?
4. Are explicit criteria used for deciding which articles to include in the review?
5. Are the reasons for excluding articles from the review reported?
6. Is bias in the selection of articles (e.g., databases or journals searched) assessed and reported?
7. Are the methods used to combine the findings appropriate to the questions to be answered by the review?
8. Are the methods used to combine the findings of relevant articles reported?

Similar guiding resources are available, such as CriSTAL (2010), Schulz, Altman, and Moher (2010); and Chacón-Moscoso, Sanduvete-Chaves and Sánchez-Martín (2016). A comprehensive list of critical appraisal tools, including one specifically designed for EBLIP (Evidence Based Library and Information Practice), is available from the University of South Australia (n.d.).

Information Resources. Determining which information resources to search is fundamental. “Searches for [articles] should be as extensive as possible in order to reduce the risk of publication bias and to identify as much relevant evidence as possible; databases relevant to the review topic should be covered” (Cochrane, 2018, p. 15). Researchers will need to consider if their research question can best be answered from a search of selected scholarly LIS databases, such as Library, Information Science & Technology Abstracts (LISTA), Library Literature & Information Science Full Text (LLISFT, and Information Science & Technology Abstracts (ISTA) (Vinson & Welsh, 2014) or by databases containing core LIS journals specifically relevant to the research question (Johnston & Green, 2018; Nixon, 2014). This dilemma becomes even more complicated, as database indexing for certain journals is variable depending on publishing year. Meta-researchers should be aware that limiting a search to well-known databases may result in missing much useful information,

which places an even greater imperative on improving the quality of reporting standards of search methods (Cochrane, 2018).

Grey literature and hand-searching. To avoid such potential oversight, systematized search and review methodology benefits from searching for grey literature (i.e., sources such as reports, dissertations, theses, databases of conference abstracts, open access literature), evaluating other review articles published on the same topic, and snowballing reference lists, as well as contacting relevant individuals and organizations and hand-searching relevant journals. Hand-searching is not to be confused with the aforementioned tasks. Rather, it requires “manual, page-by-page examination of entire journal issues or conference proceedings over a particular time period” (Vassar, Atakpo, & Kash, 2016, p. 303).

Search strategy. The structure of a search strategy (i.e., search hedge or string) should be developed based on the main concepts represented in the research questions guiding the review. The PRESS (Peer Review of Electronic Search Strategies) 2015 Guideline Evidence-Based Checklist provides detailed information for researchers about translating the research question; utilizing Boolean and proximity operators; text-word searching (i.e., free text); modifying spelling and syntax; and decision-making about limits and filters. Peer review of electronic literature search strategies using this type of structured tool enhances the quality and comprehensiveness of a search hedge (McGowan, Sampson, Salzwedel, Cogo, Foerster, & Lefebvre, 2016, p. 41).

Search filters. Search filters (e.g., language, species, publication type) should be used with caution, as imposing those that are inappropriate may fail to identify records in bibliographic databases. Likewise, date restrictions should only be used in accordance with eligibility criteria for articles. Notably, the effect of date restrictions differs among databases and sometimes reflects the date an article was indexed in the database, rather than the date the article was published. Publication format restrictions (e.g., exclusion of letters, editorials) should generally not be used when searching for systematic reviews, since any information about an eligible publication may be of value (Cochrane, 2018, p. 17). Highly sensitive search strategies are recommended (Lefebvre, Manheimer, & Glanville, 2011).

Documentation. Documenting the search process in adequate detail, including sources searched, when, by whom, and using which terms, is imperative to ensure that tasks can be reported correctly in the review and that the searches are reproducible. In addition to providing the terminology used, search syntax, operators and other specifics of the search strategy, flow diagrams (e.g., PRISMA, QUOROM) must illustrate the searching, screening, and extraction process with figures for each phase of the reviewing process (Xu, Kang, and Song, 2015).

Oversight. A volunteer oversight group (e.g., Cochrane) and supporting handbooks or knowledge sharing software (e.g., LIS Systematic Review Wiki [<http://lis-systematic-reviews.wikispaces.com>]) might aid in research methodological rigor and LIS uptake.

In addition to standardized research protocols and reporting mechanisms, differences in database metadata cause additional challenges. Metadata issues produce duplicate returns and unexpected results that may limit the assessment of relevant publications. Issues with tagging, spelling, and formatting of publication metadata among different databases affects the way in which an information source can be filtered and retrieved. Important resources could potentially be overlooked. Results in meta-analysis reviews could be greatly compromised.

Limitations to this study include the lack of searching in databases other than those aggregated in the EBSCOhost online discovery tool, which inserts bias into results. It is possible that publications in key LIS or Education journals were overlooked. Also, this study did not employ a search for additional records identified through other information resources (e.g., searching the grey literature, manually hand-searching targeted publications, or snowballing reference lists).

4. Implications and Conclusions

This study provides and encourages opportunities for further research. While the systematic search and review method has been infrequently applied in LIS, awareness and use of review articles is increasing (Koufogiannakis, 2012; Xu, Kang, & Song, 2015; Johnston & Santos Green, 2018). “As librarians seek to base their decision-making on the best available research, systematic reviews provide a useful method to gather all relevant data on a specific topic and to synthesize the results in a manageable report” (Xu, Kang, & Song, p. 298), and as they further state:

It must be noted that no standard exists for an appropriate sample size that should be included in a systematic review. In addition, reviews can take a year or more to conduct, and it is common to re-run the search towards the end of the review to identify new material. The development of a systematic review requires a great deal of time and effort (p. 307).

With the confirmatory search in 2018 we were able to answer our research questions: the components or elements of a school library learning environment are confirmed (see Table 2), the 2015 systematic search and review results are replicable, and the 2018 systematic search and review results fully confirm the 2015 results.

This study provides and encourages opportunities for further research. Examination of how teacher-librarians, classroom teachers, and administrators conceptualize school libraries as learning environments is important for designing, orchestrating and evaluating exceptional hubs of collaborative and transformative learning. Evaluating school libraries depends on identifying elements as criteria for evaluation. For example, many U.S. states use the Marzano Focused Teacher Evaluation Model (Carbaugh, Marzano & Toth 2017) for measuring an educator's effectiveness. The AASL National Standards (2018) recommend using this evaluation for school librarian evaluation because "teaching and coteaching are central to the role of a school librarian who is engaged in all aspects of learning" (p. 157). They do caution that this should be "used as a starting point for librarians and their evaluators; it does not encompass all aspects of the work of a school librarian and can be tailored to meet local circumstances" (p. 157). A detailed exploration of the elements common to both the Marzano Model and the 10 elements identified in this study could move an evaluation instrument forward for consideration. And, considering the 10 elements of the learning environment as an opportunity for reflective practice and assessment could also advance the transformation of school libraries to dynamic and innovative centers that meet the educational goals of the school and the learning community.

Instruction and learning are integral to school library programs. Tools that enable constructive assessment of the learning environments associated with these programs could enable improvement of teaching methods and relationships between students and school librarians. This will further contribute to recognition of the strong role of the school library program in the school learning community. The contribution of the school library to student achievement can be demonstrated with statistical measurement and correlation to measured results, alongside user-reported evidence showing "that the learner changes as a result of inputs, interventions, activities and processes" (Todd, 2015, p. 9).

References

- American Association of School Librarians [AASL]. (2009). *Empowering learners*. Chicago: ALA.
- American Association of School Librarians [AASL]. (2016). Definition of an Effective School Library Program. Available at: http://www.ala.org/aasl/sites/ala.org.aasl/files/content/aaslissues/positionstatements/AASL_Position%20Statement_Effective_SLP_2016-06-25.pdf
- American Association of School Librarians [AASL]. (2018). *National School Library Standards for Learners, School Librarians, and School Libraries*. Chicago: ALA Editions.
- Booth, A. (2000, July 2-5). *Librarian Heal Thyself: Evidence based Librarianship, Useful, Practical, Desirable?* 8th International Congress on Medical Librarianship. London, UK.

- Booth, A., & Brice, A. (2004). Appraising the Evidence. In A. Booth & A. Brice (Eds.). *Evidence-based Practice for Information Professionals: A Handbook*. (pp. 104-118). London: Facet.
- Brettle, A. (2009). Systematic Reviews and Evidence Based Library and Information Practice. *Evidence Based Library and Information Practice*, Vol.4, No.1. Retrieved from <http://ejournals.library.ualberta.ca/index.php/EBLIP/article/view/5082/5082>
- Carbaugh, B., Marzano, R. & Toth, M. (2017). 2017 Update: The Marzano Focused Teacher Evaluation Model. Retrieved from <https://www.learningsciences.com/wp/wp-content/uploads/2017/06/Focus-Eval-Model-Overview-2017.pdf>
- Chacón-Moscoso S, Sanduvete-Chaves S and Sánchez-Martín M (2016) The Development of a Checklist to Enhance Methodological Quality in Intervention Programs. *Frontiers in Psychology*. Vol.7, 1811. doi: 10.3389/fpsyg.2016.01811
- Cochrane. (2018). Performing the Review. In Higgins, J., Lasserson, T., Chandler, J., Tovey, D., & Churchill R. (Eds.) *Methodological Expectations of Cochrane Intervention Reviews (MECIR)* (pp. 15-25). Retrieved from http://methods.cochrane.org/sites/default/files/public/uploads/mecir_printed_booklet_final_v1.02.pdf
- CriSTAL (2010). Appraising an information needs analysis: 12 questions to help you make sense of an information needs analysis/information audit. Retrieved from <http://nettingtheevidence.pbworks.com/w/page/11403006/Critical%20Appraisal%20Checklists>
- EBSCO Industries. (2018). All Databases. Retrieved from <https://www.ebsco.com/products/research-databases>
- Eldredge, J. (1997). Evidence-based Librarianship: A Commentary for Hypothesis. *Hypothesis*, Vol.11, No.3, 4-7. Retrieved from <http://research.mlanet.org/hypothesis/hypo11-3.pdf>
- Eldredge, J. D. (2000a). Evidence-based Librarianship: An Overview. *Bulletin of the Medical Library Association*, Vol.88, No.4, 289-302. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC35250/>
- Eldredge, J. D. (2000b). Evidence-based Librarianship: Formulating EBL Questions. *Bibliotheca Medica Canadiana*, Vol.22, No.2, 74-77.
- Fraser, B.J. (1998). The Birth of a New Journal: Editor's Introduction. *Learning Environments Research*, Vol.1, 1 - 5.
- Gillespie, L.D, & Gillespie, W.J. (2003). Finding Current Evidence: Search Strategies and Common Databases. *Clinical Orthopaedics and Related Research*, Vol.413, 133-145. doi: 10.1097/01.blo.0000079324.41006.dc

- Glaser, B.G. & Strauss, A.L. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Chicago, IL: Aldine Publishing Company.
- Grant, M.J. & Booth, A. (2009). A Typology of Reviews: An Analysis of 14 Review Types and Associated Methodologies. *Health Information and Libraries Journal*, Vol.26, 91–108.
- Great Schools Partnership (2013). The Glossary of Education Reform. Learning Environment. Available at: <https://www.edglossary.org/learning-environment/>
- Hew, K.F. & Cheung, W.S. (2003). Evaluating the Participation and Quality of Thinking of Pre-service Teachers in an Asynchronous Online Discussion Environment: Part I. *International Journal of Instructional Media*, Vol.30, No.3, 247-263
- International Centre for Allied Health Evidence. (n.d.). *Critical appraisal tools*. Retrieved from <http://www.unisa.edu.au/Research/Sansom-Institute-for-Health-Research/Research/Allied-Health-Evidence/Resources/CAT/>
- Johnston, M. P., & Santos Green, L. (2018). Still polishing the diamond: School library research over the last decade. *School Library Research*, Vol.21. Retrieved from <http://www.ala.org/aasl/slr/volume21/johnston-green>
- Koufogiannakis, D. (2012). The state of systematic reviews in library and information studies. *Evidence Based Library and Information Practice*, Vol.7, No.2, 91-95.
- Lefebvre, C., Manheimer, E. & Glanville, J. (2011). Sensitivity Versus Precision. In J. Higgins & S. Green, (Eds.), *Cochrane Handbook for Systematic Reviews of Interventions*. Retrieved from http://handbook.cochrane.org/chapter_6/6_4_4_sensitivity_versus_precision.htm
- McGowan, J., Sampson, M., Salzwedel, D. M., Cogo, E., Foerster, V., & Lefebvre, C. (2016). PRESS Peer Review of Electronic Search Strategies: 2015 Guideline Statement. *Journal of Clinical Epidemiology*, Vol.75, 40-46.
- Nixon, J. M. (2014). Core journals in library and information science: Developing a Methodology for Ranking LIS Journals. *Libraries Faculty and Staff Scholarship and Research*. Paper 61. Retrieved from http://docs.lib.purdue.edu/lib_fsdocs/61
- Schulz, K. F., Altman, D. G., and Moher, D. (2010). CONSORT 2010 Statement: Updated Guidelines for Reporting Parallel Group Randomised Trials. *The BMJ* Vol.340, 698–702. doi: 10.1136/bmj.c332
- Schultz-Jones, B., Farabough, M. & Hoyt, R. (2015). Towards Consensus on the School Library Learning Environment: A Systematic Search and Review. Research Paper in the Proceedings of the 17th International Forum on Research in School Librarianship at the 44th International Association of School Librarianship Annual Conference, Maastricht, Netherlands.
- University of South Australia. (n.d.). Critical Appraisal tools. Retrieved from <http://www.unisa.edu.au/Research/Sansom-Institute-for-Health-Research/Research/Allied-Health-Evidence/Resources/CAT/>

- Urquhart, C. (2010). Systematic Reviewing, Meta-analysis and Meta-synthesis for Evidence-based Library and Information Science. *Information Research*, Vol.15, No.3. Retrieved from <http://InformationR.net/ir/15-3/colis7/colis708.html>
- Vassar, M., Atakpo, P., & Kasj, M. (2016). Manual Search Approaches Used by Systematic Reviewers in Dermatology. *Journal of the Medical Library Association*, Vol.104, No.4, 302-304.
- Xu, J., Kang, Q., and Song, Z. (2015). The current state of systematic reviews in library and information studies. *Library & Information Science Research*. Vol.37, 296-310.