Towards Consensus on the School Library Learning Environment: A Systematic Search and Review

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Abstract
The school library as a learning environment has been described by some as a dynamic domain where dedicated professionals and students engage collaboratively in an active and evolving educational climate. Although the field of classroom learning environment research can be charted internationally over the past several decades, journal article literature fails to consistently and coherently identify specific aspects of the school library learning environment and methods to evaluate outcomes. A systematic search and review of the literature using the learning environment as the primary search term revealed a set of 10 elements associated with this concept but few evaluation methods. Clearly defining school library learning environments could aid in the development and evaluation of school libraries as places where librarians and teachers transform and influence student lives and learning.

Keywords: Learning environment, Learning commons, Constructivism, School library, Evaluation

Background

A learning environment can be viewed from a variety of perspectives. According to the Glossary of Education Reform, 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.

Although commonplace, not everyone views the design space as a high priority for an exceptionally effective learning environment. Heick (2014) views the top 10 characteristics as primarily student-centered: 1) The students ask the questions, 2) questions are valued over answers, 3) ideas come from divergent sources, 4) a variety of learning models are used, 5) classroom learning "empties" into a connected community, 6) learning is personalized by a variety of criteria, 7) assessment is persistent, authentic, transparent, and never punitive, 8) criteria for success is balanced and transparent, 9) learning habits are constantly modeled, and 10) there are constant opportunities for practice (The characteristics of a highly effective learning environment). The emphasis on inquiry, personal learning styles and assessment is notable.

Within the educational community a historical record of learning environment examination has been established, reaching back approximately 80 years to the foundational work of Lewin (1936) and Murray (1938). Lewin wrote about relationships between the environment and the personal characteristics of the inhabitants, as well as the environment's effects on human behavior. Murray followed Lewin's research on behavior and the environment and introduced his famous needs-press model, where individual *needs* are influenced by environmental forces he termed *presses*. The field of classroom learning environment research can be charted internationally over the past several decades (Goh & Khine, 2002), with significant emphasis on the science classroom and the inquiry process. While this research originated mainly in the USA, it rapidly evolved in Australia and extends now to European and Asian researchers.

Grounded on the constructivist point of view, classroom learning environments are considered individual "constructions" (Tobin & Fraser, 1998, p. 626) which are neither independent from, nor external to their participants. Lorsbach and Basolo (1998) state that students and teachers simultaneously contribute to the creation of their learning environment; they interact within it and individually perceive it. Fraser (1998) refers to the learning environment as a "social, psychological and pedagogical context in which learning occurs and which affect student achievement and attitudes" (p. 3).

While the educational community was establishing a historical record of classroom learning environment examination, the school library community was evolving from a focus on provision of resources to an environment where teaching and student-centered learning outcomes become the primary focus. Consequently, the literature on the school library learning environment demonstrates an emphasis on the transition:

> Within the past decade, educational scholars have worked to define the elements that should comprise today's learning environment. As described by the

> Partnership for 21st Century Skills, learning environments should no longer be thought of as physical spaces, but as the systems that allow learning to take place. (AASL, 2009, p. 10)

School libraries now seek to provide rich learning environments "where everyone is a teacher, learner, producer, and contributor" (p. 10). For Koechlin, Loertscher, & Zwaan (2008), the *learning commons* is a physical and virtual learning environment designed to meet "the needs of 21st-century teaching and learning" (p. 9). As we challenge the traditional use of school libraries and participate in the evolution of school libraries impacting learning outcomes, an understanding and assessment of the elements of an effective learning environment becomes an essential aspect of our ability to provide evidence-based practice.

Evaluating the learning environment

A notable number of evaluation instruments have been developed from the foundational work of research on behavior by Lewin (1936) and Murray (1938). In response to the need to assess innovative classroom environments, the *What Is Happening In this Class?* (WIHIC) was developed for secondary schools with a psychological view of learning that focused on students as co-constructors of their own knowledge (Aldridge, Fraser & Huang, 1999; Dorman, 2003), as was the primary and middle school instrument *My Class Inventory* (MCI) (Fraser & O'Brien, 1985). The *Technology-Rich Outcomes-Focused Learning Environment Inventory* (TROFLEI) is used to evaluate the integration of technology in terms of changes in the learning environment (Aldridge & Fraser, 2008; McDaniel & Fraser, 2014). The purpose of these evaluation instruments is to determine how individuals and groups of individuals react to their environment; to investigate what factors can affect their reaction to the environment; and to explore associations between the environment and student outcomes (Moos, 1974; Tobin & Fraser, 1998; Walberg & Anderson, 1968).

The range of applications of instruments now includes constructivist classroom environments (Taylor, Fraser, & Fisher, 1997), teacher interpersonal behavior in the classroom (Kent & Fraser, 1997; Wubbels, Creton, Levy, & Hooymayers, 1993), investigations of associations between learning outcomes and classroom environments (McRobbie & Fraser, 1993), cross-national studies (Aldridge, Fraser, & Huang, 1999; Aldridge, Fraser, Taylor, & Chen, 2000), utilization of technologies to implement curricula design (McDaniel & Fraser, 2014), and the evaluation of educational innovations (Ogbuehi & Fraser, 2007; Maor & Fraser, 1996; Martin-Dunlop & Fraser, 2008; Monsen & Frederickson, 2004). The applicability and validity of these questionnaires to an examination of the classroom learning environment has been firmly established.

The school library learning environment is often referenced as a domain that has components similar to the classroom environment. Ballard (2010) refers to this similarity and highlights how the library space is organized and adapted to meet specific needs within the library "as a flexible learning environment capable of simultaneously supporting a variety of groups and activities" (p. 77). Evaluation of the school library learning environment has been investigated through the use of adapted versions of the classroom learning environment instruments (Schultz-Jones, 2011; Schultz-Jones & Ledbetter 2009, 2010) and the introduction of a dedicated inquiry instrument for the school library learning environment, *How My Library Supports Inquiry* (HMLSI) (Schultz-Jones & Ledbetter, 2013) that measures student perceptions of seven psychosocial factors prevalent in the school library. Further

work on useful instruments and approaches that assess the interaction of learning environment elements would extend the ability of school librarians to provide evidence of their practice. Developing these evidence-based practices necessitates a shared understanding of the concept of a learning environment. The objectives of this study are to identify such antecedents that will contribute to an understanding of the value that school libraries as learning environments add to the educational community and to identify methods that evaluate the impact of the school library learning environment on student achievement.

Methodology

To discover the use of the term *learning environment* by the school library community we conducted a rigorous review of journal article literature. Grant and Booth (2009) describe 14 different types of reviews, where a review is "to view, inspect or examine a second time or again" (Oxford English Dictionary, 2015). Four different types of reviews were considered during the examination of the literature (see Appendix A): 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 is 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 for relevant publications based on specific inclusion criteria. The authors performed three different types of 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, including recognition of the nascent *learning commons*. Table 1 demonstrates the different combinations examined before search results provided publications to review.

Searches were first conducted using a *phrase search* for "*learning environment"* and "*learning commons"* to determine the scope of the literature available. When quotes are placed around multiple words, it alerts the system to search for the terms in tandem to one another, rather than searching for each one individually. The results returned were too large perform a systematic search and review of the literature. 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. Using the *near operator* search created a smaller number of relevant articles. The search terminology used was defined as: *learning n1 environment n8 school n1 library* and *learning n1 commons n8 learning n1 environment.* 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. However, the results returned were too few to consider or returned the same titles.

The third search method was the proximity search of w*ithin 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 used to determine a description of a school library learning environment and identify methods used for evaluation.

Search Term	**Search Type**	**Number of Results (without removing duplicates**
“learning environment”	Phrase search	83,799
“learning commons”	Phrase search	1,331
learning n1 environment n8 school n1 library	Near operator	106 (37 remain)
learning n1 commons n8 learning n1 environment	Near operator	28 (17 remain)
“learning environment” n8 “school library”	Phrase search paired with Near operator	31
“learning environment” w8 “school library”	Phrase search paired with Within operator	18
“learning commons” w8 “school library”	Phrase search paired with Within operator	7
“learning commons” w8 library	Phrase search paired with Within operator	247

Table 1. Search methods using keyword proximity with near operator and within operator

After discarding duplicates, 37 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. Seventeen publications were examined for use of the phrase *learning commons* in association with *learning environment*.

Once the collection of publications was established, a content analysis was performed. In this study, words used to explicitly describe the concept of learning environment were extracted using the notion of “message ideas.” In 2000, McKenzie and Murphy (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. A grounded theory approach (Glaser & Strauss, 1967) guided an iterative process of analysis. Retrieved resources were critically reviewed line-by-line by one investigator, who identified, named, and categorized elements of learning environments as described in the literature. Element categories were proposed and syntaxes were reviewed by all three investigators until mutually agreed-upon elements of learning environments were determined as supported by the literature.

Continuous words, sentences, or paragraphs distinctly associated with the idea of learning environment were collected into a spreadsheet and then entered into the internet-based, tag-cloud generator Wordle. Entire sections of articles that focused primarily on the concept of

learning environments (e.g., Fingerson (1973), Jurkowsi (2006), Niinikangas (1995), and Pesanelli (1990) were included in their entirety.

Limitations

Limitations to this study include the lack of a complete, formal content analysis of every article or chapter retrieved through the *phrase search*. The near operator search method was based on the assumption that the phrase *learning environment* was widely used and understood. Instead, we found different terminologies used interchangeably with learning environment, such as learning commons, knowledge commons, learning space and modern learning library environment. A full content analysis based on a comprehensive search using different terminologies to discover additional publications, including books, would aid in developing a model for the school library learning environment.

Additionally, metadata issues produced duplicate returns and unexpected results which may have limited the relevant publications retrieved. For example, book chapter titles were tagged differently in different databases; some book chapters familiar to us, were retrieved, while others were not; some articles *about* an author were retrieved as *by* the author; records were retrieved separately for co-authors and some were found to be reviews rather than actual chapters. Despite these limitations, the exercise of exploring the concept of the school library learning environment proved interesting and productive.

Results

The results of the systematic search and review for *learning environment* reveal a variety of publications, as detailed in Table 2. The timeline for the 37 publications extends from 1967 to 2015, with a growing number of articles examining and considering the elements of a learning environment in the last decade. While the majority of the articles addressed situations in the USA (n=20), a range of international settings are represented. A variety of publications are included with international presentations at the International Federation of Library Associations (IFLA), the International Association of School Librarianship (IASL), and the American Educational Research Association (AERA).

Year	Number Published	Country	Journal Article/Report/Chapter	Book
1967	1	USA	Andrews High School Carpet Report	
1973	1	USA	Journal of Education for Librarianship	
1983	1	Germany	IFLA	
1990	1	USA	Futurist	
1995	1	Finland	Scandinavian Public Library Quarterly	
1996	2	Australia, USA	IASL; Language Arts	
1998	3	Sri Lanka, Asia, USA	School Libraries Worldwide; Education for Information; AERA	
1999	1	USA		The Evolving Virtual Library
2004	1	USA	Teacher Librarian	
2005	3	USA	School Library Media Activities Monthly; Knowledge Quest; Innovate	
2006	1	USA	Intervention in School & Clinic	

Year	Number Published	Country	Journal Article/Report/Chapter	Book
2008	3	USA	Teacher Librarian; School Libraries Worldwide; Colorado Libraries	
2009	2	UK, USA	IASL; Bookseller Media	
2010	2	USA	IASL	
2011	3	Canada, USA (2)	Literacies, Learning & Libraries; School Library Monthly	Global Perspectives on School Libraries
2012	3	USA	School Library Monthly (2); T H E Journal,	
2013	4	Canada, New Zealand, USA (2)	Partnership: the Canadian Journal of Library and Information Practice and Research; Collected Magazine; Learning Environments Research; PR Newswire USA,	
2014	3	New Zealand (2), USA	Collected Magazine (2); Teacher Librarian	
2015	1	USA	Knowledge Quest	

Table 2. Learning environment search results

Of the 37 publications, 81% were descriptive and detailed perspectives on what a school library learning environment either should include or was working towards. These included some descriptions of the roles and responsibilities of the school librarian. Fully 57% (n=21) focused on the physical aspects of the school library, describing physical transformations and in some cases, the collaborative nature of the project. The design of learning spaces is clearly seen as an important contributor to the learning environment. Research was typically used for continuous or quality improvement; quantitative research articles were limited to surveys (Lupton, 1996; Hill, 1998), assessment of student perceptions (Schultz-Jones, 2011; Schultz-Jones & Ledbetter 2009, 2010, 2013), and a mixed method study (Bell, 2013).

The results of the systematic search and review for *learning commons* in association with *learning environment* are detailed in Table 3. The timeline for the 17 publications extends from 1974 to 2014, with the majority of articles (89%) examining and considering the elements of a learning commons in the last decade. While the majority of the articles addressed situations in the USA (n=13), a small range of international settings are included. Despite a variety of publications, only one journal is directly related to school libraries: Teacher Librarian.

Year	Number Published	Country	Journal
1974	1	USA	National Institute of Education
1997	1	USA	Human Resource Management
2003	1	USA	Computers and Education
2007	1	Wales	Physiotherapy
2008	1	USA	Teacher Librarian
2009	2	European Union, USA	Proceedings of IADIS International Conference on Cognition; Teacher Librarian
2010	2	Australia, USA	Reference Services Review; School Library Monthly

Year	Number Published	Country	Journal
2011	3	Canada, Hong Kong, USA	New Library World; Educational Technology; Teacher Librarian
2012	3	USA	College & Research Libraries; Journal of Research & Practice in Information Technology; Journal of Food Science Education
2014	2	USA	College & Research Libraries; Computers & Education

Table 3. Learning commons search results

The iterative process of analyzing message ideas to identify, name and categorize facets of the school library learning environment resulted in 10 overarching elements or "themes" (see Table 4). 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.

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

Table 4. Learning environment elements in alphabetical order

A Wordle tag clouds (See Figure 1) was generated to provide a powerful visual representation of words used in the publications to describe learning environments. In the figure, greater prominence is given to words that appear more frequently in the source texts. We combined words with common roots under a single archetypal term to ensure the appropriate prominence of the concepts. For example, the words "learner" and "learners" were changed to LEARN; "space" and "area" to SPACES; "using" to USE; "internet" and

“online” to WEB; “multimedia” to MEDIA; “collection”, “sources”, and “tools” to RESOURCES; “haven” and “refuge” to SAFE; “reading” to READ; and “versatile” to FLEXIBLE.

Figure 1. Concepts associated with learning environments

Discussion

The transition of school library learning environments reflects a passage from content to process and this transformation was detailed and addressed throughout the publication timeline, often with reference to the elements of the learning environment as being complex and interrelated.

From carpet to innovation

The first mention of *learning environment* in these publications was in relation to carpet (Wallace, 1967) where the design aspect of the school library learning environment was related to the need for acoustical mitigation through the appropriate use of floor covering. While this reflected the traditional role of the school library as a quiet space in 1967, it is important to note that design elements such as floor coverings do emerge in later publications as the use of the library space evolves and the impact of spatial design and design elements such as lighting, thermal elements, furnishings, electrical supply, color, exhibition areas, accommodating varying group sizes and creative areas is better understood. The evolving role of school library ***spaces*** as more than a physical and virtual area that housed resources, and as differentiated from a classroom was evident in many publications.

The psychological and behavioral effect of the learning environment was recognized in publications that addressed the ***supportive*** nature of the school library. Bell (2013) conducted a study on animal-assisted therapy and reported the overwhelming success of efforts to provide a stress-free learning environment in public libraries and schools. Creating a space that generates an environment where students feel safe, nurtured, comfortable and welcome is a reflection of more than the physical or virtual design of the space. It is indicative of the impact that school librarians have on students and teachers, and the responsibility to fulfill a role that understands and competently provides a level of learner-centered service that is responsive to the needs of individuals within the educational community.

The ***creative*** element of school library learning environments was explored with a range of foci: from the use of technologies, such as augmented reality (Green, 2014) to encouraging students to explore their own ideas and create, build, make or develop projects. Incorporating inquiry based learning and encouraging curiosity and exploration have increased the creative aspects of the learning environments; the creative use of design principles has enabled “collaboration stations” (Hill, 2014, p. 10).

The ***collaborative*** element of the school library learning environment was reiterated throughout the publications and included teacher to librarian collaboration, student to librarian collaboration, and student to student collaboration. Lupton (1996) surveyed teacher perceptions (n=167) of the teacher-librarian's role in the integration of information in 25 primary schools. His findings emphasize the role of collaboration for teacher-librarians: “In this era of information technology, teacher-librarians must continue to work in partnership with their teaching colleagues and administrators if school library resource services are to remain an integral aspect of the learning environment” (p. 91). Giorgis and Peterson (1996) found that “when teachers and librarians collaborate, they create an environment capable of fostering powerful learning experiences for students” (p. 482). The concepts of sharing, being part of a community of learners (Koechlin, Loertscher, & Zwaan, 2008), discussing, interacting and participating in a variety of learning opportunities reflects the social and engaging aspect of school library activities and programs.

A ***pedagogical*** theme underlies these activities and programs. According to Fingerson (1973), "library school students require a learning environment where they can put classroom theories into actual employment prior to graduation" (p. 193). This early emphasis on educating school librarians can now be extended to the learning environments we create for our K-12 students. And within these learning environments we can explore a range of pedagogical options. Niinikangas (1995) believes that the “school library as an information centre is a laboratory” (p. 9). The experimental aspect is also encouraged in the literature related to *learning commons* where Koechlin, Loertscher & Zwaan (2008) also recognize the school library as a learning laboratory with an experimental nature that includes “professional development, traditional literacy program, information literacy, emerging literacies, and technology trials” (p. 10). Levitov (2012) emphasized the AASL definition of the learning environment as offering a setting that supports and promotes questioning, inquiry, conversation, exploration, collaboration, and creativity (p. 4). Within this setting, we seek to encourage students to actively employ theories and ideas before they graduate. In conjunction with school libraries the traditional pedagogy is transitioning to a constructivist approach. This approach focuses on inquiry and incorporates brain research, individual learning styles and multiple intelligences. School libraries should be well positioned to work across disciplines to offer student-centered opportunities.

Offering a variety of opportunities to students is indicative of the ***flexible*** element of the school library learning environment. School librarians focus on physical and virtual access to a variety of resources and opportunities that include multiple methods of delivery, and both group and individual opportunities for exploration. Hill (2014) highlighted the successful transformation of the learning space to a “modern learning library environment”: “the rule of flexibility trumps the rule of static design and order” (p. 10). Pesanelli (1990) expressed "a dynamic new concept of a 'learning environment' as something other than a classroom [that]

aims to make educational opportunities not only more accessible, but also extremely attractive to children" (p. 29). His emphasis on the inclusion of informal learning spaces such as playgrounds and community spaces predicted the efforts that school librarians make to extend learning into community spaces and provide access to a wide and flexible range of educational opportunities.

Accommodating a variety of ***resources*** was also recognized early in the timeline with the IFLA presentation by Papendieck (1983) who addressed the German country-wide campaign to redesign school libraries into school library media spaces to create a new environment of learning. Farmer (2005) recognized that technology would affect both access and delivery of resources, and that the learning environment may be affected by the digital shift. Despite the influence of technology, the school library learning environment was described as resplendent with resources: books, digital, multimedia, visual. And that these resources would be part of a rich collection that was available for access and use, over extended hours in the physical environment and 24/7 virtually.

The influence of ***technology*** was echoed across the timeline and continues to influence projections of future school library configurations. Stefl-Mabry and Goodall Powers (2005) described their efforts to develop “problem-based learning environments” by engaging with school library media specialists and teachers to “design short, technology-rich projects that meet student learning needs and teacher learning goals” (p. 14). These efforts are indicative of the impact of technologies since they “herald important opportunities for school librarians to rethink, re-imagine and recreate a dynamic learning environment for school libraries” (Todd, 2008, p. 19). Todd reviewed the use of Web environments by young people and recognized the challenges for school library leaders to integrate technology into a meaningful learning experience.

Efforts to measure, document and display the impact of school libraries on student achievement reflects the learning environment element of ***evidence-based*** practice. Lupton’s 1996 survey of teacher perceptions was an early example of evidence gathering but no other formal examples of documented teacher perceptions were found. Student achievement and the perceptions of students were highlighted by Schultz-Jones (2011) and Schultz-Jones & Ledbetter (2009, 2010, 2013), demonstrating that the school library learning environment can be examined in relation to specific areas of the curriculum. Most publications used the foundational evidence for practice approach and described the goals that school librarians and school libraries intended to achieve and implications for practice, but few user-reported evidence of practice results were included. The belief in the role of the school library is strong, but the evidence of practice throughout this body of publications is weak.

It wasn’t just Valenza (1999) who recognized that learning environments are changing. Change and ***progressive*** new directions were common themes across the publications. As Asselin (2004) noted, "Although researchers know it when they see it, they are just beginning to articulate the particular components that comprise new literacy learning environments" (p. 53). Farmer (2005) addressed the “digital-age learning environment” (p. 1) and the future use of technology as an influence on the school library, envisioning that school libraries will “be more differentiated to provide more customized service with an emphasis on interaction between learners and ideas” (p. 5). As we respond to the future needs of our learning

community, being willing to change and adapt and try new ways of building knowledge will be a hallmark of our profession.

The closing publication in the timeline of this study is focused on this future orientation and leads by example with McGrath's attention to innovation: "Educators can also benefit from design thinking to create learning environments that support constructionist teaching: building knowledge structures" (2015, p. 56). McGrath's project enlisted a collaborative school committee comprised of teachers, administrators, parents, students and community members: "the committee started with a common belief that the school library can and should improve student achievement and that new functions of the library would determine the design of the learning space" (p. 56). They investigated space concepts where innovative learning commons had been embraced, surveyed students for reactions to the current library space, and explored research in learning. The results are already demonstrating evidence of practice and provide a model of future-thinking and the interconnection of the 10 elements of a dynamic school learning environment we identified.

Models

The work of Niinikangas (1995) was predictive of the transition school libraries make from traditional information providers to a transformative role: "an open, flexible learning environment, with diverse resources, offers the opportunity to learn by doing, to create anew, to practice making choices, and consciously to build one's individual world" (p. 4). She includes a visualization of the school library as a learning centre, as shown in Figure 2.

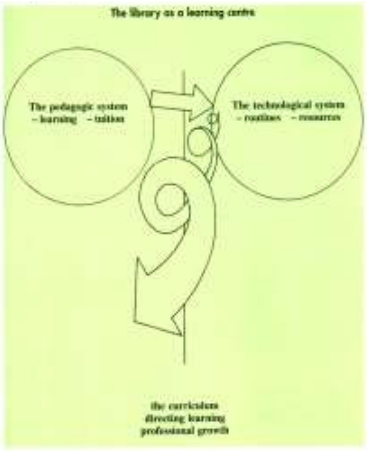

Figure 2. The library as a learning centre (Niinikangas, 1995, p. 7)

She continued with her prediction that future school libraries will include a new learning climate that enables self-instructional students through planned learning environments and school team, teacher and library staff support and guidance. (see Figure 3.)

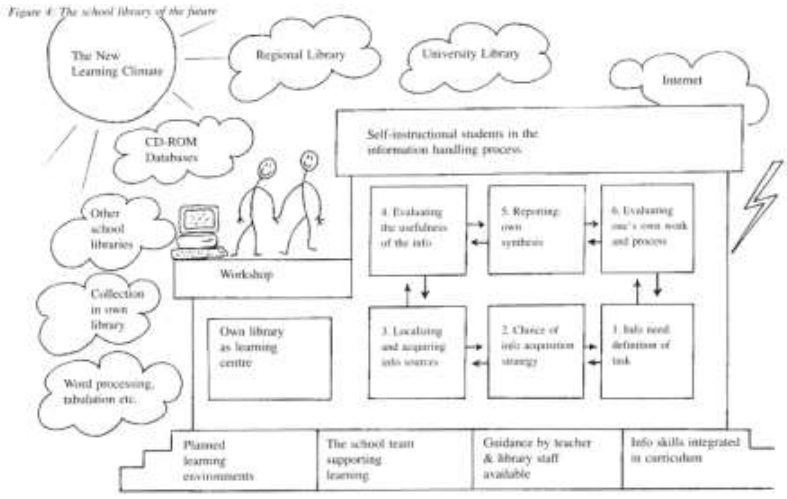

Figure 3. The school library of the future. (Niinikangas, 1995, p. 9).

Implications

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. 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).

This study also presents some challenging issues. How important is our use of terminology? Are we describing the same phenomenon when we refer to a *learning environment*? Are we using the phrase *learning commons* as a type of learning environment or as a facilities design or both? Should these concepts be considered as two separate or related phenomena? If we are addressing the 10 elements of a learning environment, how do we know we are being successful? How do we demonstrate the results of our efforts and make our success available to others as part of the growing body of evidence-based practice? And how do we remain attentive to student learning needs and responsive to the evolving educational learning research?

While the physical space is deemed an important component of the library environment, it is the use of the spaces as arenas of pedagogy and personal interaction, between school librarians, teachers and students that may be most influential in affecting student outcomes.

The interrelatedness of form and function is evident. Assessing the relationship between this pedagogy, behavior and student learning outcomes is another contribution to the evidence based research on the positive impact of school libraries on student achievement.

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Biographical Notes

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Appendix A. Types of different reviews

Grant, M.J. & Booth, A., 2009, p. 94-95

Review type	Description	Search strategy	Validation	Synthesis	Analysis	Weak-nesses	Strengths
Literature review	One size fits all: Examination of recent or current literature; can cover wide range of subjects at various levels of completeness and comprehensiveness	May or may not include comprehensive searching	May or may not include quality assessment	Typically narrative	Analysis may be chronological, conceptual, thematic, or otherwise as authors deem appropriate	Lacks explicit intent to maximize scope or analyze data collected; conclusions are open to bias from omitting sections of the literature or not questioning validity	Seeks to identify previous accomplishments; consolidates, builds upon, and identifies gaps
Critical review	Extensive literature search and critical evaluation of its quality; goes beyond mere description to include degree of analysis and conceptual innovation	May or may not include comprehensive searching	May or may not include quality assessment	Typically narrative	Seeks to identify conceptual contribution to embody existing or derive new theory	Fails to provide a structured, systematic search strategy; no formal requirement to explicitly present methodology for search, validation, synthesis, and analysis. Aggregates literature and emphasizes conceptual contribution; interpretative elements are subjective and review is starting point for further evaluation.	Opportunity to 'take stock' and evaluate what is of value from the previous body of work and resolve competing schools of thought; might be impetus for a new phase of conceptual development and subsequent 'testing'
Systematic review	Seeks to systematically search for, appraise, and synthesize research evidence, often adhering to guidelines on the conduct of a review	Aims for exhaustive, comprehensive searching	Quality assessment may determine inclusion/ exclusion	Typically narrative with tabular accompaniment	What is known; recommendations for practice. What remains unknown; uncertainty around findings; recommendations for future research	Restrictions for literature inclusion limit application of methodology to provide insights about effectiveness of practice rather than explore answers to more complex research questions	Seeks to compile all known knowledge on a topic area; recent shift is to include wider range of study designs, including quantitative, qualitative and mixed methods
Systematic search and review	Combines strength of critical review with a comprehensive search process; addresses broad questions to produce 'best evidence synthesis'	Aims for exhaustive, comprehensive searching	May or may not include quality assessment	Minimal narrative, tabular summary of studies	What is known; recommendations for practice; limitations	Incorporates multiple study types to provide a complete picture of prevalence of research on a topic; subjects literature to critical review albeit informally against the same underlying criteria	In spite of exacting requirements of a systematic review, the critical review may be prone to some limitations. Without explicit inclusion and exclusion and clearly defined process of synthesis, conclusion may be based on a subjective selection to support a particular line of argument