Investigating Differences Between Male and Female Students' Perceptions of School Library Learning Environments

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Abstract

Gender as a context within the learning environment is examined through the results of four studies in the past three years where learning environment instruments were used to evaluate the school library. Previous research indicates that male and female students have physiological differences in terms of brain-based learning and cognitive development. Research has also applied an examination of gender differences to reading preferences. The current research extends an examination of gender by asking the question: To what extent do differences between male and female student perceptions of the same school library learning environment occur, and how can these differences be addressed? The results indicate that females generally have higher expectations of their learning environments than do males, and experience less satisfaction with their actual learning environment than males.

Keywords: Learning environments, brain-based learning, cognition, gender

Introduction

Assessment of the school library learning environment equips the teacher librarian with valuable data that may challenge assumptions of how the learning environment is perceived by students. Additionally, the data can be used to correlate dimensions of the school library learning environment with gender differences so that variances in perception between male and female students can be determined and addressed. As we shape learning environments to support and advance student learning, knowledge of these differences could contribute to the development of psychosocial dimensions that address a variety of student needs.

An existing body of research on classroom learning environments, brain based learning, and gender differences supports the current analyses of the school library learning environment in a public school district in North Texas and two international schools in Europe, between 2010 and 2013.

Theoretical Framework

Learning Environment

Grounded on the constructivist point of view, learning environments are 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. These perceptions reflect individual needs and provide a basis on which to build an understanding of those needs and an opportunity to effect a learning environment that meets those needs.

The field of classroom learning environment research extends internationally over many decades (Goh & Khine, 2002) with a focus on the learning environment as a "social,

psychological and pedagogical context in which learning occurs and which affect student achievement and attitudes" (Fraser, 1998a, p. 3). From the foundational work of research on behaviour by Lewin (1936) and Murray (1938) a notable number of evaluation instruments have been developed to investigate the relationship between how individuals respond to their environment and student learning outcomes (Fraser, 1998b). The applicability and validity of these questionnaires to an examination of the classroom learning environment has been firmly established. The range of applications of these instruments includes constructivist classroom environments, teacher interpersonal behaviour in the classroom, the evaluation of educational innovations, and "links between the classroom environment and student cognitive and affective outcomes" (Dorman and Fraser, 2009, p.78).

Assessing how school library participants perceive the socio/psychological aspect of their learning environment has been previously studied (Schultz-Jones & Ledbetter, 2009, 2010a, 2010b; Schultz-Jones, Ledbetter & Turpin, 2012) drawing on the foundation of learning environment research established for the science classroom. These studies demonstrated the applicability of learning environment research to the school library environment in terms of dimensions that align with efforts to provide an inquiry-based learning space. In each of the studies, significant differences were found between what is preferred by students and what is actually occurring. For those dimensions where significant differences occur, this knowledge provided guidance to school librarians and classroom teachers on ways to enhance the interaction between the school library and the classroom, and adjust the school library learning environment through new teaching methods, resources, and interaction with students within the school learning community.

The current research extends the findings of these studies to an examination of gender by asking the question: To what extent do differences between male and female student perceptions of the same school library learning environment occur, and how can these differences be addressed? Research related to cognition and gender differences was considered for support of the current research on gender within the learning environments.

Brain-Based Learning

Brain-based learning is an approach to education that is based on scientific research about how the brain learns and includes factors of cognitive development such as how students learn differently as they age and mature socially, emotionally and cognitively. This neuroscience of learning crosses many disciplines, including biology, chemistry, genetics, neurology, psychology, sociology and technology. Approaching learning from the perspective of how the brain operates provides an opportunity to consider the wide variety of influences on this complex organ, the processes that can be adopted to activate and encourage learning, and the context or learning environment that enables learning.

Research now indicates that physical differences between male and female brains may account for behavioral, developmental, and cognitive-processing differences. These include functional differences such as the five senses, activity, and problem solving (Jensen, 2008, p.34). Based on this research, Jensen identifies an array of gender differences, presented in Table 1. Understanding these differences could be important for teachers and librarians as they consider how to engage and challenge learners.

Table 1: Gender Differences in performing skills and tasks

Male Strengths	Female Strengths
Targeting skills	Fine motor skills – ability to move fingers rapidly in unison
Working vocabulary	Computation tests
Extended focus and concentration	Multitasking
Mathematical reasoning and problem-solving aptitude	Recalling the position of objects in an array
Navigation with geometric properties of space	Spelling
Verbal intelligence	Fluency of word generation
Habit formation and maintenance	Tasks that require being sensitive to external stimuli (except visual stimuli)
Most spatial tasks	Remembering landmarks along a route
	Use of verbal memory
	Appreciation of depth and perceptual speed
	Reading body language/facial expressions

Alongside research related to gender differences is research about how people learn. Prominent among these researchers are Caine and Caine (2011) who summarize three key points about learning:

1. The search for meaning occurs through patterning. Every human being is born with a drive to make sense of experience. Simply put, in the real world all human beings (and every living organism) have to engage with their environment as a matter of survival.
2. Cognition is emotional. Among the many factors that influence meaning making is the fact that cognition is affected by emotions.
3. The brain/mind is social. No one is an island, not biologically. Even for people who love to spend most time alone, some aspects of learning are intrinsically social (p.15).

The science of learning continues to inform what we know about each other, our physiology, and how we learn. Sykes (2006) believes that it is the responsibility of teacher librarians to understand the principles emerging from brain research to make “the school library more brain friendly and connect their practice to what works” (p.4).

Gender and Library Services

Gender has previously been considered in terms of the library and library services. According to Stauffer (2007, p.402) research has demonstrated that the gender-based differences in reading do not appear until about nine years old. With an historical view, efforts to promote reading along gender lines were related to socializing children into culturally acceptable roles from the late 1800s through the 1970s. In the 1970s, researchers began questioning what motivated children to read, and gender differences became a prominent focus through the 1990s. However, Stauffer (p.418) suggests that it is an over-simplification to promote a dichotomous view of reading, since:

> complex causal factors are reduced to simple biology and the effects of ethnicity, socioeconomic status and teaching methods, in particular standardized reading lists and tests, are discounted as boys and girls are stereotyped as “non-readers” and “readers”. In addition, research has yet to reveal why some boys read and read well and why some girls do not.

Instead, what the research supports as the best method for encouraging all children to read, regardless of gender, is providing “access to a large number and wide range of materials, to allow children free choice in their reading, and to provide an ethnically, sexually, and socially diverse group of adult role models to read” (p.418).

While gender differences in reading achievement are consistently found in national and international assessments, Logan and Johnston, 2010, state that other factors, including cognitive development, may explain gender differences in reading achievement: “within the

classroom environment, whilst all children receive the same literacy instruction, differences in attention, interest and preference for different types of classroom activities may mean that boys and girls spend different amounts of time engaged in literacy activities" (p.177). For any type of reading instruction to be effective, children need to be attentive and engaged when learning and for boys, they may require a type of reading instruction that effectively focuses their attention. More research into the cognitive effects of instruction is required since "there is very little research examining the skills underpinning children's reading development as they learn to read by different methods" (p.184).

Tilley and Callison (2005) also caution against over generalizing the differences between genders. They suggest that while observations have been made that "girls tend to prefer collaboration while boys seem to prefer competition" and "girls tend to be open to options, while boys favor finding a single path when faced with solving online information search problems", …"little has been tested to determine best practice to meet these differences when students are involved in student research and inquiry projects" (p.35).

In the Ohio School Library Study, Todd and Kuhlthau (2005) noted gender differences in topic preferences for recreational reading: "Boys appeared to prefer action-oriented topics such as sports, cars, animals, sciences, wars, and space; and girls placed stronger emphasis on the arts and literature, as well as sports and animals" (p.81). This wide range of preferential differences was placed in the context of the diverse information base that school libraries provide to serve a wide variety of personal interests outside immediate curriculum needs.

Agosto, Paone, and Ipock (2007) investigated reasons for teens' use of libraries and found that there were more similarities between adolescent girl' and boys' perceptions and uses of public libraries than differences. The only major gender difference was that girls tended to rate libraries as more useful in helping them with their information needs and valued more what the authors call "female-friendly spaces" (p.399). This responsiveness to needs and provision of a welcoming environment are hallmarks of engaging libraries and complement the dimensions measured in the school library learning environment.

Data Source

The research settings include K-5 public elementary and middle schools from a school district in north Texas (2010-2011), the lower school library setting in an International Baccalaureate (IB) World School in Germany (2010- 2012), and the lower and middle school settings in an International Baccalaureate (IB) World School in Russia (2013). Table 2 details the demographic makeup of the schools' students.

Table 2: Demographic Student Data

Location	Year	Grade	Gender		Total
			Male	Female	
Texas School District	2010/2011	3	73	92	165
		4	73	116	189
		5	95	85	180
		6	78	100	178
		7	127	127	254
		8	134	126	260
Germany International School	2010/2011	3	17	19	36
		4	14	24	38

		5	19	21	40
	2011/2012	3	16	16	32
		4	16	12	28
		5	16	16	32
Russia International School	2013	3	8	6	14
		4	22	19	41
		5	20	22	42
		6	8	12	20
		7	16	15	31
		8	18	13	31
Total			**770**	**841**	**1,611**

Methods

The studies were based on quantitative data derived from the learning environment questionnaires administered to elementary and middle school students in regard to their school library experiences. The *How My Library Supports Inquiry (HMLSI)* questionnaires were developed to evaluate student perceptions of student learning in an inquiry-based constructivist school library learning environment and have been validated for use as data collection instruments (Schultz-Jones & Ledbetter, 2013).

The questionnaires have two distinct applications: student assessment of the preferred learning environment followed by student assessment of the current (actual) learning environment. They are administered in two sittings. The first questionnaire focuses attention on the preferred learning environment. Then, following a substantial time gap of several weeks, the second administration provides the same set of questions with attention on the actual learning environment.

The lower grade (third, fourth and fifth) students and middle grade (sixth, seventh and eighth) students in the 2010/2011 data collection year received the HMLSI questionnaire that delivered 28 statements with four items in each of the seven climate scales of Reflection, Librarian Support, Involvement, Investigation, Task Orientation, Cooperation, and Equity. Table 4 provides a description of the seven climate scales for the HMLSI.

Table 4. Description of HMLSI Assessment Instrument

Scale Name	Items Per Scale	Description
Librarian Support	4	Degree to which students feel the librarian supports them.
Investigation	4	Degree to which students are comfortable doing their own research.
Reflection	4	Degree to which students think about inquiry and the learning process.
Task Orientation	4	Degree to which students experience difficulty in their learning tasks or understand how to use the library.

Cooperation	4	Degree to which students feel a sense of comfort working with others in the library.
Involvement	4	Degree to which students feel a part of the library learning community.
Equity	4	Degree to which students feel they are treated fairly.

Table 5 provides an example of the questions in two of the seven climate scales.

Table 5: Climate Scale Examples for HMLSI

Librarian Support	
In my current school library (Actual)	In a perfect school library (Preferred)
The librarian would discuss things with me.	The librarian would talk with me.
The librarian would be interested in my research questions.	The librarian would be interested in my questions.
The librarian would move about the library to talk with me.	The librarian would move around the library to talk with me.
The librarian's questions would help me to understand what I am looking for.	The librarian's questions would help me to understand what I am looking for.
Investigation	
In my current school library (Actual)	In a perfect school library (Preferred)
I investigate questions that puzzle me.	I would be able to ask questions that puzzle me.
I investigate answers to the teacher's questions.	I would be able to look for answers to the teacher's questions.
I find out answers to questions by doing investigations in the library.	I would be able to find out answers to questions by doing research.
I solve problems by using answers I found in my own investigations in the library.	I would be able to solve problems by using answers I found in my own research.

During a regularly scheduled class session, the teachers distributed the questionnaires and read the instructions to the students, assuring the students that the answers remain anonymous. Once completed, the questionnaires were collected, sealed in an envelope and delivered to the researchers.

Results

Students provided their perceptions of the perfect School Library (Preferred) and of the current School Library (Actual).

t-Test Analyses

Comparison of the means from all students in all studies showed significant differences between their perceptions of their preferred and actual learning environments. To determine if these perceptions were consistent for females and males, the data were analysed by gender in each of the research study years. First the data for each study were analysed using an independent t-test analysis to determine if the means of the two genders are statistically different for each dimension. Then the data for each gender were analysed using

a dependent t-test analysis to determine if the means for each dimension are statistically different. Each study produced statistically significant results.

t-Test Analyses 2010/2011 Texas School District

For the 2010/2011 study in a north Texas school district elementary students (n = 534) indicated that they would prefer more librarian support, involvement, investigation and cooperation than they are experiencing. The data were next parsed by grade level and gender.

There is a significant difference (independent t-test) when comparing Preferred or Actual for third grade females versus third grade males. Third grade females experienced more equity than the males. There were no significant differences in their preferences. There are significant differences (dependent t-test) when comparing Preferred versus Actual for all males (n = 73) and for all females (n = 92). Third grade females and males wanted more involvement than they were experiencing. Females also wanted more cooperation while males wanted more opportunities for investigation.

Fourth grade females and males indicate a significant difference (independent t-test) when comparing Preferred or Actual. Fourth grade females experienced more investigation, task orientation and equity than the males. The females also preferred more library support than the males. Significant differences (dependent t-test) also exist when comparing Preferred versus Actual for all fourth grade females (n = 116) and for all males (n = 73). Fourth grade females and males wanted more involvement, investigation and cooperation than they were experiencing.

For the fifth grade, there is a significant difference (independent t-test) when comparing Preferred or Actual for females versus males. Fifth grade females preferred more experience with each scale than the males. There were no significant differences (dependent t-test) when comparing Preferred versus Actual for 5th grade males (n = 95). However, significant differences exist (dependent t-test) when comparing Preferred versus Actual for all fifth grade females (n = 85) who wanted more librarian support, involvement, and investigation than they were experiencing. The results for preferences by gender in grades three through five are summarized in Table 6.

Table 6. Significant Preferences by Gender 2010/2011 Texas Study

Scale	Grade 3		Grade 4		Grade 5	
	Male	Female	Male	Female	Male	Female
Librarian Support	-	-	-	More	-	More
Investigation	More	-	More	More	-	More
Reflection	-	-	-	-	-	More
Task Orientation	-	-	-	-	-	More
Cooperation	-	More	More	More	-	More
Involvement	More	More	More	More	-	More
Equity	-	-	-	-	-	More

For the 2010/2011 study in a north Texas school district middle school students (n = 692) indicated that they would prefer more reflection, librarian support, involvement, investigation, cooperation and equity than they are experiencing. The data were next parsed by grade level and gender.

There is a significant difference (independent t-test) when comparing Preferred or Actual for 6th grade females versus 6th grade males on the scale of Actual Investigation. Sixth grade females experienced more investigation, and task orientation than the males. There were no significant differences in the preferences of the males and females. There are significant differences (dependent t-test) when comparing Preferred versus Actual for all sixth grade females (n = 100) and when comparing Preferred versus Actual for all males (n = 78). Sixth grade females and males wanted more librarian support, investigation and cooperation than they were experiencing. The males are experiencing less of each of the other scales than they prefer.

With seventh grade there is a significant difference (independent t-test) when comparing Preferred or Actual for 7th grade females versus 7th grade males. Seventh grade females experienced more reflection, investigation, task orientation and equity than the males. Females also preferred more reflection, task orientation and equity than the males. Significant differences (dependent t-test) also exist when comparing Preferred versus Actual for all 7th grade females (n = 127) and when comparing Preferred versus Actual for all males (n = 127). Seventh grade females and males wanted more reflection, involvement, cooperation and equity than they were experiencing. The females are not experiencing as much librarian support, or task orientation as they prefer. The males are experiencing less investigation than they prefer.

In the eighth grade there is a significant difference (independent t-test) when comparing Preferred or Actual for females versus males. Eighth grade females experienced less reflection than the males. Females also preferred more task orientation, cooperation and equity than the males. There are also significant differences (dependent t-test) when comparing Preferred versus Actual for all females (n = 126) and for all males (n = 134). Eighth grade females and males wanted more librarian support than they were experiencing. The females are not experiencing as much reflection, involvement, investigation, task orientation, cooperation or equity as they prefer. The results for preferences by gender in grades six through eight are summarized in Table 7.

Table 7. Significant Gender Preferences 2010/2011 Texas Study

Scale	Grade 6		Grade 7		Grade 8	
	Male	Female	Male	Female	Male	Female
Librarian Support	More	More	-	More	More	More
Investigation	More	More	More	-	-	More
Reflection	More	-	More	More	-	More
Task Orientation	More	-	-	More	-	More
Cooperation	More	More	More	More	-	More
Involvement	More	-	More	More	-	More
Equity	More	-	More	More	-	More

t-Test Analyses 2010/2011 Germany International School

In the 2010-2011 school year, elementary students (n = 114) indicated that they preferred more involvement and investigation opportunities in their learning environment than they were currently receiving. Due to lower numbers in the individual grade years, the data for each gender were combined and then evaluated using dependent samples t-tests for samples greater then n = 20. When parsed by gender, females in the 2010-2011 school year (n = 64) indicated that they prefer more involvement than they were experiencing while male participants (n = 50) indicated that they prefer more involvement and investigation

opportunities. The results for preferences by gender in grades three through five are summarized in Table 8.

Table 8. Significant Gender Preferences 2010/2011 Germany Study

Scale	Grade 3		Grade 4		Grade 5	
	Male	Female	Male	Female	Male	Female
Librarian Support	-	-	-	-	-	-
Investigation	More	-	More	-	More	-
Reflection	-	-	-	-	-	-
Task Orientation	-	-	-	-	-	-
Cooperation	-	-	-	-	-	-
Involvement	More	More	More	More	More	More
Equity	-	-	-	-	-	-

t-Test Analyses 2011/2012 Germany International School

In the 2011-2012 school year elementary students (n = 92) continued to indicate that they would prefer more involvement and investigation opportunities than they perceive they actually receive. And, they added librarian support and cooperation as dimensions they would prefer to see increased. When examined by gender, females in the 2011-2012 school year (n = 44) again indicated that they prefer more involvement than they were experiencing. Male participants (n = 48) again indicated that they prefer more involvement and investigation opportunities. In addition, they perceive that there is less cooperation than they prefer (data summarized in Table 9).

Table 9. Significant Gender Preferences 2011/2012 Germany Study

Scale	Grade 3		Grade 4		Grade 5	
	Male	Female	Male	Female	Male	Female
Librarian Support	-	-	-	-	-	-
Investigation	More	-	More	-	More	-
Reflection	-	-	-	-	-	-
Task Orientation	-	-	-	-	-	-
Cooperation	More		More	-	-	-
Involvement	More	More	More	More	More	More
Equity		-	-	-	-	-

t-Test Analyses 2013 Russia International School Lower Grades

In general, elementary students (n = 97) would like to experience an increase in all areas surveyed, except for Task Orientation. Again, due to lower numbers in the individual grade years, the data for each gender were combined and then evaluated using dependent samples t-tests for samples greater then n =20. When divided by gender, the data show that males (n 50) would like more opportunities for Reflection (see Table 10).

Table 10. Significant Gender Preferences 2013 Russia Study

Scale	Grade 3	Grade 4	Grade 5

	Male	Female	Male	Female	Male	Female
Librarian Support	-	-	-	-	-	-
Investigation	-	-	-	-	-	-
Reflection	More	-	More	-	More	-
Task Orientation	-	-	-	-	-	-
Cooperation	-	-	-	-	-	-
Involvement	-	-	-	-	-	-
Equity	-	-	-	-	-	-

t-Test Analyses 2013 Russia International School Middle Grades

In general, middle school students (n = 82) would like to experience an increase in all areas surveyed, except for Investigation and Task Orientation. When parsed by gender, the data show that females (n = 40) would like more Library Support, Involvement, Investigation and Equity than the males (n = 42). However, the females experience more cooperation than the males (see Table 11).

Table 11. Significant Gender Preferences 2013 Russia Study

Scale	Grade 6		Grade 7		Grade 8	
	Male	Female	Male	Female	Male	Female
Librarian Support	-	More	-	More	-	More
Investigation	-	More	-	More	-	More
Reflection	-	-	-	-	-	-
Task Orientation	-	-	-	-	-	-
Cooperation	-	-	-	-	-	-
Involvement	-	More	-	More	-	More
Equity	-	More	-	More	-	More

Pearson r Correlations

A correlation shows a relationship between two variables. There is no causation tested, only the strength of the relationship. It is also used to determine if as one variable becomes more positive another does, or if as one variable becomes positive another becomes negative. To determine if there were relationships among the scales, a *Pearson r* statistical test was used for data submitted by male and female students across all studies.

When the results from the Actual instrument are examined, it becomes apparent that the males and females have differing perceptions. For the females, there is a positive correlation between the Teacher and female students' perceptions of Cooperation and Equity; the girls feel they are being treated equally and there is a spirit of cooperation associated with the behaviour or expectations of a teacher.

For males, the teacher also seems to be a determining factor influencing perceptions of the actual learning environment. Teachers are positively correlated with Librarian Support, Involvement and Task Orientation. This may mean that a homeroom teacher correlates to an appreciation of librarian support and a feeling of involvement where it is apparent a teacher and a librarian enjoy a positive relationship or productive work experiences.

Discussion

Learning environment assessment involves a cycle of data collection, data analysis and reflection on the results, recommendations, changes and/or modifications, and reassessment. By gaining insight into student perceptions, male and female, the potential exists to consider ways to guide changes aimed at aligning the actual learning environment with the preferred learning environment (Fraser, 2012). These perceptions also provide an opportunity to advance the development of students' metacognition and reasoning processes through consideration of the inquiry and behavioural factors at play within these learning environments.

The results indicate that there are differences between what the females prefer and perceive is happening in the actual learning environment. These differences are not as prevalent among the males. And, there are differences between what the females and males prefer, but not particularly what they perceive is happening within that actual learning environment. Overall, the results indicate that females generally have higher expectations of their learning environments than do males, and experience less satisfaction with their actual learning environment than males.

But, there are no dimensions that consistently display a preference or a perception for females or for males across all locations. Instead, the differences appear predicated on the specific learning environment location and circumstances. In each location, the learning environment is not meeting the needs of the females and males in several areas and in some cases those needs are different.

How these differences can be addressed requires sensitivity to the research results within each learning environment and consideration of the different behavioral, developmental, and cognitive-processing differences and experiences that students bring to their learning environment. This requires explicit and well-considered teaching activities and discourse that recognize the importance of the teacher and the teacher librarian in developing and altering the learning environment in order to meet student needs and affect student change. As Todd and Kuhlthau (2005) relate, "This shared dimension of pedagogy clearly plays a key role in maximizing learning outcomes" (p. 86).

Correlation results reinforce the need to consider teacher and school librarian interactions when developing approaches to help students experience inquiry and advance student learning.

Scholarly Significance and Implications

The purpose of learning environment research is to allow students to describe their perceptions of and preferences for the interactions among the students, teachers and curriculum. Knowledge of these perceptions can contribute to an understanding of student needs and lead to improvements in the school library learning environment. The evolution of this learning environment could also include enhanced interaction among school librarians, classroom teachers, and students.

While examination of data collected among schools in different locales shows that there are definite differences in how females and males perceive their libraries and in their preferences for a particular library learning environment, these differences suggest careful consideration of each learning situation that could lead to changes that would affect students' learning through their more positive perceptions of their specific library.

The implication of this research suggests a need for sensitivity to possible differences in expectations and needs between genders. As Caine and Caine (1994) suggest, "it is conceivable that some approaches to education may favour one sex over the other. Educators need to track such research for possible implications for teaching." (p.35) But, those considerations of gender should not limit our sensitivity to the learning needs of individuals and development of students' metacognition and reasoning processes within the

learning environment. Tilley and Callison (2005) make the case that “gender research should not narrow our target for learning support, but open our minds as educators to the wide variety of learning barriers we all face – cognitive, physical, social, and emotional.” (p.36)

The school library is a dynamic learning environment where spaces, resources and guidance can be provided at various levels to meet the learning needs of all students. Additional research is required before we could draw more definitive conclusions on the difference between male and female perception and needs of the learning environment. More research is also needed to determine the cognitive effects in relation to various types of instruction and interaction, toward the development of best practices to meet these differences.

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Biographical note

Barbara Schultz-Jones, PhD is an Associate Professor and Director of the School Library Program in the College of Information at the University of North Texas. She has published and taught in the areas of Information Literacy, Cataloguing and Classification, Learning Environments and Social Network Analysis. Barbara became the Chair of the Section on School Libraries for the International Federation of Library Associations (IFLA) in August, 2013. She leads study abroad projects optimizing automation systems and services in school libraries, including projects in Thailand (2003, 2004, 2005, 2006), Albania (2008), Ukraine (2010), Peru (2011), Russia (2012, 2013), Germany and Czech Republic (2014).

Cynthia Ledbetter, PhD is Professor Emeritus of Science and Mathematics Education at the University of Texas at Dallas. She has extensive experience with learning environment research in the science classroom and has moved this research to the school library learning environment in recent years. Cynthia has participated in studies related to the correlation between science and library learning environments and guides the statistical analyses for these research studies.

John Bishop, MLIS is the Head Librarian at the Anglo-American School of Moscow. A native Texan, he has worked in international school libraries in Russia, the United Arab Emirates, and Romania; public libraries in Texas, California, and New Zealand; and joint-use libraries in New Mexico and California. He started his career as a classroom teacher of Spanish and English, and then moved into professional library work upon completion of his Master's in Library and Information Science from the

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