School Libraries as Learning Environments: Examining Elementary School Students' Perceptions

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This paper presents preliminary results from a 2008/2009 research study examining the application of a learning environment *paradigm to the school library setting. With a focus on Grade 5 science classes, we examined the relationships among student perceptions of science programs and library programs. From a practical point of view, this study presents a new model for considering the contribution of school libraries to the field of education, specifically science education. From a research point of view, this study makes a unique contribution to the field of learning environments by evaluating school library programs and their relationship to classroom environments. The research will continue at other grade levels and be extended to assess the relationship between learning environments in the school library setting and student achievement.*

learning environments, school libraries, science education

This paper reports the preliminary results of a 2008/2009 research study that examined the application of a *learning environment* paradigm to the school library setting. Previous studies revealed that positive learning environments contribute to high student outcomes. Since previous research also reveals that students in settings with strong school library programs have high student achievement, the role that a learning environment plays within the school library media centre is of interest. With a focus on the science classroom, we examined the relationships among student perceptions of science programs, and library programs to identify common themes.

"*Learning environment* refers to the social, psychological and pedagogical contexts in which learning occurs and which affect student achievement and attitudes" (Fraser, 1998a, p.3). The study of learning environments can be traced back approximately 70 years to the foundational work of Lewin and Murray. Lewin (1936) wrote about relationships between the environment and the personal characteristics of the inhabitants, as well as the environment's effects on human behaviour. Murray (1938) followed Lewin's research on behaviour and the environment and introduced his famous needs-press model, where individual *needs* are

influenced by environmental forces he termed *presses*. During the 1960s and 1970s, Herbert Walberg developed the *Learning Environment Inventory* (LEI) to use for an evaluation of Harvard Project Physics (Walberg & Anderson, 1968). About the same time, Rudolf Moos (1974) developed his *Classroom Environment Scale* (CES). 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.

School library media specialists and science teachers face the challenge of providing environments that positively affect the development of student science literacy skills. Research studies situated in numerous states (Lance, K.C., Hamilton-Pennell, C., Rodney, M.J., Peterson, L., & Sitter, C. 2000; Lance, Rodney & Hamilton-Pennell, 2000a, 2000b, 2001, 2002; Lance, Welborn & Hamilton-Pennell, 1997; Smith, E. 2001) have demonstrated the impact of strong school library media programs on student achievement in reading. A study based on student evaluation of school library media centres (Todd & Kulthau, 2004) further supports the positive role of library media centres in affecting overall student achievement. However, despite substantial efforts to document the positive relationship between school library media programs and student achievement, Mardis (2007) contends that "the effect of strong school library media programs on science achievement is largely unreported" (¶ 4). With a national emphasis on requisite science literacy skills, the opportunity exists to strengthen collaboration efforts in this underserved area and examine the relationships among science programs, library programs and student achievement.

According to Geelan (1997), "If educational innovations are to succeed, they must take a more realistic view of the realities of classroom life than have some past curricular projects" (p. 4). Since the original work of Walberg and Moos, many questionnaires have been developed to examine classroom life. These instruments have been used in several lines of research reviewed by Fraser (1998c), including investigations of associations between learning outcomes and classroom environments (McRobbie & Fraser, 1993), cross-national studies (Aldridge, Fraser, & Huang, 1999; Aldridge, Fraser, Taylor, & Chen, 2000), and the evaluation of educational innovations (Ogbuehi & Fraser, 2007; Maor & Fraser, 1996; Martin, Dunlop & Fraser, 2008; Monsen & Frederickson, 2004). To date, these instruments have not been used in a school library setting.

In response to the need to assess innovative classroom environments, the *What Is Happening In this Class?* (WIHIC) was developed 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 *My Class Inventory* (MCI) (Fraser & O'Brien, 1985). The WIHIC was selected for use with secondary students and the MCI with elementary students in this study because of their distinctive ability to characterize specific dimensions of the constructivist classroom. The WIHIC assesses the dimensions of student cohesiveness, teacher/librarian support, involvement, investigation, task orientation, cooperation and equity. The MCI assesses dimensions of satisfaction, competition, friction, difficulty and cohesion. Both questionnaires have two distinct applications. The first is the assessment of the preferred learning environment, and the second is an assessment of what is actually occurring in the current learning environment.

Of primary importance, the WIHIC and the MCI provide valid and reliable instruments for the assessment of teachers' and students' perceptions of constructivist classroom learning environments (Aldridge, Fraser & Huang, 1999; Dorman, 2003; Fraser, 1998b; Fraser & O'Brien, 1985). Further, the combination of qualitative methods and

quantitative measures (Fraser & Tobin, 1991) provide insight into the integrated setting and evaluation of the near- and far-term effects of exposure to constructivist pedagogy. Therefore, application to the school library is worth examination.

Incorporation of the WIHIC and MCI contributes a unique design for a variety of classroom contexts within the burgeoning field of learning environments research (Nix, Ledbetter, & Fraser, 2001). Further, this study of psychosocial aspects of the learning environment offers potentially valuable ideas and techniques for teacher development (Fraser, 1998b) and incorporation by school librarians.

Research Setting

The research setting is a K-5 public elementary school in north Texas that provides mathematics and pre-engineering integrated curriculum at each grade level. The school does not have an attendance zone, and any elementary-aged student living in the state of Texas is eligible to apply for enrolment on a first-come basis, without charge. The school is designed to facilitate the delivery of an inquiry-based curriculum. Complementing this approach is a Research and Design Center that functions as a combination library and centre for the delivery of a robotics program. The traditional scope of a school library program has therefore expanded to incorporate exploration and design within the robotics context.

Method

The study was based on quantitative data derived from the learning environment dimensions in the MCI. The MCI was administered to 200 elementary school students in science classrooms, and the same students in regard to their school library experiences. The preliminary results reported in this paper focus on the MCI administered to the 50 Grade 5 students (age 10 and 11) in three science classrooms, and the MCI administered to the same students in regard to the school library experience, where the library has the designated title of Research and Design Center (see Table 1).

Table 1
Student demographics for Science Classes and R&D Center.

5^{th} Grade Students in Science Class (n = 50) and 5^{th} Grade Students in R&D Center (n = 50)										
Class	Male	Female	African American	Asian	Hispanic	Native American	Pacific Islander	White	Mixed	Other
1	6	11	2					15		
2	8	10	1	1				16		
3	9	6	1					14		
Total	23	27	4	1				45		

The MCI delivered 25 questions with five items in each of the five climate scales of: Satisfaction, Friction, Competition, Difficulty and Cohesion. The answer format was a choice of Yes, Don't Know, or No. The MCI designated for the school library setting was a modification of the version used for the science classroom. Modifications included replacing the terms "science classroom" with "Research and Design (R&D) Center, and modifying the concept of "doing schoolwork" to "finding resources (such as books and magazines)".

On the MCI, Satisfaction is defined as the feeling of accomplishment and enjoyment with the learning environment. Friction includes conflicts between students and between teacher and students. Competition is the perception that if one student wins, others lose. Cohesion is the perception that students are friendly and can work together. Examples of each of the preferred and actual scales for the MCI in the science classroom and the one used in the R&D Center are shown in Table 2.

Table 2
Examples of the five scales from the MCI used to evaluate the learning environments of the R&D Center and the Science Class

MCI Science		MCI Library	
Preferred	Actual	Preferred	Actual
		Satisfaction	
In my science class the students would enjoy their schoolwork.	The students enjoy their schoolwork in my class.	Students would enjoy doing their schoolwork in the R&D Center.	Students enjoy doing their schoolwork in the R&D Center.
		Friction	
In my science class students would be always fighting with each other.	Students are always fighting with each other.	Students would always fight or argue with each other in the R&D Center.	Students are always fighting with each other in the R&D Center.
		Competition	
In my science class students often would race to see who could finish first.	Students often race to see who can finish first.	Students would often race to see who can find things in the R&D Center first.	Students often race to see who can find things in the R&D Center first.
		Difficulty	
In my science class the work would be hard to do.	In my class the work is hard to do.	In my R&D Center finding different resources (such as books, magazines, CDs) would be hard to do.	In my R&D Center finding different resources (such as books, magazines, CDs) is hard to do.
		Cohesion	
In my science class everybody would be my friend.	In my class everybody is my friend.	In my R&D Center everybody would be my friend.	In my R&D Center everybody is my friend.

The paper questionnaires were administered in two semesters by the Grade 5 science teachers. The MCI for the preferred learning environment in the science classroom was administered in November, 2008 and the MCI preferred for the Research and Design Center was administered in December, 2008. The MCIs for the actual learning environment in the science classrooms and library centre were administered in early May, 2009. The teachers distributed the questionnaires and read the instructions to the students, assuring the students that the answers remain anonymous. The only help that the teachers provided was if a student did not know a specific word. The students were given up to 20 minutes to complete the questionnaires; they were then collected, sealed in an envelope and delivered to the

Curriculum Coordinator. All instruments were picked up from the Curriculum Coordinator by the researchers, once in January, 2008 and again in May, 2009.

Once both batches were together, in May, 2009, the questionnaires were processed using Remark Office OMR®, a scanning software for collecting and analyzing data from plain-paper OMR (optical mark recognition) forms. The data were exported to Excel® spreadsheets for compilation and analysis.

The data were analyzed against the learning environment dimensions for the science classroom environment and the school library environment, with *t-test analyses*. Then, the data were analyzed using *Pearson r* for a correlation between their library experiences and their science classroom experiences.

Results

The MCI generally shows that students want classrooms that use cooperative work rather than competitive operations and do not like classrooms where friction occurs among students. For the students in these science classrooms, that perception prevails. The situation for the R&D Center was assessed with the same constructs, and yields similar results. Findings related to a correlation between the R&D Center and the science classrooms indicate a positive correlation for Satisfaction. These findings will be further explored through student interviews and observation in the upcoming Fall semester.

t-Test Analyses

Data from the MCI Preferred and the MCI Actual were compared using the *t-test* for analysis of two samples assuming unequal variances (See Table 3). Comparisons of the means from the 5th grade science students showed significant differences between their perceptions of their preferred level of satisfaction and their actual satisfaction; the amount of friction; and the level of cohesion. In this case, students' preferred more satisfaction than they were experiencing. They also reported that there was significantly more friction than they preferred and less cohesion than they preferred.

These same fifth grade students were asked to provide their perceptions of the perfect R&D Center as well as their perceptions of the actual R&D Center. Students' perceived that there was significantly less Satisfaction, Friction and Cohesion than they preferred. However, they also perceived that there was significantly more Competition than would occur in their perfect R&D Center. It is interesting, in light of the correlation analysis that follows, that students' perceive less Friction than they prefer and yet perceive more Competition than they prefer. Interviews with students should uncover why these perception persist.

Table 3
Comparison between the MCI Preferred and the MCI Actual for the Science Classes and R&D Center using t-test analysis of two samples assuming unequal variance.

5th Grade Students in Science Class (n = 50) and 5th Grade Students in R&D Center (n = 50)					
Scales	Preferred Means	Actual Means	*df*	t Stat	t Critical one-tail
Science Satisfaction	2.688	2.268	91	5.543*	1.661
R&D Satisfaction	2.737	2.4	87	4.661*	1.662
Science Friction	1.208	1.572	79	-4.482*	1.664
R&D Friction	1.732	1.517	77	2.849*	1.664
Science Competition	1.592	1.644	97	-0.564	1.660
R&D Competition	1.533	1.905	103	-4.389*	1.659
Science Difficulty	1.452	1.36	98	1.356	1.660
R&D Difficulty	1.270	1.325	88	-0.762	1.662
Science Cohesiveness	2.568	2.256	96	3.104*	1.660
R&D Cohesiveness	2.322	2.101	102	1.961*	1.659

*$\alpha = 0.05$

Pearson r Correlations

To determine if there were relationships among the scales measured by the MCI, a *Pearson r* statistical test was used (see Table 4). As predicted by previous learning environments research, Satisfaction in the Science class is negatively correlated with students' perceptions of Friction among students and Competition between students. This means that as students' perceptions of Friction and Competition increase, their Satisfaction with their Science class decreases. Further, student perceptions of Friction and Competition are positively correlated; with competition comes friction. Also as seen in previous research, students' perceptions of Cohesion are negatively correlated with Friction and with Competition. Therefore, when students perceive more cohesion among classmates, perceptions of Friction and Competition are lessened.

When the R&D Center learning environment was examined, significant correlations reflecting previous research are also found. Students' perceptions of their Satisfaction are negatively correlated with the amount of Friction, Competition, and Difficulty; and positively correlated with Cohesion. Their perceptions of the amount of Friction and Competition are positively correlated, and negatively correlated with Cohesion. Competition is positively correlated with Difficulty and negatively correlated with Cohesion. Finally, Cohesion is negatively correlated with Difficulty. As with students' perceptions of their science classes, Friction, Competition, and Difficulty are tied to students being less satisfied with their experiences in the R&D Center. These factors are also related to students' perceptions of less Cohesion as Friction, Competition, and Difficulty increase.

There is a significant correlation between students' perceived Satisfaction in the R&D Center and in their Science Class ($r = 0.390$; r critical = 0.273). However, this needs to be explained through student interviews and observations.

Table 4
Correlations between Scales for the Science Classes and R&D Center as Measured by the Actual Forms of the My Class Inventory

Scales	Satisfaction	Friction	Competition	Difficulty	Cohesiveness
5th Grade Students in Science Class (n = 50)					
Satisfaction	-				
Friction	-0.401*	-			
Competition	-0.215	0.451*	-		
Difficulty	-0.329*	0.165	-0.020	-	
Cohesiveness	0.157	-0.377*	-0.395*	0.136	-
5th Grade Students in R&D Center (n = 50)					
Satisfaction	-				
Friction	-0.725*	-			
Competition	-0.457*	0.431*	-		
Difficulty	-0.459*	0.509*	0.446*	-	
Cohesiveness	0.469*	-0.457*	-0.338*	-0.337*	-

*$\alpha = 0.05$; r critical = 0.273

Discussion

The methodology for assessing a science classroom environment can be extended to the school library setting. While the results are preliminary, they demonstrate applicability to the school library environment in terms of what is preferred by students and what is actually occurring. Knowledge of student perceptions could be used to guide the evolution and improvement of the learning environment, with emphasis on key dimensions where significant differences occur. And, assessment of a school library learning environment could be a key factor in determining the success of new teaching methods and resources. The preliminary results indicate a promising start to the application of this new paradigm to the school library setting.

Additional quantitative assessment, through evaluation of student scores on state tests, along with qualitative interviews with the classroom teachers and school librarians will be scheduled for the fall semester. These added dimensions may suggest an emergent model.

Future research will identify additional constructs for assessment in the school library, recognizing that while instruction and learning are integral to the school library program there may be other constructs that distinguish the role of the school library program in the school learning community.

From a practical point of view, this study presents a new model for considering the contribution of school libraries to the field of education, specifically science education. From a research point of view, this study makes a unique contribution to the field of learning environments by evaluating school library programs and their relationship to classroom environments.

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Statement of Originality

This statement certifies that the paper above is based upon original research undertaken by the author and that the paper was conceived and written by the author(s) alone and has not been published elsewhere. All information and ideas from others is referenced.