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ABSTRACT

The distinction between formal education and museums and science centers has become less obvious over time as museums meet more needs of schools. This study examines two different cultures in the form of the school/museum partnership. The objective of the study was to identify the points at which two institutions, schools and museums, could merge and support each other. The study used grounded theory methodology and focused on observations of instances. (Contains 10 references.) (YDS)

A Museum School: Building Grounded Theory as Two Cultures Meet[1]

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Objectives

Informal learning environments, such as museums and science centers, differ in many ways from schools. With approaches to teaching and learning changing in the formal education realm and with museums striving to meet more and more of the needs of schools, distinctions blur between the two environments (Ash & Klein, 2000). What has become known as the "museum school" or museum/school partnership in the museum field blurs those distinctions even further (Science Museum of Minnesota, 1995; Klein, 1998a; Klein, 1998b). This paper examines one museum/school partnership and the coming together of two cultures -- science center and school.

The objectives of this study were to identify areas where the two cultures could merge and support each other in the museum/school partnership and to further identify those areas where the two institutions could support each other in any museum and school relationship. We use the word culture in the most general sense to refer to the environment, community, belief systems, political structure, language, behaviors and ways of being of each organization. We see this work as developing a framework for future relationships and future studies of those relationships, particularly with the partnership between the St. Louis Science Center and Compton-Drew Investigative Learning Center.

This paper reflects progress to date in the analysis of data and development of grounded theory.

The Partners

Compton-Drew Investigative Learning Center (ILC) Middle School is a magnet school within St. Louis Public Schools, located adjacent to the St. Louis Science Center (SLSC). After a two-year pilot in the school scheduled to move into the new facility, Compton-Drew ILC opened its doors to 540 students in grades 6, 7 and 8 on September 3, 1996. While students and visitors say "wow" as they look at the building and classrooms for the first time, the unique Schools for Thought curriculum and SLSC partnership distinguish Compton-Drew (Klein, 1998a).

During the regular school year, approximately 88% of the students come from St. Louis City and the rest from other school districts in St. Louis County as part of a voluntary interdistrict exchange program. Approximately, 60% are African American, 39% are Caucasian and one percent are

[1] This paper was prepared for the 2001 Annual Meeting of the American Educational Research Association (AERA) in Seattle, WA. This paper was presented in a structured poster session sponsored by the Informal Learning Environments Research Special Interest Group.

Hispanic, Asian or Native American. Most students arrive by bus or district paid taxicabs, and 48% qualify for the Federal lunch program. The average daily attendance rate is one of the highest in the district at 95%. Scores on nationally norm-referenced standardized tests are also among the highest in the district at just over 50%.

Students are selected by lottery with no entrance requirements. Compton-Drew has full special education inclusion, which is new for the district and teachers. Thus, students with various learning and behavior difficulties are in rooms with students labeled "regular" and those identified as gifted. We have a full range of academic abilities and learning styles.

The SLSC assigns two full-time staff to work directly with Compton-Drew: Kit Klein and Jean Corse, both employed by the SLSC. They share offices at Compton-Drew and the Science Center. Klein has been with the SLSC since the beginning of the SFT project during the pilot and focuses on curriculum development, professional development, and research. Corse, experienced SLSC employee with background in various SLSC program areas, joined the museum school with the opening of Compton-Drew and focuses on the integration of SLSC resources with the curriculum for all subjects, not just science. When funding is available, SLSC assigns up to three additional staff to work half-time at Compton-Drew while working half-time in the galleries of SLSC.

The remaining staff at Compton-Drew are St. Louis Public Schools employees. The principal, Andrea Walker, has assembled a staff with various backgrounds and experiences. Three Compton-Drew staff have participated in this poster session. Cheryl Ward serves as Schools for Thought Program Coordinator during the regular school, leading professional development and taking part in curriculum development. During the summer, Ward serves as principal of the summer academy. Sharonica Hardin applies her expertise to sixth grade literature as a classroom teacher during the regular school year and as instructional coordinator during the summer academy. Vivian Grigsby co-teaches sixth grade science for nine months of the year and leads the science component in the summer academy with her expertise in curriculum development and implementation.

The most unique feature of Compton-Drew is its curriculum. Curriculum units are teacher and student driven. Units last four to twelve weeks and incorporate all state and district objectives. Examples of units from our pilot school are described elsewhere (Taylor, Klein and Lamon 1996) and are featured in a multimedia book on SFT currently in development.

At Compton-Drew, teachers collaborate with each other, researchers, SLSC staff and experts in various content areas to develop units. A grant from the James S. McDonnell Foundation has provided resources to assist teachers in this development from May 1998 through June 1999 and during the summer academies.

The St. Louis Science Center is an informal science learning environment that combines galleries, demonstrations, theaters and special programs to provide visitors of all ages with a wide variety of experiences. Our slogan, "The Playground For Your Head," reflects our informal and fun approach to "minds-on" science. The Science Center is free to all visitors. Paid venues include an OMNIMAX® Theater, Planetarium and Discovery Room.

We serve approximately 1.5 million people annually, including visitors to our science center and participants in our programs in schools and community groups in the bi-state region. (For more information, see our Web site - http://www.slsc.org.)

The Museum-School Concept as applied to our partnership is a relatively new idea; however, the phrase "museum school" has been used over the years to mean different things in different settings. Often a museum offers classes on their site in modern classrooms without any connection to a school or school district (i.e. separate from any "formal" educational institution). At the other end of the spectrum, there are schools and districts with their own museums. These are managed, maintained and owned by the school or district (i.e. separate from "informal" educational institutions). In both cases, the term museum school is used.

Museums and schools each have their strengths. Their differences have led us to view them as distinct cultures. Both differences and similarities allow for strong partnerships, when built on each partner's strengths. As more and more schools and museums are seeking such partnerships, they are bridging the gap between the two extremes above and combining the strengths of the formal and informal learning environments.

A new concept of a "museum school" has evolved since the Buffalo Museum of Science and the Science Museum of Minnesota opened their museum schools in 1990 and 1991, respectively. In each case, the school is run by the school district in close partnership with the museum. In 1995, the Science Museum of Minnesota, in cooperation with the Institute of Museum Services and the Association of Science-Technology Centers, hosted "Museum Schools: A National Symposium" in Washington, DC (Science Museum of Minnesota, 1995). During the symposium, participants began to define and make a case for museum schools. It seemed clear that a "museum school" was something that neither institution could do alone. Models discussed were varied and rich.

In a follow-up conference in 1998, "Museum Schools and Student Success: A National Discussion" sponsored by the Institute of Museum and Library Services, the Smithsonian Institution and the Science Museum of Minnesota, participants considered ways to assess the impact of "museum schools" on student achievement and thus make a stronger case for support of the "museum school" concept. As an outcome of this conference, we developed a plan for assessing long-term impact of the Compton-Drew/St. Louis Science Center partnership on our graduates. This current study is one step in that process.

Museums may continue to call the classes they offer on-site their museum school. School districts may continue to build museums in schools and call them their museum schools. In the context of our work, and in use by more and more institutions, the term "museum school" refers to the school resulting from a partnership between a museum and school district or school, sometimes with a university partner. With Compton-Drew, the "museum school" is a partnership in which each partner brings its strengths to the table. Each partner institution benefits, but the greatest benefit is to the students. This partnership grows from mutual goals and a common vision, rather than one partner trying to fix the other or trying to meet the other's needs.

The partnership between Compton-Drew and the Science Center serves as a type of lab school for the Science Center, where staff learn more about the school and district culture so that lessons learned from the one school can be transferred to other schools. One of the larger goals is to support school reform in the district and region. Teachers and district level administrators learn more about the world of informal science institutions and what resources are available to support curriculum, again, lessons transferred to other schools.

Perspectives and Theoretical Framework

This study was funded as part of a grant from the James S. McDonnell Foundation to support Schools for Thought, a curriculum framework and philosophy coming out of the Cognitive Studies in Educational Practice program of the Foundation. Work of the original Schools for Thought Collaborative provides much of the theoretical framework for the research and curriculum at the school (Bruer, 1993; Lamon, et al., 1996).

Multiple perspectives are included in this study. Data draw from the perspectives of teachers, students, parents, administrators and science center staff. The study itself was carried out, written and presented by representatives of teachers, administrators, science center staff and researchers.

With our focus on the intersection of two cultures (actually three when research is included, a new culture and language to most of the school and science center staff involved), it is important to include multiple perspectives throughout the whole process.

Research in the area of museum/school partnerships is still in its infancy, as was seen at the museum school symposiums in 1993 and 1998 (Science Museum of Minnesota, 1995; King, 1999). Research in school evaluation, innovation and change, teacher beliefs, school climate, and cognitive science have influenced related research projects at this museum school. Program evaluation has remained the dominant method used in other museum schools.

Methodology

Grounded theory methodology (Glaser & Strauss, 1967; Strauss & Corbin, 1994) was used in this study since the field is so new with little existing theory and since the study serves as a foundation for future research by building theory.

The methodological approach focused on observation of instances where the two cultures came together and on reflection of those instances by the participants. This involved three methods of data collection: observation with field notes and video documentation, videotaped interviews of participants, and collection of documents.

Data Source and Data Collection

This work examines one summer school unit at the museum school, lasting six weeks with a beginning enrollment of 150 students entering grades 6, 7 and 8. Students were placed in two

teams of three classes each, with those students new to the school in separate classes from those returning.

We chose the summer school session as a focus of this study rather than the regular school for several reasons. First, summer school does not have the same curricular requirements and would give staff the perceived freedom to try new ideas. Summer school is on a smaller scale than the regular school. We had more Science Center staff available for summer school due to grant supported projects.

Five science center staff (two full-time and three part-time) documented the unit such that each class was scheduled to be videotaped for one of its three sessions. Classes unrelated to the unit, such as district testing days, were not taped. Each staff member also took field notes, following one of the two teams. Weekly professional development meetings, curriculum development meetings and lead teacher meetings were also videotaped. Documents were collected throughout the summer and included handouts given to students, daily bulletins for the school and handouts given to teachers in professional development meetings.

Interviews were conducted and videotaped during the last three days of summer school. These included students, high school volunteers, parents, teachers, and lead teachers. Interviews were opportunistic, catching individuals as we could rather than scheduling specific times. Evaluation surveys of staff were conducted by the administration and were included in our documentation collection.

Twenty-six two hour videotapes and a one inch notebook with documentation (hands-outs from classes, notes to all staff, etc.) were analyzed by members of the science center staff for instances of the merging of the two cultures. We plan to have teaching staff and administration analyze the data as well. Thus, an iterative process will be used to complete definitions and categories of the type of "merging instances." Triangulation will occur as various members of the team code the same data and as multiple data sources are used (classroom observation, interviews and written documents).

Responding to an Existing Model

The Education Program Matrix used by the St. Louis Science Center (St. Louis Science Center, 1996) serves as a model for interactions with all Science Center program participants. The matrix in Table 1 identifies the areas of concern for this study. In the model, "Levels of Engagement" between visitor and the Science Center (rows) are matched with the "Audience Identification" (columns). For this study, we are concerned with the audience type in the Formal Education category. As we developed our own model from the museum school partnership, we wanted to see if the categories for Level of Engagement would hold up in that emerging model.

The Levels of Engagement move to successive levels of increased engagement. "Single experiences suggest the least level of interaction, similar to those experienced by house guests of local residents, annual field trip visitors, special event guests, or convention attendees. Repeat experiences are generated through classes, lecture series and other opportunities for multiple engagements. A committed relationship indicates a conscious decision to invest time and interest

in the St. Louis Science Center and its activities, engaging in membership, advisory teams, sponsorship, networks or projects. A sustained relationship provides maximum benefit and indicates a more intensive and long term engagement, including internships, partnerships, Teachers in Residences, community collaborations, endowments, and committee or Board membership" (St. Louis Science Center, 1996, 7-8). The museum school partnership between the Science Center and Compton-Drew ILC has been considered a sustained relationship with formal education, but within that partnership are variations in levels of engagement.

Table 1. St. Louis Science Center Educational Program Matrix

	Families	Children & Youth	Adults	Formal Education	Organizations
Single Experience				X	
Repeat Experience				X	
Committed Relationship				X	
Sustained Relationship				X	

Results

From the analysis by Science Center staff, we identified four aspects of interactions between the school and science center: resources, levels of engagement, participants and purpose. Categories within each aspect were determined. These were defined and examples of each were identified.

- Resources: use of science center resources at the science center, use of science center resources at the school, use of school resources by the science center
- Levels of Engagement: simple, in-depth
- Type of Participant: teacher, student, parent, volunteer, administrator, science center staff in summer program, all other science center staff
- Purpose of interaction: to support unit, to support learning in general, to support operations, other support

Once school partners are able to add their analyses, these may change. Each is defined below with examples provided.

Resources

- Use of SLSC resources at the Science Center (*SLSC @ SLSC*) includes use of staff, exhibits or any other tangible resource at the Science Center. For example, a visit to a gallery by students or a preview of an OMNIMAX® film by a teacher would fall into this category.
- Use of SLSC resources at the school (*SLSC @ CD*) includes use of staff, collections items or any other tangible resource belonging to the Science Center that is used at the school's site. This would include resources such as Science Center staff involved in a classroom and items from collections in a display case in the school's hall.
- Use of school resources (*CD Res*) by the SLSC includes use of staff or other resources of the school by staff of the Science Center. Science Center staff parking spaces at the school and program space for Science Center programs are just two examples.

Levels of Engagement

- *Simple* and short periods of engagement are one-time interactions lasting anywhere from a few minutes to one class period.
- *In-depth* engagement includes repeated interaction over more than one class period.

We did not find the categories used in the Education Program Matrix of the Science Center to fit our situation or data. In the summer academy, engagement was in-depth when it involved the unit as a whole and occurred over several class periods. This was the case in most types of interactions. Short periods of contact, often not directly related to the unit, yielded simple levels of engagement. The assumption implicit in our definitions should be tested further because it may not hold in the regular school year that short periods of interaction yield minimal engagement.

Type of Participant

- *Teacher* includes those teaching in the Summer Academy.
- *Student* includes only those students enrolled in the summer program.
- *Parent* includes both parents of students enrolled and the Parent Liaison.
- *Volunteer* includes both parent and high school volunteers.
- *Administrator* includes the principal (Administrator in Charge) and the Instructional Coordinator of the Summer Academy.
- Science Center staff in the summer program (*ILC Staff*) are Kit Klein, Jean Corse and the three Science Center staff working part-time at Compton-Drew.
- All other science center staff (*SLSC Staff*) are included in the last category.

Purpose of interaction

- Support of the "Diggin' It" Schools for Thought unit (*Unit Support*) involves support directly related to the learning goals of the unit.
- *Support for learning* in general applies to learning not directly related to the unit.
- *Support of operations* includes providing facilities and other resources needed for regular operations of the program or institution.

- *Other support* is all support that does not fit a category above.

Each example of science center and school interaction can be described in terms of each of the four aspects above. Table 2 provides a listing of examples and coding applied to each. The type of participant category was not mutually exclusive. Thus, the main two participant types are given below.

Table 2. Examples of Coded Items

Example	Resource	Engagement	Participant	Purpose
Curriculum Development Team	SLSC @ CD	In-Depth	Teachers & ILC staff	Unit Support
Dig Site Preparation	SLSC @ CD	In-Depth	ILC Staff & SLSC Staff	Unit Support
Actor to introduce unit	SLSC @ CD	Simple	Students	Unit Support
Visit to Dig Dinosaurs	SLSC @ SLSC	In-Depth	Students	Unit Support
ILC Staff in classes	SLSC @ CD	In-Depth	Students	Unit Support
Visits to galleries for research	SLSC @ SLSC	Simple	Students	Unit Support
SLSC Staff attending student symposium	SLSC @ CD	Simple	SLSC Staff & Students	Unit Support
Collection items in display cases at CD	SLSC @ CD	In-Depth	Student	Unit Support
Bulletin boards by ILC Staff	SLSC @ CD	Simple	Student & Parents	Support Learning
OMNIMAX® Film – Thrill Ride	SLSC @ SLSC	Simple	Students	Support Learning
SLSC Meetings at CD	CD	Simple	SLSC Staff	Support Operations
SLSC Staff use of CD parking lot	CD	Simple	SLSC Staff	Support Operations
Informal feedback by teachers on Dig Dinos	CD	Simple	SLSC Staff	Support Learning
SLSC YES Program at CD	CD	In-Depth	SLSC Staff	Support Operations

A few examples will help clarify the coding used by the ILC staff.

The curriculum development team for the summer school used resources from the school and science center at the school, was an in-depth interaction consisting of meetings from January through July, and involved ten teachers, two administrators and two science center staff. The purpose of the interaction was to support and develop the unit. Throughout this process the representatives of the two cultures worked through differences in language and perspective to reach common understanding and goals.

A visit to the Science Center's ecology gallery is an another example. In this case, Science Center resources were used at the Science Center for a short, one-time visit with students, teachers and science center staff (both those assigned to the school and the general staff) participating to directly support the unit. Gallery visits in the regular school year for student research purposes may be coded as in-depth levels of engagement, but this summer in this gallery they were simple interactions.

Two examples of the use of Compton-Drew resources draw the distinction between simple and in-depth engagement. At the simple level, Science Center staff used the Compton-Drew parking lot when the over-flow lots where not available and there was room at Compton-Drew. This supported the operations of the Science Center by allowing for more parking of paying visitors in the Science Center lots. On a much more in-depth level, the Science Center's Youth Exploring Science (YES) program was held for eight weeks at Compton-Drew because there was no program space available at the Science Center. The YES Teens, as part of the Science Center staff, were trained in workplace skills, science content and program delivery. They then delivered programs to community organizations in four classrooms at Compton-Drew. Supervising staff met with the summer academy principal regularly and interacted daily with the custodial and technical staff of the school. Throughout this process, the two cultures came together often to work through differences in language and expectations.

ILC staff identified additional examples from the regular school year that fit into the coding system, but that did not occur in the summer. The Science Center used Compton-Drew resources when it had students appear in television spots for the marketing department and in photographs for the annual report. It used Compton-Drew resources when teachers from Compton-Drew served on the Teacher Partners team and when the principal served on our committee for the Loeb Prize award for excellence in teaching. All of these were "other support" with "SLSC Staff" as the audience and a "simple" level of engagement.

After defining each aspect above and each category within it, we reviewed the data to determine which examples were two cultures merging rather than simple instances of science center and school interactions. Is a one-shot presentation by Science Center staff at the school a simple level of engagement or can we see evidence of two cultures learning from each other?

We used the working definition for "merging cultures" to be the development of shared language (e.g. gallery, exhibit, instructional assistant, room names), an understanding of the "other's" resources (what's available, when it can be used and how it can be used to support learning) and an understanding of the expertise available from the "other's" staff.

While people were exposed to the language of the other group during the simple levels of engagement, the understanding of that language and the application of that language did not occur. This did occur in in-depth levels.

An understanding of the resources available by the other institution was not as clear-cut as the language. At all levels of engagement, participants were made aware of at least one resource of the

partner institution. Knowing it could be used and how to use it for the purpose of supporting learning was more difficult. This did not occur in simple levels of engagement and occurred in varying degrees in in-depth levels. This occurred most often when the purpose of the interaction was to support the Schools for Thought unit or the YES Program.

Understanding the expertise available from the partner's staff occurred only when staff from both partners were involved in the interaction and only at in-depth levels of engagement. Even then, degree varied.

Conclusions

We identified four aspects of interactions between the school and science center: resources, levels of engagement, participants and purpose. Categories within each aspect were determined. We then examined each example for further instances of merging culture.

Thus far in our analysis we have found insistences when the two cultures begin to merge such that shared language, an understanding of the "other's" resources and an understanding of the expertise available from the "other's" staff develop. These occur to varying degrees when there exists an in-depth level of engagement with participants from both cultures with the purpose of supporting the curriculum or a similar program (the YES program).

Next Steps

It is our hope that the definitions and examples emerging from this study will provide the basis for future research into the effects of such interactions and merging of cultures on the participants. Separating out interactions between the two partners and examples of two cultures coming together provides a basis for examining the effects and effectiveness of the two cultures coming together.

Museum schools like ours are growing in number each year, yet research into their effectiveness, strengths and impact on the two cultures is limited. Our work helps to develop an awareness and understanding of what the merging of the two cultures looks like and when it may occur. The work that follows this initial building of grounded theory will take our current understanding to the next level through an examination of the impact on both cultures and on student learning.

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