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Teachers' Reactions to Learning Commons in Secondary Schools

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ABSTRACT. *This study examined the design of learning commons in three secondary schools as they related to teachers. The frequency and quality of collaboration among teachers, and between teachers and teacher librarians, was measured along with perceptions of engagement, job satisfaction, and design attributes germane to the learning commons model. Teachers at one school responded more positively than those at the other two schools. Significant differences in teachers' reactions to the new spaces were found within each school. This study partly substantiated the benefits of the model. Findings uncover limitations in how learning commons accommodate teachers' professional needs.*

KEYWORDS   learning commons, teachers, teacher librarians, secondary schools, job satisfaction

The learning commons model functionally and spatially integrates library services, information technology services, and media services to provide a continuum of services to the user, a blending of staff knowledge and skills, and referral to appropriate areas of expertise. This new paradigm extends the boundaries of the library's information ecology and calls for a restructuring of services and physical and virtual space focused on the learning needs of our user community (McMullen, 2007, p. 2).

A school's library is traditionally thought of as a space where students can gain knowledge and explore interests in a wide range of topics. At the same time, libraries are known for their lack of social opportunities. The image of a strict librarian shushing students for speaking too loudly is common. Today, many school libraries allow students the opportunity to hone social skills while they research, read, and learn. Libraries are evolving to be places of "hum and hub, not hush" (Bondi, 2011, para. 1). This is why many traditional school libraries are being renovated using the learning-commons model as a guide.

THE LEARNING COMMONS CONCEPT

A learning commons aims to inspire users by encouraging creative use of 21st century technology as well as collaboration through modern physical designs. Designs congruent with the learning-commons model offer comfortable spaces to socialize, learn, participate, and create in a variety of ways. A learning commons also promotes access to virtual, synchronized learning options to support integrated service needs of the digital generation (Koechlin, Rosenfeld, & Loertscher, 2010; McMullen, 2007).

Although numerous school and public libraries in North America have recently evolved toward the learning-commons model, literature describing the model generally fails to discuss architectural guidelines in meaningful ways (Closer-Crane, 2010). No standard list of physical changes that must be made to redefine a library as a learning commons has been published. For example, if one school adds a green screen to its media room and incorporates a soft seating area for quiet study, while another school makes those changes and many more (e.g., special signage designating the space as a learning commons, additional computers for media creation, and so on), both spaces might be considered as learning commons settings. This is, perhaps, because design attributes have not been described or measured in terms of how much they impact the attitudes or behaviors of users.

In an effort to conceptualize the learning commons model, the British Columbia Teacher Librarians Association (BCTLA, 2012) has described how the model moves beyond simple physical alterations to existing libraries by incorporating virtual spaces, experimental learning centers, and open commons. For example, a learning commons should not only include accessible, physically flexible furniture to comfortably accommodate individuals and groups, but also exemplary learning experiences relevant to the real world, while fostering a celebration of learning by becoming a go-to place for projects and professional engagement.

Many of the points made by the BCTLA focus on the student's experience of a learning commons. Others also highlight how much the learning commons model accounts for students over and above other types of users

by describing the space as an extension of the classroom, affording access to technology and learning support by encouraging users, through physical design, to spend lengthy periods of time in the setting (McMullen, 2007). The argument that the longer users remain in a learning commons, the more likely they are to experience educational enrichment is cogent. However, what appears to be missing from the literature is *how* these environments affect collaboration, satisfaction, and engagement levels among teachers.

HOW MIGHT TEACHERS FIT INTO THE MODEL?

The focus of the learning commons model's focus on flexibility, group work, presentations, and occupant comfort may influence how teachers use the learning commons in their classes, as well as how they work with teacher librarians. Arguably, teachers' attitudes and behaviors about learning commons influence the success of these spaces. Some educators and researchers have stated that resource and collection development, information literacy instruction, technology assistance, and faculty training are some ways in which a learning commons might enhance the quantity and quality of cooperative partnerships between teachers and teacher-librarians (Leeder, 2011). Others have noted the need to direct teachers away from working in isolated classrooms to promote collaborative teaching partnerships in open spaces (Bondi, 2011). In this context, the term 'collaboration' generally refers to teacher-to-teacher, or teacher-to-teacher librarian relationships characterized by professional equality that encourages alignment of different educational perspectives (Leeder, 2011).

The environmental psychology literature can offer more evidence as to why school settings (and, by extension, learning commons) might engage users and augment collaborations between them. Simply moving chairs and other furniture to face each other in close proximity can increase social interaction (Osmond, 1957). Moreover, an increase in collaboration, satisfaction, and engagement among teachers may occur because of additional technological (and perhaps, staff) resources afforded by a learning commons.

Environmental psychologists have outlined four broad assumptions about how school environments can affect attitudes and behaviors (Weinstein, 1981). One assumption is that although school settings do not teach students directly, they can facilitate (or hinder) learning. The second is that the effects of the school environment are moderated by social and instructional contexts and do not affect all students the same way. The third is that one optimal type of learning setting does not exist. The environment ought to be congruent with what is being taught, the goals of the course, and the attributes of the students and teachers. The last assumption is that learning is maximized when the physical environment is considered equally to other course aspects, such as curriculum and technology (Gifford, 2007).

Taken together, these four assumptions support the aims and expectations of the learning commons model. Thus, by modernizing secondary school libraries to include a wider spectrum of technology and design standards suited both for academic research and personal enjoyment, an increase in teachers' levels of collaboration, job satisfaction, and engagement can be expected beyond student learning and scholarship. The present study aims to measure these factors and discuss the results for three suburban secondary schools.

SCHOOL SITE DETAILS

The three secondary schools in this study were in a medium-sized city in British Columbia, Canada.

School A

"School A" was the first in the school district to commit to the learning commons model. Just over CAD$60,700 was spent altering School A's library, and these expenditures served as a baseline for procuring a grant to renovate the remainder of the secondary schools in the district.

A variety of furniture, fixtures, and technology was purchased to change School A's library into a learning commons. For example, a green screen (used for compositing two images or video streams together) and short-throw projector were installed, along with several tub chairs and group worktables (see Table 1 for a more detailed list of items, and Figure 1 for a photo of the new learning commons).

Because School A's library had already undergone the physical transition to a learning commons prior to being included in the present study, data collection was undertaken after design changes were complete. Thus, teachers working at School A had more time to use new opportunities for teacher-to-teacher and teacher-to-teacher librarian collaborations as a result of design changes, compared to teachers working at other schools included in this study.

Data describing teachers' attitudes and behaviors after a renovation (but not before) cannot serve as a true pre- and post-occupancy evaluation. Without knowing how teachers experienced School A's original library, any changes in teacher collaboration, job satisfaction, or engagement must be attributed to the length of time spent using the new learning commons.

TABLE 1 Items Purchased for the New Learning Commons at School A

Green screen
Chairs
Motorized screen
Short-throw projector
Magazine rack
Tub chairs
Mobile monitor unit
Video graphics array (VGA) switch
32" and 42" flat screen LCD TV/monitors
Group work tables
Foam and fabric for benches
Shelving units
Shelving casters
A/V system upgrade
Large "Learning Commons" sign and other signage for inside the space
Student laptops
Study carrels
Charging trolleys
Lectern with sound
Mobile TV stand
VGA M-M cables
Mac adaptors
Self-sinking stamp
Camera
Microphone
Tripod

FIGURE 1 Post-Renovation Photograph of School A's Learning Commons. Photo Credit: Ruth Wadsworth.

TABLE 2 Mid-Renovation Design Changes at School B

Removal of selected reference materials and hardcopy books from bookshelves
Installation of a large window linking the office of a staff member responsible for
 technology with both the learning commons and a computer lab room
Partial completion of new media room

School B

Administrators and staff at School B had been interested in altering the library to a learning commons for many months prior to being included in the present study. Some initial planning had been done about feasible design attributes, and a learning-commons team existed to guide the renovation. These initial planning efforts affected the present study in that, like School A, a "before-and-after" research project could not be implemented. This is because some design changes were complete before this study's first round of data collection. For example, some removal of hardcopy reference materials had been accomplished at the mid-renovation point (often done during a transition to a learning commons to create a less cluttered space and encourage the use of up-to-date online resources). In addition, a large window linking the office of a staff member responsible for technology with both the learning commons and a computer laboratory was installed to allow more light penetration into the learning commons.

By the end of the renovation, movable ("flexible") soft seating and foot stools were placed throughout a "quiet study" area, as well as in an additional area near the entrance and inside window alcoves. A new media room (with a "green wall" instead of green screen) had also been completed (refer to Table 2 and Table 3 for a list of design changes at mid- and post-renovation stages in School B, respectively, and Figure 2 for a photo of a portion of the completed space).

TABLE 3 Post-Renovation Design Changes at School B.

New 'Learning Commons' sign outside of entrance to learning commons
New movable ("flexible") soft seating chairs and footstools placed throughout the quiet
 study area of the learning commons, as well as in an additional area near the entrance
 and inside window alcoves
30 new laptops available for use in the learning commons, and for sign-out use
 throughout the school
Laptop trolley to store and charge laptops
Media room completion, including new chairs, fresh paint for all walls, a 'green wall' for
 filming, and a row of desktop computers along another wall for media-related use
Security gate removed from entrance

FIGURE 2 Post-Renovation Photograph of School B's Learning Commons. Photo Credit: Bonnie McComb.

School C

School C became involved with the present study at an early stage of the design process when no design alterations to the library had been fully conceptualized. Thus, research at School C took the form of a "before-and-after" study that assessed the extent the learning-commons model affected teachers' levels of professional collaboration, job satisfaction, and engagement at work compared to the traditional library design model.

Some of the design changes made to School C's original library included purchasing small and large circular tables for enhanced group work, ergonomic seating options, soft seating, and tall tables and bar stools for a new social area (see Table 4 for a complete list of design alterations made at School C, and Figure 3 for a photo of part of the new learning commons).

TABLE 4 Post-Renovation Design Changes at School C

Long computer tables relocated to the perimeter of the room
Small circular tables for computers (4 computers per table)
Movable ergonomic stools for small circular tables
Tall bar stools for tall circular tables
More collaborative/group seating available at large, movable tables
Individual and small-group seating available at smaller tables along perimeter
Improved wifi connectivity for laptop use
Two walls painted yellow
Numerous books purged
Security gates removed at all entrances
Collaboration TVs on a cart available for student and teacher use
Soft seating area created near plants and daylighting
Computer tablets purchased for sign out

FIGURE 3 Post-Renovation Photograph of School C's Learning Commons. Photo Credit: Lindsay McCunn.

METHOD

Participants

Full- and part-time teachers working in schools A, B, and C were asked by their principals to participate in this study during one of their monthly staff meetings. Twenty-nine teachers participated in the first round of data collection at School A, and 35 teachers participated in the second round.

Eight teachers participated in the first round of data collection at School B, and 21 teachers participated in the second round. Finally, 37 teachers participated in the first round of data collection at School C, and 33 teachers took part in the second round of data collection.

Materials

A brief questionnaire created for this study, in cooperation with staff at each school, included two parts. Part I asked eight 7-point Likert scale-type questions ranging from "Strongly Disagree" (1) to "Strongly Agree" (7). These items enquired about teachers' perceptions of the frequency and quality of collaborations with teacher librarians and other teachers (e.g., "The new learning commons helps teachers collaborate with each other more often

TABLE 5 Items Included in Part I of the Questionnaire for School A

The new learning commons helps teachers collaborate with each other more often than the old library did.
The new learning commons helps teachers collaborate more often with teacher-librarians working at the school.
The new learning commons helps teachers collaborate better with other teachers working at the school.
The new learning commons helps teachers collaborate better with teacher-librarians working at the school.
The new learning commons provides me with resources to teach more efficiently than the old library did.
The new learning commons makes me feel more engaged at work than the old library did.
The new learning commons has not made much of a positive impact on my job satisfaction.
The new learning commons has inspired me to use more technology in my classes.

Note. Scored on 7-point Likert scales ranging from Strongly Disagree (1) to Strongly Agree (7).

than the old library did," "The new learning commons helps teachers collaborate more often with teacher-librarians working at the school," "The new learning commons helps teachers collaborate better with other teachers working at the school," and "The new learning commons helps teachers collaborate better with teacher-librarians working at the school").

Levels of engagement (e.g., "The new learning commons makes me feel more engaged at work than the old library did"), job satisfaction (e.g., "The new learning commons has not made much of a positive impact on my job satisfaction," reverse coded), and whether technology and resources afforded by the new learning commons were also investigated (e.g., "The new learning commons has inspired me to use more technology in my classes," "The new learning commons provides me with resources to teach more efficiently than the old library did"). Table 5 includes items used in Part I of the questionnaire for School A (questionnaires provided at each round of data collection varied in how items were asked depending on the stage of renovation).

Part II included four questions requiring continuous, nominal, and open-ended responses (see Table 6 for items used for School A). Two questions asked about the number of peers teachers had worked with in the new learning commons, and whether this number was higher than it had been before renovation (e.g., "How many teachers have you worked with in the new learning commons?" and "Do you work with more teachers in the learning commons now than you did before the renovation?"). The last two questions asked about which design features were perceived by teachers as having the most positive and negative impact on their job (e.g., "Which of the following design attributes in the learning commons has had the greatest positive impact on your job?" and "Which of the following design attributes in the learning commons has had the greatest negative impact on your job?"). Possible responses included: "More computers," "More space for reading,"

TABLE 6 Items Included in Part II of the Questionnaire for School A

How many teachers have you worked with in the new learning commons?
_____

Do you work with more teachers in the learning commons now than you did before the renovation?

a) Yes
b) No

Which of the following design attributes in the learning commons has had the greatest positive impact on your job?

a) More computers
b) More space for reading
c) More soft seating
d) More space for student interaction and group work
e) More opportunity for staff collaboration
f) No attribute of the learning commons has had a positive impact on my job satisfaction
g) Have not used the learning commons

Which of the following design attributes in the learning commons has had the greatest negative impact on your job?

a) More computers
b) More space for reading
c) More soft seating
d) More space for student interaction and group work
e) More opportunity for staff collaboration
f) None of these
g) No attribute of the learning commons has had a negative or null impact on my job
h) Have not used the learning commons

"More soft seating," "More space for student interaction and group work," "More opportunity for staff collaboration," "None of these," "No attribute of the learning commons has had a negative or null impact on my job," or "Have not used the learning commons."

Procedure

Prior to the staff meetings at which data collection was scheduled to occur, an electronic version of the questionnaire was emailed to the principal and teacher librarian working at each participating school. Questionnaires were printed by a school staff member and provided for teachers to complete during the staff meeting or at their own convenience after the meeting. Completed questionnaires were placed in an envelope and mailed to the author of the present study for analysis and retention.

At Schools A and B, the first and second rounds of data collection occurred 4 months apart. At School C, rounds of data collection occurred 13 months apart.

RESULTS

Results for School A

On average, teachers working at School A provided neutral responses about whether the new learning commons helped them collaborate with each other ($M = 4.24$, $SD = 2.08$ at round 1 of data collection; $M = 4.09$, $SD = 1.69$ at round 2 of data collection), and with teacher librarians, more often ($M = 4.62$, $SD = 2.01$ at round 1 of data collection; $M = 4.17$, $SD = 1.87$ at round 2 of data collection). Table 7 provides all means and standard deviations for each item at each round at School A.

Teachers reported neutrally about whether the new learning commons afforded better-quality collaboration among teachers ($M = 4.17$, $SD = 2.07$ at round 1 of data collection; $M = 3.83$, $SD = 1.69$ at round 2 of data collection), and between teachers and teacher librarians ($M = 4.69$, $SD = 1.76$ at round 1 of data collection; $M = 4.03$, $SD = 1.51$ at round 2 of data collection).

Neutral responses were also given on average about whether the new space provided teachers with the resources to teach more efficiently ($M = 4.83$, $SD = 1.95$ at round 1 of data collection; $M = 4.34$, $SD = 2.00$ at round 2 of data collection), and about whether the learning commons made teachers feel more engaged at work than the previous library setting ($M = 4.48$, $SD = 2.17$ at round 1 of data collection; $M = 3.69$, $SD = 1.91$ at round 2 of data collection).

Teachers also provided neutral responses about whether the new learning commons had made a positive impact on their job satisfaction ($M = 3.69$, $SD = 2.25$ at round 1 of data collection; $M = 3.26$, $SD = 1.95$ at round 2 of data collection), and on their inspiration to use technology in their classes ($M = 4.59$, $SD = 1.99$ at round 1 of data collection; $M = 3.77$, $SD = 1.77$ at round 2 of data collection).

On average, teachers at School A reported lower levels of collaboration, engagement, and job satisfaction in the new learning commons over time. However, these differences were not statistically significant (all $ps > .05$). However, when asked to quantify the number of other teachers they had worked with in the new space, participants reported collaborating with significantly fewer teachers over time ($M = 3.83$, $SD = 4.75$ at round 1 of data collection; $M = 1.77$, $SD = 2.49$ at round 2 of data collection; $t(40) = 2.10$, $p < .05$). This finding was supported by a significant difference between related qualitative responses (i.e., "Do you work with more teachers in the learning commons now than you did before the renovation?"), $M = 1.52$, $SD = 0.51$ at round 1 of data collection; $M = 1.77$, $SD = 0.43$ at round 2 of data collection where '1' = yes and '2' = no; $t(55) = -2.14$, $p < .05$.

On average, teachers who answered the questionnaire in round 1 reported that having more space for students to read had the greatest positive impact on their job ($M = 2.21$, $SD = 1.93$). In round 2, on average, teachers

TABLE 7 Descriptive Statistics for School A.

Question	Item	Data Collection Round	Mean	Standard Deviation
1	"The new learning commons helps teachers collaborate with each other more often than the old library did."	1	4.24	2.08
		2	4.09	1.69
2	"The new learning commons helps teachers collaborate more often with teacher-librarians working at the school."	1	4.62	2.01
		2	4.17	1.87
3	"The new learning commons helps teachers collaborate better with other teachers working at the school."	1	4.17	2.07
		2	3.83	1.69
4	"The new learning commons helps teachers collaborate better with teacher-librarians working at the school."	1	4.69	1.78
		2	4.03	1.51
5	"The new learning commons provides me with resources to teach more efficiently than the old library did."	1	4.83	1.95
		2	4.34	2.00
6	"The new learning commons makes me feel more engaged at work than the old library did."	1	4.48	2.17
		2	3.69	1.91
7	"The new learning commons has not made much of a positive impact on my job satisfaction." *Note: This question was negatively scored*	1	3.69	2.25
		2	3.26	1.95
8	"The new learning commons has inspired me to use more technology in my classes."	1	4.59	1.99
		2	3.77	1.77
9	"How many teachers have you worked with in the new learning commons?"	1	3.83	4.75
		2	1.77	2.49
10	"Do you work with more teachers in the learning commons now than you did before the renovation?"	1	1.52	0.51
		2	1.77	0.43
11	"Which of the following design attributes in the learning commons has had the greatest positive impact on your job?"	1	2.21	1.93
		2	3.49	1.96
12	"Which of the following design attributes in the learning commons has had the greatest negative impact on your job?"	1	5.17	2.38
		2	6.17	1.59

Note: Means for questions 1 through 8 are based on a 7-point Likert scale where 0 = Strongly disagree and 7 = Strongly agree. Means for question 9 has no upper limit (open-ended response). Means for question 10 are based on a nominal coding scheme where 1 = Yes and 2 = No. Means for questions 11 and 12 are based on a nominal coding scheme where, for question 11, 1 = More computers, 2 = More space for reading, 3 = More soft seating, 4 = More space for student interaction and group work, 5 = More opportunity for staff collaboration, 6 = No attribute of the learning commons has had a positive impact on my job satisfaction, and 7 = Have not used the learning commons, and, for question 12, 1 = More computers, 2 = More space for reading, 3 = More soft seating, 4 = More space for student interaction and group work, 5 = More opportunity for staff collaboration, 6 = None of these, 7 = No attribute of the learning commons has had a negative or null impact on my job, and 8 = Have not used the learning commons.s

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reported that space for student interaction and group work had the greatest positive impact on their job ($M = 3.49$, $SD = 1.96$).

Further, on average, teachers who participated in round 1 thought that added opportunities for staff collaboration afforded by the new learning commons had the greatest negative impact on their job ($M = 5.17$, $SD = 2.38$). In contrast, in round 2, teachers, on average, reported that none of the options provided in the item had the greatest negative impact on their job ($M = 6.17$, $SD = 1.58$). This does not mean, however, that no attribute of the learning commons had a negative or null impact on teachers' jobs (because stating this was an option in the question).

Some participants chose to write in the open-ended comment sections provided below each Likert scale. In the first round of data collection (early post-renovation), some comments included: "We've always had a collaborative teacher-teacher librarian model here. I miss the name 'library' and so do the kids. I miss the books. I miss the atmosphere. It's cold now and institutional. Ugly linoleum. Cheap chairs," "When teacher-librarians offer opportunities to meet (e.g., instructional tools, etc.), then there is more collaboration," and "I like the teacher meeting space in the middle."

During the second round of data collection (late post-renovation), some participants commented that: "The teacher-librarian is not available full-time and this impacts opportunities for collaboration," "There are too few books and the space is too sparse," and "The space has made no difference in how I work. Collaborations are about people."

Results for School B

A positive, significant difference was found between the two rounds of data collection in teachers' perceptions of whether the learning commons allowed them to collaborate with other teachers more often, $t(17.75) = 2.77$, $p < .05$. However, this difference was between low ($M = 2.88$, $SD = 0.84$) and neutral means ($M = 3.95$, $SD = 1.16$). See Table 8 for means and standard deviations for each scale item and round for School B.

Another positive, significant difference occurred between teachers' perceptions of the frequency of their collaborations with teacher librarians in the new learning commons after the changes, $t(27) = 2.58$, $p < .05$. Teachers also felt more positively about the frequency of these collaborations compared to the frequency among their teacher colleagues ($M = 3.13$, $SD = 0.99$ at round 1 of data collection; $M = 4.52$, $SD = 1.40$ at round 2 of data collection).

A significant difference was not found between the reported quality of collaborations among teachers after the changes in the new learning commons, despite the average response being more positive at the second round of data collection ($M = 3.25$, $SD = 1.17$) than at the first ($M = 4.05$, $SD = 1.07$), $p > .05$. However, a significant positive difference was revealed

TABLE 8 Descriptive Statistics for School B.

Question	Item	Data Collection Round	Mean	Standard Deviation
1	"The new learning commons helps teachers collaborate with each other more often than the old library did."	1	2.88	0.84
		2	3.95	1.16
2	"The new learning commons helps teachers collaborate more often with teacher-librarians working at the school."	1	3.13	0.99
		2	4.52	1.40
3	"The new learning commons helps teachers collaborate better with other teachers working at the school."	1	3.25	1.17
		2	4.05	1.07
4	"The new learning commons helps teachers collaborate better with teacher-librarians working at the school."	1	3.38	1.41
		2	4.90	1.51
5	"The new learning commons provides me with resources to teach more efficiently than the old library did."	1	3.75	1.28
		2	5.00	1.87
6	"The new learning commons makes me feel more engaged at work than the old library did."	1	3.25	1.04
		2	4.62	1.53
7	"The new learning commons has not made much of a positive impact on my job satisfaction." *Note: This question was negatively scored*	1	2.50	1.31
		2	3.81	2.04
8	"The new learning commons has inspired me to use more technology in my classes."	1	3.25	1.58
		2	4.57	1.40
9	"How many teachers have you worked with in the new learning commons?"	1	1.38	3.50
		2	1.43	2.32
10	"Do you work with more teachers in the learning commons now than you did before the renovation?"	1	2.00	0.00
		2	1.81	0.40
11	"Which of the following design attributes in the learning commons has had the greatest positive impact on your job?"	1	4.88	2.95
		2	2.81	1.99
12	"Which of the following design attributes in the learning commons has had the greatest negative impact on your job?"	1	7.38	0.74
		2	6.38	1.88
13	"The new learning commons enriches and supports teaching and learning in the school."	1	3.50	0.76
		2	5.38	1.12
14	"The new learning commons provides a wide range of resources."	1	4.13	0.99
		2	5.81	0.98

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15	"The new learning commons provides a wide range of technologies."	1	3.88	1.13
		2	5.81	1.17
16	"The teacher-librarian collaborates with you to plan and teach research projects."	1	5.25	2.25
		2	5.24	1.81
17	"The new learning commons promotes literacy and the love of reading."	1	3.75	1.75
		2	5.90	1.38

Note: Means for questions 1 through 8, and 13 through 17, are based on a 7-point Likert scale where 0 = Strongly disagree and 7 = Strongly agree. Means for question 9 has no upper limit (open-ended response). Means for question 10 are based on a nominal coding scheme where 1 = Yes and 2 = No. Means for questions 11 and 12 are based on a nominal coding scheme where, for question 11, 1 = More computers, 2 = More space for reading, 3 = More soft seating, 4 = More space for student interaction and group work, 5 = More opportunity for staff collaboration, 6 = No attribute of the learning commons has had a positive impact on my job satisfaction, and 7 = Have not used the learning commons, and, for question 12, 1 = More computers, 2 = More space for reading, 3 = More soft seating, 4 = More space for student interaction and group work, 5 = More opportunity for staff collaboration, 6 = None of these, 7 = No attribute of the learning commons has had a negative or null impact on my job, and 8 = Have not used the learning commons.

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about the quality of collaborations that occurred over time in the learning commons between teachers and teacher librarians ($M = 3.38$, $SD = 1.41$ at round 1 of data collection; $M = 4.90$, $SD = 1.51$ at round 2 of data collection), $t(27) = -2.48$, $p < .05$.

The completed learning commons made teachers feel significantly more engaged at work than the mid-renovation space ($M = 3.25$, $SD = 1.04$ at round 1 of data collection; $M = 4.57$, $SD = 1.87$ at round 2 of data collection), $t(27) = -2.32$, $p < .05$. Although an increase in teachers' opinions occurred, on average, as to whether the completed learning commons provided resources to teach more efficiently than the space did at the mid-renovation stage ($M = 3.75$, $SD = 1.28$ at round 1 of data collection; $M = 5.00$, $SD = 1.87$ at round 2 of data collection), the difference was not significant ($p > .05$).

Teachers also reported, on average, negative ($M = 2.50$, $SD = 1.31$) and neutral ($M = 3.81$, $SD = 2.04$) responses about whether the space had made a positive impact on their job satisfaction after the design changes. Although this difference was not statistically significant ($p > .05$), teachers reported inspiration to use technology in their classes significantly increased during the renovation ($M = 3.25$, $SD = 1.58$ at round 1 of data collection compared to $M = 4.57$, $SD = 1.40$ at round 2 of data collection), $t(27) = -2.20$, $p < .05$).

When asked to quantify the number of teachers they had worked with in the new learning commons, participants at School B reported collaborating with roughly the same number of teachers in the space after the changes ($M = 1.38$, $SD = 3.50$ at round 1 of data collection; $M = 1.43$, $SD = 2.32$ at round 2 of data collection).

Teachers who answered the questionnaire in round 1 stated that, on average, having more opportunities for staff collaboration had the greatest positive impact on their job ($M = 4.88$, $SD = 3.00$). In round 2, on average, teachers reported that the additional soft seating had greatest positive impact on their job ($M = 2.81$, $SD = 1.99$).

Furthermore, on average, teachers who participated in round 1 stated that "none of the attributes of the learning commons had a negative or null impact on their job" ($M = 7.38$, $SD = 0.74$). In round 2, teachers, on average, reported that none of the options provided in the item had the greatest negative impact on their job ($M = 6.38$, $SD = 1.88$).

At the first round of data collection (mid-renovation), some participants commented in the open-ended section of the questionnaire that: "The shift toward computer-work has reduced the number of students reading for pleasure," and "Open plan spaces do not mesh with anything remotely real-world and are a waste of time and technology." At the second round of data collection (post-renovation), some participants wrote: "I have seen a great deal of good collaboration in the new space," "Really great resources now," "Now teachers have the opportunity to sit 'in' with students," "New

laptops and seating are excellent," and "I notice students have a more positive attitude toward the library now."

Results for School C

Before changes to the library occurred, teachers working at School C mildly disagreed that the existing library helped them collaborate with each other often ($M = 2.59$, $SD = 1.74$; see Table 9 for means and standard deviations for each scale item for School C). This finding did not significantly change after renovations ($M = 2.87$, $SD = 1.51$). Although teachers responded more neutrally concerning whether the space helped them collaborate with teacher librarians often before and after renovations ($M = 3.54$, $SD = 1.63$; $M = 3.34$, $SD = 1.58$, respectively), the difference was not statistically significant ($p > .05$).

Teachers also reported similarly low collaboration quality among their teacher colleagues in the previous library ($M = 2.81$, $SD = 1.73$) and the new learning commons ($M = 2.97$, $SD = 1.35$), but felt more neutrally about collaboration quality between themselves and teacher librarians at pre- and post-renovation times ($M = 3.65$, $SD = 1.69$; $M = 3.37$, $SD = 1.51$).

Responses about whether the previous library provided participants with resources to teach efficiently were neutral at the pre-renovation stage ($M = 3.27$, $SD = 1.54$) and did not significantly differ from teachers' responses after renovations were made toward the learning commons model ($M = 3.68$, $SD = 1.56$). Similarly neutral responses were also revealed about whether the library made teachers feel engaged at work ($M = 3.19$, $SD = 1.54$; $M = 3.05$, $SD = 1.59$, respectively). Teachers also responded mildly negatively about their inspiration to use technology in their classes before and after renovations ($M = 2.68$, $SD = 1.80$; $M = 2.95$, $SD = 1.74$, respectively).

Although teachers provided neutral responses, on average, about whether the previous library setting made a positive impact on their job satisfaction at the pre-renovation stage ($M = 3.00$, $SD = 1.65$), their perceptions became significantly lower after changes had been made toward the learning commons model ($M = 2.34$, $SD = 1.76$; $t(73) = 2.06$, $p < .05$).

Before renovations to the design had been made, teachers, on average, thought that more soft seating would have the greatest positive impact on their job ($M = 3.19$, $SD = 1.70$). Further, on average, teachers thought that more opportunities for staff collaboration would have the greatest negative impact on their job ($M = 4.65$, $SD = 1.86$). However, after design changes were complete, teachers reported that more opportunities for staff collaboration had the greatest positive impact on their job ($M = 4.50$, $SD = 2.24$), and that, on average, no attribute of the learning commons had a negative or null impact on their jobs ($M = 6.58$, $SD = 1.46$).

TABLE 9 Descriptive Statistics for School C.

Question	Item	Data Collection Round	Mean	Standard Deviation
1	"The current library helps teachers collaborate with each other often."	1	2.59	1.74
	"The new learning commons helps teachers collaborate with each other often."	2	2.87	1.51
2	"The current library helps teachers collaborate often with the teacher-librarian."	1	3.54	1.63
	"The new learning commons helps teachers collaborate often with the teacher-librarian."	2	3.34	1.58
3	"The current library helps teachers collaborate well with other teachers working at the school."	1	2.81	1.73
	"The new learning commons helps teachers collaborate well with other teachers working at the school."	2	2.97	1.35
4	"The current library helps teachers collaborate well with the teacher-librarian."	1	3.65	1.69
	"The new learning commons helps teachers collaborate well with the teacher-librarian."	2	3.37	1.51
5	"The current library provides me with resources to teach efficiently."	1	3.27	1.54
	"The new learning commons provides me with resources to teach efficiently."	2	3.68	1.56
6	"The current library makes me feel engaged at work."	1	3.19	1.54
	"The new learning commons makes me feel engaged at work."	2	3.05	1.59
7	"The current library has not made much of a positive impact on my job satisfaction."	1	3.00	1.65
	Note: This question was negatively scored			
	"The new learning commons has not made much of a positive impact on my job satisfaction."	2	2.34	1.76
	Note: This question was negatively scored			
8	"The current library has inspired me to use more technology in my classes."	1	2.68	1.80
	"The new learning commons has inspired me to use more technology in my classes."	2	2.95	1.74
9	"Which of the following design attributes of a learning commons might have the greatest positive impact on your job?"	1	3.19	1.70
	"Which of the following design attributes in the learning commons has had the greatest positive impact on your job?"	2	4.50	2.24
10	"Which of the following design attributes of a learning commons might have the greatest negative impact on your job?"	1	4.65	1.86
	"Which of the following design attributes in the learning commons has had the greatest negative impact on your job?"	2	6.58	1.46

Note: Means for questions 1 through 8 are based on a 7-point Likert scale where 0 = Strongly disagree and 7 = Strongly agree. Means for questions 9 are based on a nominal coding scheme where 1 = More computers, 2 = More space for students to read, 3 = More soft seating, 4 = More space for student interaction and group work, 5 = More opportunity for staff collaboration, 6 = No attribute of the learning commons has had a positive impact on my job satisfaction, and 7 = Have not used the learning commons. Means for question 10 are the same as question 9 except for 6 = None of these, 7 = No attribute of the learning commons has had a negative or null impact on my job, and 8 = Have not used the learning commons.

At the first round of data collection (pre-renovation), some participants commented in the open-ended section of the questionnaire that: "One concern is that kids might simply use the soft seating for sleeping or lounging," "Cubicles for test writing would be a good addition," "Less clutter would be good," "More room for speakers," "The library is too loud—students need quiet space to work," "Circular tables would help collaboration efforts for both staff and students," and "Keep in mind that computers sometimes stop/limit interactions."

During round 2 of data collection (post-renovation), some open-ended comments were that: "The learning commons has neither helped or hurt by teaching practice," "The learning commons is too loud to collaborate well with teachers and teacher-librarians," "The food rules have created a negative environment for people having to enforce them," "Changes to the library have almost no impact on my teaching life," and "I like the idea of getting rid of old reading material that has not been looked at for 10 years or so."

DISCUSSION

Discussion for School A

Teachers do not seem to be working optimally with the learning commons model in School A, and some unsatisfactory design attributes in the new setting exist. Between the two post-renovation data collection rounds occurring 4 months apart, teachers at School A did not report collaborating significantly more often, or with greater perceived quality, with other teachers or with teacher-librarians in the new learning commons. In addition, teachers using the new learning commons did not experience a significant increase in job satisfaction or engagement. In fact, the average response concerning collaboration, engagement, and job satisfaction was, on average, neutral and decreased over time.

The general dissatisfaction with the new space is also reflected in how teachers perceive the space's design. Teachers reported that added opportunities for staff collaboration afforded by the new learning commons had the greatest negative impact on teachers' jobs. This is not surprising, given the unenthusiastic tone of some of the open-ended comments provided by teachers working at School A.

Interestingly, the design elements that teachers considered as having the greatest positive impact on their job were those that affect students more than staff (e.g., space for students to read and work in groups). Perhaps teachers at School A do not yet consider the new learning commons as a space for teachers to use in tandem with students.

Discussion for School B

Teachers at School B reported that the completed learning commons helped them collaborate with other teachers more often than at the mid-renovation stage. They also believed that the new setting afforded even more collaboration opportunities between themselves and teacher librarians. Although their responses were mildly negative or neutral, they improved after the changes. If a replication of this study were undertaken at School B, whether teachers respond more positively about the number of opportunities to collaborate with other teachers in the learning commons should be further investigated.

Similarly, teachers felt more positive after the changes about the quality of collaborations with other teachers in the learning commons. Although this difference was not largely significant, a positive difference was found in the quality of collaborations that occurred between teachers and teacher librarians after the changes. Again, teachers appeared to be more satisfied with their professional relationships with the teacher librarian than with other teachers in the school.

That teachers at School B experienced more chances for collaboration in the learning commons after it was completed is not surprising. Although the renovation was not a lengthy process (less than a year), it likely limited the number of activities teachers could initiate in the setting. This is supported by the finding that teachers felt more positive about the completed learning commons providing them with resources to teach more efficiently than at the mid-renovation stage. The completed learning commons also made teachers say they felt more engaged at work and report being more inspired to use technology in their classes than the mid-renovation space. Further, teachers stated that none of the attributes of the learning commons had a negative or null impact on their job. Along with teachers' optimistic open-ended responses offered post-renovation, the results suggest that the new learning commons at School B is positively influencing teachers' attitudes and behaviors at work.

One result that was inconsistent with the generally positive responses given by teachers about the new learning commons were the less-positive and neutral perceptions about whether the space made a positive impact on job satisfaction over time. Of course, numerous facets of job satisfaction exist (e.g., personal relationships with specific colleagues, salary levels, time of year, and so on). Perhaps teachers perceived these other elements as more influential to their job satisfaction than the influence of one area in the school. Thus, including a question in future research about job satisfaction may not be practical. The concept of job satisfaction is likely understood by teachers as too complex to be related to the physical learning commons setting and its functionality.

Teachers also stated that having more opportunities for staff collaboration, along with more soft seating options, had the greatest positive effect on their job. Although they did not report a significant increase in collaboration opportunities with other teachers in the new space, perhaps they believed there were enough chances for this aspect of the learning commons to have a strong influence on their job. Because the present study did not have access to baseline data on teachers' attitudes about teacher-to-teacher collaboration frequencies before the renovation began, this result offers some insight into their experiences before changes to the library were made.

Discussion for School C

School C afforded a 'before and after' research design. Findings concerning the pre-renovation phase revealed mildly negative responses about whether the library helped teachers collaborate with each other. However, teachers gave neutral answers about whether the library space helped them collaborate with teacher librarians. Teachers also perceived low collaboration quality among teachers in the library but were more neutral about their collaborations between teachers and teacher librarians.

Findings concerning the frequency and quality of collaborations among teachers, and between teachers and teacher librarians, after renovations were made to the library space were not significantly different than those before the alterations. Despite this, teachers' perceptions about the previous library's ability to foster opportunities for professional collaboration serve as an important baseline upon which future data collected at School C can be compared. Understanding how teachers experienced the previous space is essential in measuring the success and functionally of the new learning commons again in the future.

Prior to the completion of the new learning commons, teachers offered neutral responses as to whether the library provided them with resources to teach efficiently, and about whether the space made them feel engaged at work. Low average responses were also given by teachers about their inspiration to use technology in their classes. That teachers' post-renovation responses did not significantly differ from those provided before changes to the space were made suggests the new learning commons is not offering teachers sufficient collegial elements.

Indeed, the only significant change in teachers' perceptions was about whether the learning commons makes a positive impact on their job satisfaction. That the new space has made a more negative impact on job satisfaction than the previous library is certainly something for administrators and researchers to investigate further. As stated in the discussion for School B, a variety of factors may exist when evaluating one's job satisfaction. Teachers

may have perceived these facets as more influential to their job satisfaction than the influence of one area in the school. Because job satisfaction is likely understood by teachers as too complex to be related to the physical learning commons setting and its functionality, a replication of this research may not include a question about the concept.

In terms of specific design attributes, teachers stated at the pre-renovation stage that having more soft-seating options would have the greatest positive impact on their jobs. Teachers also reported that added opportunities for staff collaboration would have the greatest negative impact on their jobs. Administrators at School C were free to make use of these initial findings and discuss with teachers their expectations about the new learning-commons setting before renovations were completed.

Post-renovation, teachers noted that additional opportunities for staff collaboration had made the greatest positive impact on their jobs (a reversal from the findings before renovations had been made), and that no attribute of the learning commons had made a negative or null impact on their jobs. These findings suggest that despite neutral-to-low responses to scale items, professional collaboration is an important aspect of the learning commons. Again, more research is necessary to expand these findings for strong future comparisons and practical utility.

Study Limitations

The way in which data were collected at School A makes reaching conclusions difficult. No baseline information was gathered about teachers' attitudes about, or behaviors in, the previous library. Thus, comparisons cannot be made in the present study that might explain teachers' neutral impressions of the new learning commons.

Another challenge in interpreting results from School A is that not enough time may have passed between the completion of the learning commons and the first round of data collection (or the time between the first and second rounds of data collection). This possibility is supported by McMullen (2007), who explained that the kind of partnerships that make the learning commons model a success take time and sometimes pose challenges to staff. McMullen (2007) noted that synergistic relationships between staff members working in learning commons settings require their work culture to move through a period of assimilation. One of McMullen's (2007) main points was that ample time for staff to optimally transition to the learning commons model is paramount.

Additionally, a follow-up of the present study is recommended to investigate teachers' attitudes and behaviors concerning the learning commons after a lengthier period of use. Because so few teachers participated in the

first round of data collection at School B (n = 8), a larger sample should be used in future research to ensure significance testing yields more representative results.

Another potential benefit to continuing this research at School B in particular would be to address the present study's limitation of the timing of data collection rounds. Teachers were not very satisfied at the mid-renovation stage. This may indicate a level of uncertainty about the learning commons' utility, functionality, and aesthetic quality. During round 1, some teachers reported difficulty in answering the questionnaire because they did not know how the space would "turn out" or because it was "unfinished." Thus, further investigation is recommended to substantiate the present results.

CONCLUSIONS AND FUTURE RESEARCH

The learning commons model is often expected by school administrators and researchers to provide students with technologically rich, mentally stimulating, comfortable spaces to think critically and communicate effectively. This study investigated whether the physical design of secondary school learning commons facilitates or constrains several attitudes and behaviors for teachers, thus addressing an apparent gap in the literature.

In the context of teachers' perceptions of their work environment, this study partly substantiated research on the benefits of the learning commons model. The findings indicate limitations to the model with respect to how it accommodates some of the professional needs of teachers, such as job satisfaction and opportunities for collaboration. Indeed, the encouraging results from School B contrast with the finding at School A that the learning commons did not positively impact teachers' collaborations with each other, or with teacher librarians, over time. Similarly, at School C, levels of teacher-to-teacher and teacher-to-teacher librarian collaborations were found to be low, as were levels of engagement and satisfaction.

In the future, behavioral mapping techniques and observational diagrams of the functional relationships teachers have with the learning commons may offer a better understanding of how (and to what extent) certain areas of the learning commons are used, while accounting for the spatial constraints in each school. But overall, the present study offers a great deal of preliminary information about the value of physical design of learning commons settings in secondary schools as they relate to teachers. The learning commons model appears to be largely successful in the early stages of implementation, and numerous advantages for both teachers and students can be expected in the future.

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