Building Relationships, Sharing Resources, and Opening Opportunities: A STEM Learning Community Builds Social Capital for Students with Disabilities

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Abstract

This article describes a learning community designed for university students with disabilities in science, technology, engineering, and math (STEM) majors at the University of Southern Maine. The Learning Community (LC) seminar is a credit-bearing class and part of a pipeline of supports and services for high school and college students with disabilities. The current study used a mixed-methods research design to explore the LC from the students' perspective in order to understand what they gained from the course. Analysis revealed that students gained knowledge, skills, access to resources, and social support, all of which are important facets of social capital. Implications for practice and future research are discussed.

Keywords: Disability, higher education, STEM, learning community, social capital

On a September afternoon, eight students settle into what appeared to be a typical university seminar. They arrange laptops, books, and backpacks around themselves and face the instructor as she talks with individual students and prepares for class. Small details, however, reveal that this is a different sort of class. In the back of the room, students freely help themselves to school supplies and snacks. As class starts, the instructor announces the day's topic, "Back in the groove," and each student describes personal challenges and accomplishments as he or she transitions from summer into the school year. While concerns such as getting used to online classes; handling stress; and juggling work, family, and academics are common among university students, it became apparent that these individuals struggle more than others as they talked about "being a slow reader," arranging for tutors, and coming out of a "meltdown." Nevertheless, these students moved on from their challenges as they offered each other encouragement and suggested strategies. The instructor replies, "We will *both* do it, okay?"

This was a meeting of the Eastern Alliance in Science, Technology, Engineering and Mathematics (EAST) Learning Community (LC) seminar, a credit-bearing class designed for university students with disabilities majoring in science, technology, engineering, and math (STEM). The University of Southern Maine (USM) has hosted EAST since 2003. Funded by the National Science Foundation's Research in Disabilities Education (RDE) Program, EAST is one of ten alliances across the country with the mission to increase the number of students with disabilities who enter STEM majors and advance to graduate school or STEM careers. As do other RDE programs, EAST has created a pipeline of supports and services into STEM majors and jobs. As Martin and his colleagues pointed out, however, "the idea of a pipeline is too simplistic for some groups of students, such as those with disabilities." (Martin et al., 2011, p. 286) since students are not simply in or out of the pipeline, but also possibly undecided about their status or likely success in

the pipeline. Therefore, a systemic approach to support for students with disabilities is desirable (Martin et al., 2011) and EAST has accomplished this through a variety of opportunities such as undergraduate STEM research experiences, tutoring, summer institutes, mentoring, and the LC itself.

It is well documented that individuals with disabilities have lower rates of persistence in college as well as low rates of participation in graduate study and professions in STEM (National Council on Disability [NCD], 2004). Many individuals with disabilities enter postsecondary education with poor academic preparation and self-management (Baer & Flexer, 2007; NCD, 2004). These individuals often need higher levels of self-determination to navigate the student-directed college environment, wrestle with issues of disclosure, understand their own support needs, and advocate for accommodations (Brinckerhoff, McGuire, & Shaw, 2002; Thomas & Getzel, 2005). Due to this combination of factors, individuals with disabilities often enter college ill prepared to progress (Heiman & Precel, 2003). Once in postsecondary education, students with disabilities often report encountering negative attitudes from faculty and peers and are even explicitly discouraged from continuing (Moon, Utschig, Todd, & Bozzorg, 2011).

Supporting all students to be college or career-ready when they graduate from high school and improving postsecondary outcomes are two major foci of national educational policy today. The importance of these goals is emphasized by the fact that individuals who have attended at least some college earn, on average, 26% more than those with just a high school diploma (Center for Law and Social Policy, 2010). Furthermore, increased attention has been paid to maintaining the United States' global competitiveness, especially in STEM fields (American Association of Colleges for Teacher Education, 2007; Hurtado, Cabrera, Lin, Arellano, & Espinosa, 2009). For students with disabilities, however, these outcomes continue to be a challenge and attention needs to be devoted to effectively improving postsecondary outcomes and broadening participation in STEM fields.

One promising practice is the creation of learning communities. Learning communities are intentional, collaborative groups that work toward a common purpose and may lead to the creation of new knowledge and other positive results for individuals and the group itself (Kilpatrick, Barrett, & Jones, 2003). Learning communities have been shown to enhance curricular coherence, support student learning, and create an enhanced sense of community in postsecondary environments (Shushok & Sriram, 2010). Learning communities have been found to have a positive effect on six-year graduation/retention rates and postsecondary outcomes for students who start out as non-STEM majors (Whalen & Shelley, 2010). Research reveals that learning communities increase the number of courses passed, credits earned, and promote faster completion of developmental course requirements among students in community colleges (Scrivener & Coghlan, 2011; Weissman et al., 2011). Finally, learning communities have been found to have positive influences on minority students' attitudes, learning experiences, and intrinsic motivation (Freeman, Alston, & Winborne, 2008). There is, therefore, a growing body of research indicating positive effects of learning communities for students who are new to postsecondary education, academically underprepared, or who share common identity markers. With these outcomes in mind, learning communities are being created for students with disabilities (Do-IT, 2010-2012; Izzo, Murray, Priest, & McArrell, 2011) and even the faculty and staff who support them (Access STEM, 2008). The impact of learning communities on students with disabilities, however, is just beginning to be explored.

One theoretical framework through which to view learning communities and interpret their impact on participants' lives is the notion of social capital. Social capital has been defined as accumulated interpersonal commodities such as trust, reciprocal relationships, community membership, and other behaviors that allow individuals to act collectively (Bourdieu, 1986; Putnam, 1995). Conversely, individuals or groups who lack social capital often lack the resources and power to participate in larger communities or dominant cultures.

In the fields of disability services and vocational rehabilitation, social capital has become a framing concept for initiatives designed to increase the community-based employment and inclusion of individuals with disabilities (Curran, 2008; Devine & Parr, 2008; Zimmerman, 2008). Increasing the social capital of individuals with disabilities may increase the likelihood that they "are 'of' the community, not merely in the community" (Williams, 2008, p. 159). Furthermore, social capital of the individuals with disabilities is enhanced as their valued contributions to the wider community accrue and are recognized (Parris & Granger, 2008). This article describes

a learning community designed for university students with disabilities in STEM majors while investigating a broad research question: In what ways does participation in the learning community contribute to the social capital of participants?

Methods

We explored the EAST LC from the students' perspective in order to understand what participants gained from the course. We employed a mixed-methods research design that utilized a body of descriptive quantitative and qualitative evaluation data from three years of LC implementation. This research design was particularly appropriate to our purpose, which was to understand the LC experience from the students' perspective. In this section, we describe the structure and organization of the EAST LC itself, the sample of students who participated, the tools used for collecting evaluation data, and the analysis carried out in this investigation.

The EAST Learning Community

The EAST LC seminar is an elective variable-credit course offered both fall and spring semesters that meets once a week and is open to students who are considering or have chosen STEM majors. While designed to support students with disabilities, it is not necessary that students register with the Office of Supports for Students with Disabilities prior to enrolling in the LC. The content of the EAST LC focuses on academic supports, self-advocacy and self-determination skills, addresses disability-specific concerns and topics, and explores opportunities in STEM careers. As students make progress in their undergraduate careers, seminar topics also include applying to graduate school, resume and cover letter writing, presentation, and interview skills. Students typically enroll in the LC for more than one semester. Returning students take on mentorship roles as they share advice and experiences.

Sample

Between spring 2009 and fall 2011, a total of 60 students participated in the LC seminar and 43 have completed both pre- and post-seminar surveys. Twenty-four (56%) students have taken the LC more than one time and seven (16%) have taken it three or more times. In addition to the LC seminar, 51% of the students participate in EAST-funded tutoring on a regular basis and 21% participate in undergraduate research fellowships sponsored by EAST. Of the 43 participants who completed the LC seminar, 11 are female and 32 are male. Participants' grade levels were diverse: freshmen (n = 8), sophomores (n = 10), juniors (n = 5), seniors (n = 18), graduate students (n = 2), and 14 had not formally matriculated. The majority of the students indicate their race as Caucasian with only 4% and 1% identifying as African American and Native American, respectively. Although 28% of LC participants chose not to disclose or did not give permission to report their disability status, the remaining 72% of the participants have a range of disabilities. Most commonly (35%), they report either attention deficit disorder/attention deficit hyperactivity disorder or learning disabilities. The rest of the participants reported a range of disabilities including medical or health related disabilities (12%), psychiatric/emotional disabilities (11%), Autism spectrum (7%), and orthopedic disabilities (4%). Finally, 2% of students report being deaf or hard of hearing and 2% report having a traumatic brain injury.

Data Collection Tools

Data for this investigation came from three years of pre- and post-seminar surveys in which students rated and wrote about their expectations and outcomes from the course. We complimented survey data with a focus group with current LC participants, which included an online discussion forum. The discussions allowed us to probe more deeply into emerging themes that had not been fully articulated in the survey instruments.

Survey instruments. The pre- and post-seminar surveys were developed collaboratively by EAST staff and project evaluators in order to capture a range of variables related to the learning community, student outcomes, demographics, and provide program feedback. The survey development process included peer review and pilot testing. The final questionnaires were delivered and monitored online via Survey Monkey by contracted program evaluation staff at the Education Development Center, Inc. (EDC). The pre-seminar survey asked how students learned about the seminar and provided open-ended options to (a) describe their reasons for signing up and (b) their expectations for involvement. Prior to participating in the seminar, participants were also asked to check possible benefits from a given list of 22 items. They were asked to rate their interest in STEM careers, academic preparedness,

and confidence in STEM on a 5-point scale (from "not at all" to "a lot").

The post-seminar survey mirrored the pre-test in the following ways. Participants were asked to rate the extent to which they achieved the same 22 expected benefits on the pre-test on a 5-point scale. Students were asked again to rate their interest in STEM careers, academic preparedness, and confidence to succeed in STEM on the same 5-point scale. The post-seminar survey also included an open-ended item that asked participants to list 2-3 key things that they had learned. Complete copies of the surveys are available online at http://cct.edc.org/surveys/EAST/lcs.html.

Focus group. A focus group of current LC students was conducted in order to supplement the survey data. The EAST co-principal investigator who was unknown to LC students conducted the focus group. The discussion lasted approximately one hour and was recorded and transcribed. The focus group discussion was guided by a protocol that asked students to describe the LC to others who were unfamiliar with it, examples of skills and knowledge learned, and the benefits of the learning community. An online discussion forum was created in the LC Blackboard website in which students responded to questions regarding technology supports, examples of opportunities and resources at the university, how EAST matched them individually with appropriate supports and opportunities, and what they feel they have contributed to the LC as whole or to specific members.

Analysis. The goal of our analysis was to uncover latent themes in participants' ratings of survey items, answers to open-ended items, and discussions. We recognized that while our surveys were a useful tool to gather data on common items from all LC participants across three years, they were also limited in depth and opportunities to probe for meaning (Hubbard & Power, 2003). We therefore complimented the surveys with discussions, in person and online, to confirm themes and enhance the richness of our data (Creswell, 2009). Although our data was both quantitative and qualitative, we used the steps of data reduction, display, and conclusion drawing recommended by Huberman and Miles (1994) for both data sets.

Data reduction. Quantitative survey data were reduced across years in order to gain a general sense of participants' beliefs in the possible benefits of the LC, their mean level of interest in STEM careers, and a sense of their own academic preparedness and confidence in STEM prior to participation. Data from post-LC surveys was also reduced to item frequencies and means across three years. Qualitative data from open-ended survey items as well as discussion groups was read and condensed through a coding process that identified common ideas and themes in the data (Coffey & Atkinson, 1996).

Data Display. Once reduced to item frequencies and means across the three years of LC implementation, quantitative data were displayed in tables that allowed the researchers to order, sort, and categorize the items. The researchers compared pre- and post-LC survey data, identified priorities, and examined the items themselves to identify themes through content analysis. Similarly, coded qualitative data from open-ended items and discussions was displayed in tables and sorted to look for similarities and distinctions across code categories.

Drawing conclusions. By examining pre- and post-survey data and connecting discussion data to open-ended survey items, we arrived at our conclusions through what Creswell refers to as a "confirmatory triangulation design" (2009, p. 210). We identified and confirmed themes from multiple perspectives and data sources. As the recurrent themes emerged we more fully interrogated these themes by grounding them in the literature on social capital (Corbin & Strauss, 2007). In general, our methods elucidated dimensions of social capital as it developed in the LC that can be explored in more targeted ways in future research.

Findings

Analysis revealed that students gained knowledge, skills, access to resources, and social support, all of which are important facets of social capital. Individuals came to the LC through an array of channels typical of how students find and enroll in classes, such as university advising staff, professors, faculty advisors, and/or friends. They were referred to and ultimately chose to enroll in the EAST learning community primarily because of their academic struggles. Nevertheless, despite their history of difficulty in school, students were optimistic about what the LC could offer them. As one student participant noted, "Learning new skills is always difficult but the skills I will learn in this class will help me become a better learner."

Anticipating the Learning Community

While each individual LC participant had their own expectations for the class, we interpreted the number of times a possible benefit was checked as a measure of the group's overall priority. We then organized priorities into high (chosen by 56-73% of students), moderate (46-55%), some (36-45%), and low (23-35%) categories (See Table 1).

High priorities. As shown in Table 1, the highest priorities for students were improved academic outcomes such as grades (73%), study habits (67%), and time management (57%). This aligns with students' open-ended responses on the pre-seminar survey. Overall, fifty-one qualitative comments related to study skills; tutoring, including help with homework and assistance with content, writing, and math; and organizational or time management skills. Students acknowledged that they needed help "keeping up" as well as getting and staying "on track." One participant identified "a tendency to fall behind and give up."

The most frequent content areas that were identified as challenging involved quantitative reasoning required in math, chemistry, and physics courses. Some students also said that they needed help with writing. Finally, students often generally summarized their goals or reasons for enrolling in the LC as wanting to become a "better learner," "increasing my potential as a student," or as one student poetically phrased it, "to fine tune and oil the mechanics of being a successful person in whatever endeavors I pursue."

Although all of the students in the LC struggled academically at one time or another, only five respondents to the pre-seminar survey specifically cited the need for disability-related help as their reason for enrolling in the class. One, for example, said "the class would help me deal with my learning disabilities in a healthy and effective way." Another thought that the LC would provide help "managing my learning disabilities or how to start the process."

Also in the high priority category is exploration of career goals (57%). In the open-ended question asking why they enrolled in the LC, 17 respondents appreciated the fact that the class was comprised of other STEM majors and saw the seminar as an opportunity to build professional networks. Although some students' future orientation lacked specificity (e.g., "a way to plan for the future," "post graduation stuff"), others were focused on employment (e.g., "how to survive and thrive in a career environment" and "job paths"). Overall, these high priority benefits reflect students' academic self-knowledge and the fact that they are at an exploratory stage in their career paths.

Moderate priorities. In the moderate priority range, we still see a focus on academic support (clarify learning goals, 47%; help balance academics with other responsibilities, 47%; and assistive technology, 50%) as well as career exploration, which is more specifically framed as "learn more about opportunities for research and employment in STEM" (53%). In this category, however, we also begin to see some interest in building social connections (make friends/increase social support, 55%; increase connections with USM professors and staff, 50%). In the open-ended question, 15 students cited connections with other students or faculty and networking as a reason to enroll in the LC. The LC was seen as a place where student had "lots of things in common." They anticipated that this group would offer personal support by being "compassionate" and they wanted to "participate in a student community, which … addresses concerns and insecurities." One student even thought that he/she could provide help to "other members of the class." Students hoped that social connections with students and faculty would contribute to their professional development.

Career exploration and social connections are outcomes that we continue to see in the "some priority" category. Forty-five percent of students checked "learn about careers in STEM" and 38% checked "increase peer (student-student) academic support network/increase collaboration with other students" as well as "increase connections with EAST staff." Students also indicated that they had hoped the LC would help them become more aware of and navigate resources both in EAST and USM in general (40%). Eleven students commented that the EAST LC would open doors to resources and opportunities at USM and beyond, including assistive technology, tutoring, undergraduate fellowships, research grants, internships and other "opportunities that I might have otherwise missed." Finally, 38% of students checked "develop a personal plan of action."

Table 1

Learning Community Participants' Priorities of Possible Benefits (N=60)

Possible Benefits of Learning Community	Frequency	%	Priority
Improve grades in coursework	44	73	High
Improve study habits	40	67	High
Clarify career goal(s)	35	58	High
Improve time management skills	34	57	High
Learn about STEM fields	34	57	High
Make friends/increase social support	33	55	Mod.
Learn about USM STEM facilities and/or research work	32	53	Mod.
Learn about opportunities for research and employment in STEM	32	53	Mod.
Learn about assistive technologies/other devices to help me learn	30	50	Mod.
Increase connections with USM professors and staff	30	50	Mod.
Clarify learning goal(s) and help balance academics with other responsibilities	28	47	Mod.
Learn about careers in STEM	27	45	Some
Learn about and help navigating USM services	24	40	Some
Learn about EAST programs and services	24	40	Some
Develop a personal plan of action	23	38	Some
Increase peer (student-student) academic support network/increase collaboration with other students	23	38	Some
Increase connections with EAST staff	23	38	Some
Improve self-advocacy skills	21	35	Low
Learn about applying for graduate school in a STEM field	21	35	Low
Learn about other resources and services (not related to EAST or USM)	21	35	Low
Help with the transition to graduate school in a STEM field	14	23	Low

Learning in the Learning Community

After each semester in the EAST LC seminar, participants were asked to complete a questionnaire that mirrored the pre-seminar survey and probed what students felt they gained. One student wrote, "Originally I needed it for my schedule and then it just happened to be exactly what I needed to succeed with my studies." The post-seminar survey asked students to report the extent to which the LC helped them with the same list of outcomes that were listed as possible benefits prior to their LC participation. They rated these items on a 5-point likert-type scale from 1 (not at all) to 5 (a lot). All of the 22 possible outcomes had a mean rating of 2.71 or higher indicating that EAST helped students in all but one area to at least some degree (see Table 2). Findings from both the post-seminar survey and focus group reflect four major themes: (a) actively connecting students to resources, (b) skill development, (c) social support, and (d) lessons students learned about themselves.

EAST staff actively connecting students to resources. Overall, students found that (a) they built positive relationships with EAST staff and (b) staff were critical in increasing students' awareness of and helped them take advantage of opportunities and supports. The highest rated outcome was "increased connections with EAST staff" (mean = 4.38). This

Table 2

Students' Perceived Gains

To what extent did the Learning Community seminar help:	Mean Rating (N=43)
Increase connections with EAST staff	4.38
Learn about assistive technologies and other devices to help me learn	4.24
Learn about STEM fields	4.16
Learn about EAST programs and services	4.10
Learn about USM STEM facilities and/or research work	4.07
Develop a personal plan of action	4.02
Improve time management skills	4.00
Clarify learning goals	3.93
Increase connections with USM professors and staff	3.88
Improve study habits	3.81
Learn about opportunities for research and employment in STEM	3.81
Learn about and get help navigating USM services	3.81
Help balance academics with other responsibilities	3.79
Increase peer (student-student) academic support network/increase collaboration with other students	3.79
Learn about other resources and services (not related to EAST or USM)	3.71
Improve self-advocacy skills	3.70
Clarify career goal(s)	3.64
Learn about careers in STEM	3.62
Improve grades in coursework	3.51
Make friends/increase social support	3.51
Learn about applying for graduate school in a STEM field	3.27
Help with the transition to graduate school in a STEM field	2.71

is indicative of the relationships that EAST staff and students share. The open-ended survey items and focus group discussions highlighted these positive relationships. One student said, "The professors in this class are very helpful." Another student said, "Teachers bring the resources to you." Furthermore, the relationships resulted in direct benefits for the students. One student said, "EAST team in general has really helped in finding the right tools to get successful in several classes especially in those that are really tough. Chemistry, three times, and the fourth time, I found a good tutor and I was able to pass the class very well."

One of the critical elements of students' connections with EAST staff is the extent to which staff members learn about their students and can therefore individualize support. One student wrote, "They helped me pass Chemistry by finding me the right tutor, and providing study periods where I could focus on my work without distractions. They also helped me improve my resume, and even got me an internship that I am working right now." Finding the *"right"* tutor was a combination of someone who knew the content and could individualize instruction. This student's specific need for a quiet space for studying was something that EAST staff helped him realize and then find.

The second highest post-seminar outcome was "learning about assistive technologies and other devices" (mean = 4.24), which again highlights tangible benefits for students and augment services provided by the university's Office of Supports for Students with Disabilities. One student wrote, "EAST helps with any accommodations that you need, like assistive technology." In their open-ended responses, four students listed the technology that they gained from EAST, such as the voice recognition software Dragon Naturally Speaking (Nuance Communications, 2010) and LiveScribe pens (Livescribe, 2010) for recording and note taking. One student noted:

> [The LiveScribe pen] is the most effective tool I have come across for recording lectures as well as the simultaneous capture of written note taking and the audio of the lecture in real time. I have been recruited to provide lecture notes to the office of students with disabilities, and this allows internet postings for the entire office to view and hear. It's amazing.

Three of the outcomes with the highest mean ratings relate to a greater awareness of opportunities, specifically: "learn about STEM fields" (mean = 4.16), "learn about EAST programs and services" (mean = 4.10), and "learn about USM STEM facilities and/or research work" (mean = 4.07). Participants in the focus group with current LC students discussed learning about "options and things to get involved with at this school….They [EAST staff] bring that to light and we see what we can have at our potential and stuff that can interest us." More than just pointing out opportunities, however, EAST helped students accomplish the tasks to get involved. One student described his insecurities and worries about applying for research fellowships. With help from EAST staff, he was successful in demystifying the process, pointing out his own accomplishments, and gaining experience. He said:

> You become aware of something that you are interested in pursuing an internship, or a fellowship and you look at it and say, "That is really cool; I bet there is a lot of competition…I don't know how to enter the competition, and if I don't enter it properly I don't stand a chance of winning and even if I enter it properly, I don't stand a chance." [But EAST staff say,] "Here is a checklist, you have already done three of them; here, that is enough." I have done two fellowships now. The first one, you are kind of amazed that you got it at all…then the second one, you say, "I can do this; I can do this!"

For this student and others, awareness of opportunities translated into concrete resources such as tutoring, fellowships, and internships. One student wrote, "A degree in a major program does not always equal a job. Internships and cooperative jobs are critical nowadays. I already found a paying internship!"

Skill development. Students rated their academic preparedness on a five-point scale (1 = very poorly to 5 = extremely well prepared) before and after LC participation (see Table 3). Students experienced improvement from pre- to post-seminar in their academic preparedness. Even after participation in the LC, however, students as a group rated themselves only as being moderately to well-prepared in their STEM courses.

Nevertheless, when asked what two or three things students learned in the LC, academic and study skills were by far the most common. Sixteen students cited time management and organizational skills as an important outcome of the course. They specifically

Table 3

Pre- and Post-Comparison of Academic Preparedness for Learning Community Participants (N=31)

How well prepared academically do you feel for courses in the following fields?	Pre Mean	Post Mean
Science	3.26	3.61
Technology	3.32	3.87
Engineering	2.90	2.97
Mathematics	3.06	3.16

wrote about making lists, using calendars, "how to pace myself for…exams and quizzes," and how "to focus on important events." Closely related to these organizational skills were study strategies. One student wrote, "I learned from EAST that I personally really benefit from using note cards to help memorize formulas and equations for math, engineering and science." Three students responded that they worked on and improved their writing skills, which included strategies, communicating in writing, and grant applications. It is interesting to note that most of the skills students cited as having learned were not STEM-specific, but are relevant in any academic context.

Above and beyond academic skills, LC participants reported learning resume building, job seeking skills, and skills related to employment success such as "people communication" and "how to network with people close to me." A student in the focus group said that skills learned and practiced in the LC were "resume builders and you can bring them into interviews and you can talk about being a part of a community like EAST." Another student noted learning the importance of "resume language; tone and accuracy can mean the difference between getting interviews and getting forgotten." Another wrote, "I was walked through setting up a correct and accurate resume, which I then used to apply for a position I had been wanting as a Summer RA on campus."

Social support. The theme of social support emerges as an outcome throughout the list of benefits gained in the LC. Participants found that the LC helped them "make friends/increase social support" (mean = 3.51). They also found that the LC helped "increase peer student-student academic support network/ increase collaboration with other students" (mean = 3.79). Finally, professional supports such as "connections with USM professors and staff" and "connections with EAST staff" were rated very highly with a mean of 3.88 and 4.38, respectively. Overall, students describe the EAST LC as "very accepting," "supportive and inviting," and even "allows you to build a family in your university." The social support in the LC allowed students to connect "with like-minded students." The LC became a place where students were not alone in their struggles. Indeed, they found instructors and fellow students in the LC who could help them. A student in the focus group summed this up by saying:

> I will very quickly think that I am the only person in the room who is struggling… I am struggling alone. So being able to walk into a room and say, "I am having a hard time with this [is a good thing]." Not only does nobody give you a hard time, but they say, "A lot of people are having a hard time with this, this is hard. But look; you are doing this right, you are doing that right. Let me call someone who may be able to help you."

Finally, the social support in the LC was more than just a benefit received by members. One student described the reciprocal nature of the social support when she wrote, "Community Lab learning and involvement has helped me reach out to others in need of learning."

Lessons learned about themselves. In this context of shared experience and support, students felt that they became better students and were more able to succeed on their own. A number of students said that they became more aware of "where I am strong and where I need to improve." Another student wrote about what it means to be a student by observing, "I've learned that being efficient and productive in school has a lot more to do with your study skills and time management then just being intellectual." Finally, a student found confirmation that she is doing the right thing academically when she wrote, "I received validation that my study and time-management skills are sound and well thought out."

A student in the focus group used the analogy of a tool box to describe what he gained in the LC. He said:

> You open your tool box and you pull out the hammer and pliers and you don't realize that you are just looking at the top tray…and you pull that out and you are looking at all the power tools you can use. And it is a big eye opener to have that available…look what there is…there is all that!

Some of the skills in the tool box relate to a student's confidence and self-efficacy. One young woman said:

> I have gotten better at demonstrating in other locations because you can come here and essentially shakily test out an extrovert skill or two here just to see how it goes, build some momentum, so that you get confidence so that you can do it on a blackboard in front of a different class that may be more intimidating.

Another student described the therapeutic value of having a place to work on recognizing past patterns of academic struggle with the hope of becoming more proactive in the future. He said:

> This almost seems like [an] academic therapy group… Last week we were talking about my pattern, which is, by mid-semester, I'll feel really discouraged and I will drop the ball for a couple of weeks. So now I know how not to do that, how to anticipate, building coping skills in time management and put the safe guards in place.

Another young woman followed up on this point and said that EAST has been helpful in really understanding the nature of one's difficulties. She said, "When you are having trouble they usually say, 'Well, what is the source? Can you pinpoint the source of the problem?' And they help you do that." This level of self-awareness and the notion of an academic tool box are necessary for students to ultimately become effective self-advocates. It is interesting to note that prior to participating in the EAST LC, building self-advocacy skills was the second lowest priority for the students as a group. After participating in the LC, however, students felt that EAST had helped them improved self-advocacy skills between "some" and "quite a bit" (mean = 3.70).

Discussion and Implications

In the online follow-up to the focus group, one student wrote:

> Everyone in the group has knowledge that has potential value to some other person/s of the group. This pool of knowledge and muscle is accessible to everyone. The group as a whole is more efficient in its function toward a common or an individual's goal, rather than just a single person, trudging through school on their own.

This statement encapsulates the primary outcome of the learning community: social capital. The learning community itself builds valuable knowledge that is accessible to everyone in the group and collectively greater than any one individual can accrue on his or her own. The development of social capital in a group context such as a learning community may be similar to the development of an individual's sense of self-efficacy, which can develop through vicarious experiences (observing others) and social persuasion (the influence of others) (Jenson, Petri, Day, Truman, & Duffy, 2011). Indeed, a learning community can provide the context in which one sees others successfully cope and ultimately succeed. The members of the learning community can provide the encouragement and positive influence needed to enhance self-efficacy.

According to Devine and Parr (2008), relationships are the primary mechanisms by which social capital is built in learning communities. First, the students come together and create *bonding* social capital experiences

(Holt, 2010) because of common characteristics or identities. For individuals in the EAST LC, their initial bonds may be based on disability, struggles in school, and commitment to STEM. While time together in the LC created proximity, which "is important to sustaining social capital" (Devine & Parr, 2008, p. 405), merely being in the same space is not sufficient. For social capital to fully develop, trust and reciprocity are needed (Devine & Parr, 2008; Putnam, 1995). Our LC students described trust and reciprocity acknowledging an individual's trustworthiness to the group. Another participant described the reciprocity of their relationships when he wrote:

> I could access the experts' knowledge, or at the very least speak with someone who knows more about it than me. In return for their help I am ready to provide whatever knowledge I may have... and any muscle or other brain effort that would be helpful to any other group or subgroup.

Our findings also reveal that tangible benefits are an outcome of the LC and are directly related to the social capital of the group. Students translated information and relationships into tutorial services, internships, and technology, which in turn translated into gains in skill and knowledge and further opportunities. Bourdieu (1986) pointed out that, as individuals accrue social capital, they have opportunities to convert this into economic capital. We can see this beginning to happen as students in the LC find paid internships. The potential for this increases as students draw upon their accrued social capital for admission to graduate school and jobs in STEM fields.

Limitations and Future Research

Given the fact that the EAST LC is specifically designed for students with disabilities, it is important to pay attention to what Holt (2010) calls the "dark side of social capital" (p. 18). She cautions that "segregated spaces then, are often double-edged; simultaneously providing a safe space of affirmation and demarking the space and its occupants as different, possibly, although not inevitably, in a negative sense" (Holt, 2010, p. 15). The hope is that not only does a group build bonding social capital, as described above, through internal trust and reciprocity, but also *bridging* social capital, which can serve to span what Putnam (1995) called "underlying social cleavages" (p. 665). We may be seeing the beginning of bridging social capital when the students use skills and knowledge in classes beyond the LC setting as in the case of the "extrovert skills" described in the focus group. Going forward, it is important to pay attention to mechanisms for greater bridging social capital so that students with disabilities are recognized for their contributions in the larger university and STEM communities "rather than being perceived as only needing help" (Zimmerman, 2008, p. 175).

Another area for future exploration is to more fully understand facilitation strategies that foster social capital. The findings from this investigation reveal the importance of the EAST staff in the lives of EAST students. Teaching and facilitation strategies used by EAST staff appear to successfully build relationships and increase students' awareness and confidence. It would be valuable, however, to more closely examine the effect of specific teaching and facilitation methods and to pay special attention to how staff members can transfer responsibility for the LC to students as they gain social capital themselves.

Despite the fact that students came to the LC with high hopes for improved academic outcomes, the extent to which they accomplished this goal is not clear. While students reported a wide range of improved academic management skills, they did not report improved grades as a major outcome of the LC. Further exploration of the relationship between EAST participation and academic outcomes is warranted. It may be that the impact of LC participation alone is insufficient for improved grades, but that positive effects are possible when paired with other resources.

Finally, the current study is relatively small and exploratory and therefore contains inherent limitations. While these limitations cause us to narrow the scope of the generalizations that can be made, they point in the direction of future research. It is not possible to draw causal conclusions about the effect of the learning community on student outcomes. In order to capture this relationship, future research should utilize control groups to evaluate changes in social capital variables as well as more narrowly defined outcome variables such as persistence, graduation rates, and post-graduation outcomes. Nevertheless, the dimensions of social capital identified in this investigation will serve to build and refine future research.

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