HOW SELF-DIRECTED LEARNING RELATES TO TECHNOLOGY INTEGRATION AND PEDAGOGICAL BELIEFS IN MIDDLE SCHOOL CLASSROOMS

By

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Senior Honors Thesis

Submitted to the Sociology Department in Partial

Fulfillment of the Requirements for the

Sociology Honors Program

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April 26, 2019

INTRODUCTION

Self-directed learning (SDL) is defined as "a process in which individuals take the initiative, with or without the help of others, in diagnosing their own learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (Knowles 1975:18). SDL is considered an important lifelong learning skill and has been the focus of research in adult education for decades. More recently, research on SDL has examined its implementation and the development of self-directed learning skills in primary and secondary education. SDL is believed to prepare students better for learning in higher education, as well as continued learning after they complete their formal education (Bolhuis 2003). It teaches students how to learn, rather than simply what to learn, which gives them more ownership over their learning and more motivation to learn (Schunk 1996 in Bolhuis 2003). SDL is a vital skill for students because it teaches them independence and the skills that they will need to continue learning throughout their lives.

Over the past decade, research on SDL has shifted from a focus on adult education, to one on higher education and primary and secondary education. This research has either approached SDL as a set of skills that is developed by students and that some students are more predisposed to than others, or as an instructional method. SDL as an instructional method involves educators employing SDL in the classroom so that all students may have more independence in their study of a topic, learn content better, and naturally develop SDL skills. As described in greater detail below, most research has approached SDL as a set of skills that some students are more prepared to acquire than others.

Research that focuses on skill acquisition found that some students are better positioned to develop SDL skills based on their personality traits or characteristics (Brockett & Hiemstra 1991; Oddi 1986; Lounsbury et al. 2009), and that students who are more predisposed to SDL develop SDL skills better in a less structured classroom, while those who are less predisposed to it require a more structured classroom (Dynan et al. 2008). Such research also found that the development of SDL skills in students led to higher levels of academic achievement (Lounsbury et al. 2009), and that the development of SDL skills in students with learning disabilities helped improve their performance and behavior (Agran, Blanchard, & Wehmeyer 2000; Jimenez & Browder 2010). With the rise in technology use in classrooms, research on the acquisition of SDL skills among students has also begun to examine technology use in relation to the development of those skills (Ciampa and Gallagher 2013; Thornton and Sharples 2005; Bartholomew et al. 2017). This research, however, has produced contradictory results concerning the effectiveness of technology in helping develop SDL skills. Research that approaches SDL as an instructional method has produced fairly negative results concerning SDL's effectiveness in such a way (Cox 2015; Francis & Flannigan's 2012; Basset, Martinez, & Martin 2014).

This study approached SDL as an instructional method and explored the following primary research question: How does the implementation of self-directed learning by middle school educators differ by their extent of technology integration and pedagogical beliefs? The extent of technology integration is understood here as how often students use technology in a classroom to support the learning process. A teachers' pedagogical beliefs can fall anywhere on a continuum from teacher-centered (lecture-based instruction) to student-centered

(student-centered learning activities). Pedagogical beliefs determine how an instructor structures their classroom, and it is an important factor in the implementation of SDL that should be examined. Further, as described below, pedagogical beliefs are directly related to how educators implement technology in their classroom, so how technology integration and SDL as an instructional method are related should not be examined independent of pedagogical beliefs.

When studying SDL, this study also examined the secondary question: If there is a relationship between pedagogical beliefs and educators' implementation of self-directed learning, how does this implementation differ by the racial composition of the school in which the educator teaches? This secondary question is framed around a critical race theoretical framework and explores whether differences in the implementation of SDL by the racial composition of schools could be contributing to the differences in learning experiences between black and Hispanic students and white students.

To examine the questions described above, two methods were employed: a) quantitative analyses of teachers' responses to a survey that focused on pedagogical beliefs, beliefs about student technology use, technology practices, SDL practices, SDL practices with technology, and SDL practices without technology; and b) qualitative analyses of interviews with six teachers that focused on their understanding of SDL, use of SDL in their classrooms, and beliefs about SDL.

In the sections below, I examine the research performed to date on SDL, pedagogical beliefs and technology integration, and Critical Race Theory, which informed my research questions. Next, I describe the methodology I employed to examine these questions. Findings from the statistical analyses and interviews are then presented. The paper ends by discussing the

findings, describing the significance and implications of the findings, and identifying next steps that should be taken to deepen understanding of these questions.

LITERATURE REVIEW

Introduction

Self-directed learning (SDL) is an important 21st century lifelong learning skill (Dynan, Cate, & Rhee 2008; Bolhuis 2003), in which students learn how to identify their own learning goals and reach those goals with relatively little guidance from a teacher or instructor. SDL skills become more important for students as they rise through the educational system, from elementary to secondary to higher education, and even more so when they enter the workforce and must be capable of learning new material independently.

The study presented here examined the question: How does the implementation of self-directed learning by middle school educators differ by their extent of technology integration and pedagogical beliefs? The study also examined the secondary question: If there is a relationship between pedagogical beliefs and educators' implementation of self-directed learning, how does this implementation differ by the racial composition of the school in which the educator teaches? I hypothesized that educators with more student-centered pedagogical beliefs implement self-directed learning to a higher degree than those with more teacher-centered beliefs. I also hypothesized that pedagogical beliefs have a stronger relationship with the implementation of self-directed learning than technology use, and therefore should be considered an important factor in its implementation. In addition, I hypothesized that educators who work in schools serving a larger percentage of students categorized as black or Hispanic implement

self-directed learning to a lesser degree than those in schools serving a larger percentage of students categorized as white.

The following literature review will provide a deeper understanding of the research performed to date on self-directed learning, the relationship between pedagogical beliefs and technology integration, and critical race theory in education. These concepts are briefly described below before I delve into further detail.

Self-directed learning consists of learners identifying their own learning goals and the materials needed to attain those goals, and then achieving those goals with minimal assistance from an instructor. Research on SDL typically either views it as a set of skills that is developed by students and that some students are more predisposed than others, or as an instructional method. SDL as an instructional method involves educators employing SDL in the classroom so that students may have more independence in their study of a topic, learn content better, and naturally develop SDL skills. Most research on SDL approaches it as a set of skills developed by students, and the topics covered within this approach include:

- The personality traits or characteristics that make a student more ready for SDL or more predisposed to it;
- The classroom structures that allow different students to develop SDL skills;
- The relationship between the development of SDL skills and GPA or academic achievement;
- The relationship between the development of SDL skills and technology; and
- The effects that the development of SDL skills in students with learning disabilities has on their learning processes and academic achievement.

My research explored SDL as an instructional method and how it relates to pedagogical beliefs. I took this approach because the findings concerned with how technology relates to the development of SDL skills have been particularly inconsistent, and I hypothesized that the missing factor in this literature has been pedagogical beliefs and how they relate to SDL as an instructional method.

Pedagogical beliefs are teachers' beliefs about teaching and learning and how to best instruct their students. There are two main kinds of pedagogical beliefs: teacher-centered beliefs and student-centered beliefs. Instructors with teacher-centered beliefs value more lecture-based instruction, with the teacher transmitting knowledge to the students. Those with student-centered beliefs value incorporating students more in their own learning process and employ more student-centered learning activities. Much of the research on pedagogical beliefs has explored how pedagogical beliefs relate to technology integration. Generally, it has been shown that teachers with more student-centered beliefs tend to be more willing to integrate technology and integrate it in more innovative, student-centered ways. Teachers with teacher-centered beliefs tend to be less willing to integrate technology because they do not view it as especially useful or helpful, and they also tend to integrate it in ways that do not involve the students using the technology directly. On occasion, there have been instances where teachers with more teacher-centered beliefs began to transition to more student-centered beliefs after the integration of technology (Tondeur et al. 2016:561). Because of the strong relationship between pedagogical beliefs and technology integration, I argue that the relationship between technology use in classrooms and the implementation of SDL cannot be examined independent of pedagogical beliefs.

Finally, I frame the results of my thesis in a Critical Race Theoretical Framework. Critical Race Theory (CRT) places race and racial narratives at the center of understanding certain phenomena in our society. CRT, which has numerous components that are laid out later in this literature review, originates in law and was brought to education by Gloria Ladson-Billings and William Tate. Of particular importance to my research is the critical race understanding of the differences in curriculum and instruction between classrooms that have mostly students categorized as white compared to those with mostly students categorized as black or Hispanic, as well as between schools serving high percentages of students categorized as white versus those serving high percentages of students categorized as black or Hispanic. Because SDL as an instructional method is a component of curriculum and instruction that involves a teacher's faith in students to be efficient and effective independent learners, and because classrooms with a majority of students categorized as white tend to have more student-centered instruction (Zamudio et al. 2011:109), I hypothesized that in this study teachers who work at schools serving higher percentages of students categorized as white will implement SDL more than those at schools serving higher percentages of students categorized as black or Hispanic.

As an important 21st century lifelong learning skill, it is imperative that we continue to search for new factors that could play a role in the implementation of self-directed learning in classrooms in order to better understand SDL itself and how to teach students SDL skills. The next three sections describe self-directed learning, the relationship between pedagogical beliefs and technology integration, and critical race theory in education in more detail. Through this literature review, the reader will understand why it is necessary to examine the relationship

between SDL and technology integration and SDL and pedagogical beliefs, and which relationship is stronger. The reader will also understand why it is necessary to understand those relationships within a CRT theoretical framework.

Self-Directed Learning

General Definition:

Self-directed learning (SDL) is an important 21st century lifelong learning skill that allows students to gradually become more independent learners throughout their lives. This skill is necessary for students as they rise through the educational system and independent learning becomes more important for success in school. SDL skills are also vital for success in the workforce, where it is necessary to be able to learn new material without external guidance.

Self-directed learning is generally defined as "a process in which individuals take the initiative, with or without the help of others, in diagnosing their own learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (Knowles 1975:18). D.R. Garrison (1997) proposed a comprehensive model of self-directed learning that incorporates three interrelated dimensions. The first dimension is self-management, which "concerns the enactment of learning goals and the management of learning resources and support" (Garrison 1997:22). The second dimension, self-monitoring, requires that learners "take responsibility for the construction of personal meaning" as well as be aware of their thinking and "modify [it] according to the learning task/goal" (Garrison 1997:24). The final dimension is motivation, which includes both "the process of deciding to participate [in learning] (entering motivation), and the effort required to stay on task and persist (task motivation)"

(Garrison 1997:26). Although all of these dimensions are centered on the student taking responsibility for their own learning, "self-directed learning usually takes place in association with various kinds of helpers, such as teachers, tutors, mentors, resource people, and peers" (Knowles 1975:18), with the helper creating "the educational conditions that will facilitate self-direction" by providing some external direction and support (Garrison 1997:30).

Many argue that self-directed learning is an important life skill "that is necessary for lifelong learning" (Dynan, Cate, & Rhee 2008:97). The implementation of self-directed learning in primary and secondary education is vital for preparing students for the more independent types of learning that they will encounter in "vocational and/or higher and adult education" (Bolhuis 2003:328). Self-directed learning also helps "students to acquire the learning skills, attitudes and knowledge to empower [the] ownership" of their learning, and will therefore encourage the continuation of learning even after they have left formal education (Bolhuis 2003:329). There is also the added factor that SDL sets "a learning goal (how to solve certain problems) rather than a performance goal (solving a certain problem)," which not only helps students develop lifelong learning skills, but also "leads to higher motivation, and higher achievement" (Schunk 1996 in Bolhuis 2003:340). Teaching is not just about teaching content, but it is also about teaching skills, and that is where SDL plays an important role (Bolhuis 2003:341).

Skills Acquisition:

Self-directed learning has been studied as both a skill that must be cultivated by students, and as an instructional method that teaches students content as well as SDL skills. In fact, the framework developed by Brockett and Hiemstra (1991) understands SDL as containing two dimensions, one in which it is an instructional method, and the other in which it is a personal

characteristic or trait, what they call "learner self-directedness" (p. 33), that allows students to develop SDL skills. By far the most common focus of the research on SDL has been studying it as a set of skills for students to acquire, and when doing so researchers have examined the types of students who are more inclined towards developing SDL skills, what kinds of classroom structures facilitate the development of SDL skills, how the development of SDL skills affects student learning outcomes, the relationship between the development of SDL skills and technology, and how the development of SDL skills in students with learning disabilities affects their learning processes and academic achievement.

Some researchers who have studied SDL skill acquisition in students have explored the characteristics or personality traits of students who are more inclined towards SDL, using the second part of the framework developed by Brockett and Hiemstra (1991) which focuses on SDL as a personal characteristic. Lorys F. Oddi (1986) developed the Oddi Continuing Learning Inventory, which was tested on "graduate students in law, nursing, and adult education" (p. 102), based on the idea that there are three "personality dimensions of self-directed continuing learners" (p. 98). These dimensions include:

1. Proactive Drive versus Reactive Drive (PD/RD), which is "focused on the learner's ability to initiate and persist in learning without immediate or obvious external reinforcement;"
2. Cognitive Openness versus Defensiveness, which is the learner's "openness to change," and;
3. Commitment to Learning versus Apathy or Aversion to Learning (CL/AAL), which focuses on the enjoyment that students take from learning, their initiative to continue

learning, and their participation "in learning through a variety of modes" (Oddi 1986: 98-99).

All of these dimensions are interrelated and each exists on a continuum with "individuals marked by high amounts of the characteristic (i.e. self-directed continuing learners)" on one end, and "individuals marked by low amounts of the characteristic (i.e., non-self-directed continuing learners)" on the other (Oddi 1986:98). Knowing which students are more predisposed to SDL in theory facilitates the development of SDL skills in students. In addition, Lounsbury et al. 2009 found that students who "are more engaged in self-directed learning" have been found to "have a firm sense of identity… experience higher levels of life satisfaction; have higher levels of vocational interests for investigative, artistic, enterprising, and conventional occupations; and they are more likely to be conscientious, well-adjusted, optimistic, self-actualized, intuitive, hard-working, and open to new experiences" (p. 417). The relationship between self-directed learning and these personality traits were found in a sample that spanned from 6th grade students to college students (Lounsbury et al. 2009).

Using the notion that different students are more inclined towards SDL, Dynan et al. (2008) grouped university students according to their "readiness for SDL" into structured and unstructured classes (p. 99). In their study, students who tested in the pre-test with high levels of readiness for SDL were placed in more unstructured classes, while those with low levels were placed in more structured ones (Dynan et al. 2008:98). They found that "structure match enhances SDL skills… [and] that courses designed to enhance students' readiness for SDL can do so" (Dynan et al. 2008:99).

Lounsbury et al. (2009) also examined the relationship between the development of SDL skills and academic performance, and found that there were "consistently significant positive correlations between Self-Directed Learning and GPA for all grade levels examined" (p. 415). The results showed a trend with "an upward shift from 6th to 7th grade in middle school, from 9th to 12th grade in high school, and from freshman to junior year in college," in the correlation between SDL and GPA (Lounsbury et al. 2009:416). This trend could have been because of "increased opportunities for [SDL]" with each successive grade, "increased salience of [SDL] as a function of… instructional design or teacher expectancies, or… increased salience of [SDL] as a function of age-related personality changes" (Lounsbury et al. 2009:416).

Self-directed learning as a set of skills has been studied in relation to technology as well, in order to determine the effect that technology has on the development of those skills. Ciampa and Gallagher (2013) found that, among the 8th graders in their sample, students became more self-directed and "independent learners who were aware of new opportunities and [uses] of" iPod Touches once they were integrated (p. 318). These results were seen both at school and at home, and the iPods also allowed for more self-pacing, and therefore more self-direction among "struggling learners" who could "accommodate their individual learning needs" (Ciampa & Gallagher 2013:322-323). Thornton and Sharples (2005) also found that adult self-directed learners who were learning a foreign language were able to use technology to support their learning by "manag[ing] time and learning more efficiently… hav[ing] learning resources available when needed… support[ing] foreign language use such as reading and writing… [and] blend[ing] learning and entertainment" (p. 3).

Bartholomew et al. (2017), on the other hand, found that the integration of mobile devices among 7th and 8th graders completing an "engineering design challenge" that involved designing a pill dispenser did "not correspond with an increase in student self-directed learning and, in some cases, may be detrimental to [SDL]" (p. 17). Instead, they suggest that the development of SDL skills is "related to student and environmental characteristics rather than access to specific technology tools" (Bartholomew et al. 2017:17). In this case, students with "average skill in using mobile devices, higher "digital nativeness" scores… familiarity with open-ended design problems, and [a higher] comfort level in working in groups" had higher levels of SDL (Bartholomew et al. 2017:17). The relationship between student characteristics and SDL could support Dynan et al.'s (2008) findings, demonstrating that students may need to be grouped by readiness for SDL and taught accordingly in order to develop SDL skills. Teachers also "perceived self-directed learning to be a product of external conditions such as: the presence of an open-ended problem, a task involving group work, or other classroom-environmental factors" (Bartholomew et al. 2017:17).

Finally, among students with learning disabilities it has been found that the development of SDL skills taught them "to modify and regulate their own behavior," and helped them improve "their performance of target behaviors," which are behaviors that students themselves identified as related to the goals that they set (Agran, Blanchard, & Wehmeyer 2000:361). In addition, the students enjoyed SDL because they had more responsibility and were more involved in their own learning process (Agran et al. 2000: 361). Jimenez and Browder (2010) found in their sample of middle school students with learning disabilities that students were able to use "the self-directed strategy of following" a chart given to them by the researchers to guide

them through their science lessons with little instruction (p. 42). The students were also able to determine "what they knew and what they wanted to learn," and to learn "information about a new [untaught] concept" (Jimenez & Browder 2010:42-44). In general, they found that self-directed learning, in conjunction with the chart and "systematic instruction" to direct them, effectively helped these students with significant learning disabilities guide themselves "through new science content" (Jimenez & Browder 2010:44).

Instructional Method:

Research on self-directed learning has also approached SDL as an instructional method. Contrary to research that has studied SDL as a skill that is developed by students, research that has focused on SDL as an instructional method has produced fairly negative results concerning its effectiveness.

Research that found SDL to be an ineffective instructional method emphasized students' resistance and dislike of SDL instruction. Cox (2015) found that the graduate students in his courses were not comfortable with the level of freedom and flexibility they were given through SDL, and he found that "students need more direction and mistake the freedom given by the professor as a weakness, lack of engagement, lack of preparation, or lack of organization" (Cox 2016:20). Cox's findings support Garrison's (1997) model of SDL, which argues that the student should not learn completely independently, but with direction and support from the teacher in order to be effective. Francis and Flannigan's (2012) study also found that increased use of SDL as an instructional method was "associated with feelings of discouragement and dislike as well as disengagement with learning activities" among the college students in their study (p. 10).

In addition, Francis and Flannigan (2012) found that "SDL was not directly related to academic performance" (p. 10), and Basset, Martinez, and Martin (2014) found in a high school chemistry classroom that there were "significantly greater gains in knowledge of chemistry for the teacher-led instruction group" (p. 88), although teacher-led instruction and self-directed activity based learning (SDABL) (SDL combined with activity-based learning, or letting students choose activities according to their abilities and interests) both led to "significant gains in content knowledge" (p. 87). Students who participated in SDABL also reported that they preferred teacher-led instruction (Basset et al. 2014:88), which could have resulted from the teacher-researcher's "lack of training in facilitating a student-directed method of instruction," as well as the difficulty in "[o]vercoming students' tendencies to rely on the teacher for continuous step-by step guidance" (Basset et al. 2014:91). This again suggests the necessity of a combination of student independence and teacher support and direction, as well as the need for gradual implementation of SDL among students who are unfamiliar with it.

It is interesting that the research that examines SDL as a set of skills rather than as an instructional method has in general produced more positive results. These findings could suggest that there is significant student dependence on teachers for instruction, as well as the need for a more gradual implementation of SDL as an instructional method than the above studies employed. The findings of the studies reviewed also emphasize the need to cater to different students who may be more or less ready for SDL instruction, or the development of SDL skills, in order to allow each student to feel comfortable and develop at their own pace. The research on SDL, both SDL as a set of skills developed by students and as an instructional method that teaches those skills, has examined SDL from a variety of perspectives. However, one

perspective that I believe is missing is the relationship between SDL as an instructional method and teacher pedagogical beliefs. This gap is particularly significant in the research which examines how technology affects SDL, which has focused on SDL as a set of skills rather than an instructional method and has produced contradictory results.

Pedagogical Beliefs and Technology Integration

Over the past few decades, technology has had an increasing presence in classrooms all around the world, and many researchers have focused their attention on the issue of technology integration into classroom practices. As this research has developed, much of the focus has been placed on how teachers' pedagogical beliefs relate to the extent of technology integration in classrooms and its effectiveness. I define technology integration as that which actively involves students in using technology for the learning process, rather than the technology being used by the teacher to present material without engaging the students. I choose to define technology integration as such because technology use that does not involve students, although it may help the teacher instruct with more ease, does not teach or engage the students any differently than the same lesson would without technology.

Before defining pedagogical beliefs, it is important to understand the distinction between beliefs and knowledge and why it is necessary to study teachers' pedagogical beliefs, rather than their knowledge of different educational practices or tools. Beliefs differ from knowledge in the sense that once we gain "*knowledge* of a proposition" we can "accept it as being true or false," or, in the case of teachers, as "an effective tool for their classroom use" (Ertmer 2005:28). According to Pajares (1992), the most common distinction made between beliefs and knowledge is that a "belief is based on evaluation and judgment; knowledge is based on objective fact" (p.

313). Compared to knowledge, beliefs have a stronger effect on how educators teach. For example, teachers with teacher-centered beliefs "use an interactive whiteboard only to project content," while those with student-centered beliefs "use the board to support interactive student inquiry process," even when both types of teachers have "sufficient knowledge" about the whiteboard and the ways in which it can be used (Hall 2010 in Kim et al. 2013:76). According to Pajares (1992), the best way to conduct research and "inform educational practice" is to study teacher beliefs (p. 329), or their "attitudes about education—about schooling, teaching, and students" (p. 316).

Pedagogical beliefs are generally defined as teachers' "beliefs about teaching and learning" (Tondeur et al. 2016:557). Most researchers identify two different types of pedagogical beliefs that constitute two ends of a continuum. On one end there are teacher-centered pedagogical beliefs, in which "the teacher acts as an authority, supervising the process of learning acquisition and serving as the expert in a highly structured learning environment" (Tondeur et al. 2016:557). Teachers with teacher-centered beliefs "tend to emphasize the activities that [they use] to promote learning" (Kim et al. 2013:78). On the other end of the continuum are student-centered, or learner-centered, pedagogical beliefs, in which teachers "tend to emphasize individual student needs and interests" (Kerlinger and Kaya 1956; Mayer 2003 in Tondeur et al. 2016:557) and "the activities in which a student is engaged" (Kim et al. 2013:78). It is important to remember that educator pedagogical beliefs generally do not fall on one end of the continuum or the other, but instead reside somewhere in between a preference for "structured, directed learning environments [and] unstructured, open-ended learning environments" (Kim et al. 2013:78).

When integrating technology into their classroom practices, teachers tend to do so in ways that align with their pedagogical beliefs and practices (Tondeur et al. 2016). Ertmer et al. 2012 found that teachers in their "study viewed their own attitudes and beliefs as facilitating technology integration" (p. 433), and eleven of the twelve teachers "were able to enact practices that closely aligned with their beliefs" (p. 429). Teachers with more teacher-centered beliefs generally use technology to emphasize "skills acquisition," while those with more student-centered beliefs use technology "for the assignment of more open ended (higher-order) learning objectives" (Tondeur et al. 2016:564). Teachers with a more student-centered approach also tend to integrate technology more seamlessly, "meaning that the focus and emphasis [remain] on the learning rather than on the technology" (Kim et al. 2013:81). In some cases, teachers with more teacher-centered beliefs develop more student-centered beliefs after the integration of technology (Tondeur et al. 2016:561).

Ertmer et al. (2012) also found that "the attitudes and beliefs of others" were perceived by the teachers in their study "as constraining integration efforts" within their school (p. 434). Outside pressures can affect teachers' pedagogical beliefs as well, for example "time pressures and an examination-oriented society tend to lead to teacher-oriented approaches to technology" (Lin et al. 2012 in Tondeur et al. 2016:569). Interestingly, for one teacher in Ertmer et al.'s (2012) study, her "espoused beliefs appear[ed] more student-centered than enacted beliefs/practices," possibly because she was transitioning from teacher-centered to student centered beliefs and her practices had not fully made the transition yet, or because she had external (resource) constraints that limited her access and level of integration (p. 431).

Tondeur et al. (2016) posited that student-centered beliefs "could be perceived as enablers for technology integration" and that teachers with such beliefs were "more likely to adopt technology in student-centered ways" (p. 562). This has been supported by other studies, which found that "teachers with constructivist beliefs [or student-centered beliefs] tended to use technology to support student-centered learning curricula," while teachers with teacher-centered beliefs "used computers to support more teacher directed curricula" (Andrew 2007; Hermans, Tondeur, van Braak, & Valcke 2008 in Ertmer et al. 2012:424).

For some teachers with more teacher-centered beliefs, these beliefs can act as a "barrier to their educational uses of technology" because they believe that more traditional methods, such as a whiteboard, are sufficient for their "educational purposes," and that technology would not add anything essential (Tondeur et al. 2016:562). This belief may be well-founded considering the evidence that teachers with more teacher-centered beliefs tend to integrate technology in ways to support the transfer of knowledge or "learning objectives" from teacher to student, rather than to support more interactive learning on the part of the student (Tondeur et al. 2016:564). The importance of aligning beliefs and technology integration practices is demonstrated in Kopcha's (2012) study, which found that teachers' beliefs about the effectiveness of technology integration "grew stronger" when a mentor who was giving them professional training and support "introduc[ed] them to classroom practices that aligned with their beliefs and were effective with students" (p. 1116).

The strong connection between pedagogical beliefs and extent of technology integration, and the ways in which technology is integrated, could shed light on how pedagogical beliefs relate to self-directed learning. Research on the relationship between SDL and technology has

produced contradictory results, and part of the reason for this may lie in the lack of incorporation of pedagogical beliefs into the equation. While examining both the relationship between SDL and technology use and between SDL and pedagogical beliefs, it is important to understand that teachers with more student-centered beliefs integrate technology to support student-centered learning. This suggests that the relationship between pedagogical beliefs and SDL is stronger than that between technology use and SDL. Teachers with more teacher-centered beliefs who do not integrate technology to support student-learning will not only be less likely to implement SDL in general, but they will also be less likely to implement it in activities with technology because SDL is a type of student-centered learning technique. Therefore, technology in and of itself should have a weaker relationship with the implementation of SDL than with pedagogical beliefs, because the ways in which technology is integrated is dependent on pedagogical beliefs. Research that attempts to study the relationship between SDL and technology without factoring in pedagogical beliefs may be missing a factor that could have a significant impact on our understanding of who implements SDL in their classroom and why.

Critical Race Theory

An Overview:

Critical Race Theory (CRT) is a theoretical framework originally developed by legal researchers that "grounds racial problems in race-specific language in order to define and utilize ideologies free of the racial hierarchies that have defined much of U.S. history, politics, and educational systems" (Taylor 2006: 73). CRT originates from critical legal studies (CLS), "a leftist legal movement that challenged the traditional legal scholarship that focused on doctrinal

and policy analysis (Gordon 1990) in favor of a form of law that spoke to the specificity of individuals and groups in social and cultural contexts" (Ladson-Billings 2010:18).

Critical Race Theory has its beginnings in the 1970s among "lawyers, activists, and legal scholars," when original thinkers within the movement, such as Derrick Bell (the father of CRT), Alan Freedman, and Richard Delgado, realized "that new theories and strategies were needed to combat the subtler forms of racism that were gaining ground" (Delgado & Stefancic 2012:4). CRT has since been adopted by other disciplines outside of law, including education, political science, women's studies, ethnic studies, American studies, and sociology (Delgado & Stefancic 2012:6-7). CRT frames "racism as not the acts of individuals, but the larger, systemic, structural conventions and customs that uphold and sustain oppressive group relationships, status, income, and educational attainment" (Taylor 2006: 73). It is meant to give a voice to the oppressed or ignored group in order to give "a counterscript to mainstream accounts of their realities" (Tillman 2002 in Howard 2008:956).

A central component of CRT is the belief that "racism is ordinary… the usual way society does business, the common, everyday experience of most people of color in this country" (Delgado & Stefancic 2012:7). This integration of racism and white superiority into our society not only makes the experiences of non-whites fundamentally different from those of whites, but it also causes whites to be generally unaware of "the racial realities experienced by their non-White fellow citizens" because they are in the position of power and privilege (Taylor 2006: 74). When whites cannot or do not acknowledge racism in our society because of its ordinary nature, then racism becomes that much more difficult to address and solve (Delgado & Stefancic 2012:8). Solutions such as colorblindness, "or 'formal' concepts of equality… can thus remedy

only the most blatant forms of discrimination" (Delgado & Stefancic 2012:8) and serve to perpetuate more subtler forms that are ingrained in our everyday society.

Another aspect of CRT is the belief "that our system of white-over-color ascendancy serves important purposes, both psychic and material, for the dominant group" (Delgado & Stefancic 2012:67). In our society, racism serves to advance "the interests of both white elites (materially) and working-class Caucasians (psychically)," creating little incentive for members of those parts of society to combat racism (Delgado & Stefancic 2012:8). In order for there to be any advancement for the interests of people of color in the United States, "self-interests on the part of whites [and] the demands of people of color" must converge (Zamudio, Russell, Rios, and Bridgeman 2011:47), a phenomenon known as interest convergence or material determinism. In other words, people of color's self-interests and demands cannot be advanced if that advancement does not also serve whites in some way.

A third component is counterstorytelling, emerging from the practice of legal storytelling. Legal storytelling is based on the notion "that members of this country's dominant racial group cannot easily grasp what it is like to be nonwhite" (Delgado & Stefancic 2012:45) and that "[e]ngaging stories" can help them understand this reality better (Delgado & Stefancic 2012: 48). Counterstorytelling is a means "to make visible the distinctive experiences of people of color [and]… to expose and challenge social constructions of race" (Taylor 2006: 74-5). Some CRT theorists believe "that stories… have a valid destructive function," and that counterstorytelling can be used "to challenge, displace, or mock" mainstream narratives or beliefs that "marginalize others or conceal their humanity" (Delgado & Stefancic 2012:49).

Critical race theory uses revisionist history to reexamine "America's historical record" in order to align it with the experiences of minorities throughout history, while also offering "evidence, sometimes suppressed, in the very record, to support those new interpretations" (Delgado & Stefancic 2012:24). Further, CRT frames racism as something "permanent, with periods of seeming progress followed by periods of resistance and backlash as societal forces reassert majority dominance" (Taylor 2006: 305). It posits that our society does not have the vocabulary or the means to redress the less obvious forms of racism and the harm caused by them (Delgado & Stefancic 2012:31).

Proponents of CRT are also critical of liberalism because of liberals' belief "in color blindness and neutral principles of constitutional law" (Delgado & Stefancic 2012:26). As mentioned earlier, colorblindness can only solve the more obvious forms of racism in our society, while it can perpetuate others. In order to address the subtler, more ingrained forms of racism in our society, CRT believes that we must adopt "aggressive, color-conscious efforts" (Delgado & Stefancic 2012:27). In addition, CRT writers challenge the notion of "rights", believing that in our society "rights are almost always procedural (for example, to a fair process) rather than substantive (for example, to food, housing, or education)... are almost always cut back when they conflict with the interests of the powerful… [and] are… alienating" (Delgado & Stefancic 2012:26).

A final component of CRT is the looking inward at "minority communities and movements" and paying close attention to the roles of three main factors: intersectionality, essentialism and antiessentialism, and nationalism versus assimilation (Delgado & Stefancic 2012:57). Intersectionality is "the examination of race, sex, class, national origin, and sexual

orientation, and how their combination play out in various settings" (Delgado & Stefancic 2012:57). CRT posits that the framing of these subgroups "determine[s] who has power, voice, and representation and who does not" (Delgado & Stefancic 2012:61). Essentialism is comprised of the "search for the proper unit, or atom, of social analysis and change," for example for all minority races to unite under their identity as a minority race in order to combat racism (Delgado & Stefancic 2012:64). The issue with this line of thinking that antiessentialist thinkers raise, and that relates back to intersectionality, is that "certain minority groups, socioeconomic classes, and sexual orientations may end up better off and others worse" (Delgado & Stefancic 2012:64). The main idea around intersectionality and antiessentialism is that "[n]o person has a single, easily stated unitary identity" (Delgado & Stefancic 2012:10). Finally, an example of nationalism is Derrick Bell's urging of "African Americans to forswear the struggle for school integration, [or assimilation], and aim for building the best possible black schools" (Delgado & Stefancic 2012:67). Nationalism and assimilation fall on two ends of a continuum, and it is possible, and common, to fall somewhere in between.

There are three main groups of critical race scholars, defined by how they understand the function of racism: idealists, realists, and materialists (Delgado & Stefancic 2012). Idealists believe "that racism and discrimination are matters of thinking, mental categorization, attitude, and discourse," and can be combated by working to change these ways of thinking and talking about race (Delgado & Stefancic 2012:21). Realists, also known as economic determinists, believe "racism is more than a collection of unfavorable impressions of members of other groups… racism is a means by which society allocates privilege and status" (Delgado & Stefancic 2012:21) and is therefore much more difficult to address and change. Finally,

materialists believe that "the ebb and flow of racial progress and retrenchment" are dependent on historical conditions, and that as circumstances change "one group finds it possible to seize advantage or to exploit another… and then form appropriate collective attitudes to rationalize what was done" (Delgado & Stefancic 2012:22).

CRT in Education:

Critical Race Theory was introduced to education by scholars Gloria Ladson-Billings and William Tate (1995) (Andrews van Horne, Avery, & Mayo 2018: 32), and has since been studied by numerous researchers and applied to education in various ways. In relation to the achievement gap, CRT looks critically at the contexts within which different races learn and the experiences of non-whites relate to the gap. Many programs designed to close the achievement gap, such as the No Child Left Behind Act, are "based on the assumption that targeted schools can single-handedly undo centuries of racialized, institutionalized practices and habits to achieve equal academic achievement for minority ethnic groups without changing any of the other inequalities in students' lives" (Sunderman, Kim, & Orfield, 2005 in Taylor 2006: 79), while ignoring the advantages of the "dominant culture" (Taylor 2006: 79). By looking at the achievement gap through the experiences, or the narratives, of non-white students, CRT also exposes how "tracking and ability grouping" favor white students while they "[stigmatize] minority students," further creating a "stereotype threat," in which students "[b]elonging to a group whose intellectual powers are widely held to be inferior [are subject to] a situation of added stress that causes academic underperformance" (Taylor 2006: 80). Further, CRT "sees the official school curriculum as a culturally specific artifact designed to maintain a White supremacist master script" (Ladson-Billings 2010:24). The stories of minorities that "challenge

dominant culture authority and power" are ignored, and colorblindness in the curriculum "presumes a homogenized 'we' in a celebration of diversity" (Ladson-Billings 2010:25). Aside from "the distortions, omissions, and stereotypes of school curriculum content," CRT also considers "the rigor of the curriculum and access to what is deemed 'enriched' curriculum via gifted and talented courses and classes" in its analysis (Ladson-Billings 2010:25).

According to critical race theory, race neutrality or colorblindness, also poses a problem in that it "purports to see deficiency as an individual problem," while "current instructional strategies presume that African American students are deficient," blinding instructors and students to the role that racism plays in this phenomenon (Ladson-Billings 2010:25). Intelligence testing as well, according to CRT, is "a movement to legitimize African American student deficiency under the guise of scientific rationalism (Alienkoff 1991; Gould 1981 in Ladson-Billings 2010:26). Minority students tend to perform poorly "on traditional assessment measures" because poor curriculum and instruction coupled with external causes of stress, such as extra responsibility placed on them in home situations, does not prepare them well and the tests themselves do not measure the practical knowledge that these students have acquired in their lives (Ladson-Billings 2010:26).

Critical race theory also posits that "inequality in school funding is a function of institutional and structural racism" because public schools are almost always funded according to property taxes, so poorer, minority areas have underfunded schools, while richer, white areas have well funded schools (Ladson-Billings 2010:26-27). Segregation, desegregation, and resegregation in the United States have always been centered on white privilege and on the "perpetual fight regarding who is going to have access to the privileges society provides and to

what degree any other groups will have access" (Zamudio et al. 2011:50). Minority students also tend to have less access to advanced or gifted classes, either because their own school does not offer as many as schools serving high percentages of students categorized as white or, if they are in a school serving a majority of students categorized as white, then because they are not placed in those classes (Zamudio et al. 2011). In addition, the classes in which minority students tend to be placed, "classes where students need the most help and the most engaging curriculum and instruction[,] are assigned the least experienced teachers" (Zamudio et al. 2011:205). The students in these classes are also "exposed to a different knowledge set" than white students in advanced and gifted classes (Zamudio et al. 2011:108). The instruction in these types of classes differs as well, with the students in the advanced and gifted classes receiving instruction "that spurs active student engagement, student construction of knowledge, and critical thinking" (student-centered instruction), while "students in the general, vocational, or ESL classes are often exposed to pedagogies where students are expected to be passive, where knowledge is transmitted to individuals, and rote learning strategies are required" (teacher-centered instruction) (Zamudio et al. 2011:109). According to CRT, teacher expectations and perceptions "about who can and who cannot be successful with what kinds of curriculum and instruction" further perpetuate the gap between how white and minority students are taught (Zamudio et al. 2011:110).

Condron et al. (2013) examined the achievement gap using CRT by focusing on segregation within and between schools as a significant factor related to the gap. They identify how "[r]esidential and school segregation… concentrates advantages and disadvantages, thereby intensifying social inequalities and their consequences" (Condron et al. 2013: 131), because

"segregated schools tend to be unequally resourced" (Condron et al. 2013: 132). In addition, "school segregation concentrates the stratification of resources emanating outside of schools that students bring with them to school" (Condron et al. 2013: 132). Such resources, which stem from the "concentrated advantages [or]… disadvantages" that accompany being a white or non-white student can either advantage or disadvantage students who are exposed to them (Condron et al. 2013: 132). Condron et al.'s (2013) study found that when black and white students are more segregated from each other, in terms of the "racial composition" of their schools (p. 132), and when black students are isolated from white students and "exposed primarily" to other black students (p. 135), the achievement gap increases "in math and reading," while when black students are exposed to white students, the achievement gap is reduced (p. 149). When black students attend schools with a majority of white students, they are exposed to both the advantages that are provided for those schools, such as funding, as well as the advantages that the white students themselves bring from their more privileged communities.

Conclusion

The research on self-directed learning has approached it as both a set of skills that students develop and as an instructional method that teaches those skills. Researchers have viewed SDL most often as a set of skills that students develop, and within this approach there have been many different perspectives taken when studying its development, but the research on how technology use affects the development of SDL skills has been particularly inconclusive and contradictory. One approach to addressing the gaps in the literature on the relationship between SDL and technology use is to examine the relationship between pedagogical beliefs and SDL as an instructional method. Research has shown that pedagogical beliefs are inherently linked to

how educators integrate technology into their classrooms. When studying the relationship between SDL and technology use, researchers have examined technology as independent of pedagogical beliefs, which I believe has contributed to the current confusion. Because pedagogical beliefs are connected to technology integration practices, examining the relationship between pedagogical beliefs and SDL instruction could provide insight into some of the questions raised about how technology affects the implementation of SDL, and could show that pedagogical beliefs have a stronger relationship with SDL than technology has with SDL, providing the missing link between the two.

Finally, it is important to place research about educational practices into a larger critical race theoretical framework in order to understand whether or not this practice contributes to the differences in curriculum and instruction between white and minority students. By doing so with my research, I compared the levels of implementation of SDL as an instructional method that teaches SDL skills in schools serving mostly students categorized as white and schools serving mostly students categorized as black or Hispanic. I hypothesized that there will be greater levels of SDL instruction in schools serving a majority of students categorized as white compared to schools serving a majority of students categorized as black or Hispanic. I made this hypothesis using the critical race theory understanding of how curriculum and instruction differ according to classes/schools serving mostly white or mostly minority students. If the instruction of white students tends to be more student-centered, while that of minority students more teacher-centered because of teacher perceptions of students, then it follows that there will be greater implementation of SDL at schools serving high percentages of students categorized as white compared to schools serving higher percentages of students categorized as black or Hispanic. If

there are any differences in the implementation of SDL by school racial composition, they will raise further questions about equality of instruction that will have to be addressed in future research.

METHODOLOGY

To explore the relationship between teachers' implementation of SDL and their extent of technology integration and pedagogical beliefs, as well as whether the implementation of SDL differs based on the racial composition of the schools in which teachers work, this study used a multi-method approach that included a survey and interviews. In this section the sampling approach, survey design, statistical analyses, and interview protocol are described.

Sampling Approach

This study focused on beliefs and practices of public school teachers in Massachusetts who teach in grades 5-8. The sample of teachers who participated in the study was recruited via two methods. First, convenience sampling was used with personal contacts who worked at four different public schools in Massachusetts, two urban and two suburban. Snowball sampling was then used to reach out to other teachers who worked at the same schools as my contacts. After reaching out to these contacts, the Massachusetts Department of Elementary and Secondary Education School and District Profiles Database was used to obtain the emails of 324 principals, and then snowball sampling was used to reach out to teachers in their schools.

Of the four initial contacts, three responded saying that they were willing to forward an email about the study to teachers at their school. The contacts were then sent an email thanking them for their participation and inviting them to participate in the study if they were teachers

themselves, as well as an email to be forwarded to other teachers at their school. The email that was sent to teachers at the school explained the study and contained a link to the survey, as well as a brief description of what the survey would involve (Email in Appendix 1).

After reaching out to the contacts, the researcher obtained the emails of the principals of 324 middle schools or schools that had middle schools grades, for example K-8 schools, in Massachusetts. In this study, middle school grades included grades 5-8, but elementary schools that only went up to grade 5 were not included. The principals received a similar email to the one that was sent to the contacts after they agreed to participate. The email informed them of the study and asked if they would send the same email as above to the teachers of grades 5-8 in their school (Email in Appendix 1).

Survey Design

The email sent to teachers of grades 5-8 contained a link to a Qualtrics survey. The survey consisted of 18 multi-part questions (Survey in Appendix 2). The first question was an informed consent form, to which participants were asked to respond "yes" or "no". If they responded "yes," they were directed to the next question, and if they responded "no," they were directed to the end of the survey. The following section had six questions that asked about the respondent's age, gender identity, number of years teaching, subjects they teach, grades they teach, and at what school they teach. The remainder of the survey was designed to measure six different constructs:

1. Teachers' pedagogical beliefs: whether they are more student-centered or teacher-centered;

2. Teachers' beliefs about technology use: their beliefs about the effectiveness and the benefits of students using technology in the classroom;
3. Teachers' technology practices: how they have the students use technology in the classroom;
4. Teachers' self-directed learning practices: how often they implement self-directed learning in the classroom;
5. Teachers' self-directed learning practices with technology: how often they use technology in activities that implement self-directed learning; and
6. Teachers' self-directed learning practices without technology: how often they use self-directed learning in activities that do not incorporate technology.

To measure pedagogical beliefs, I borrowed nineteen items from Henry Jay Becker and Roger E. Anderson's Teaching, Learning, and Computing (TLC) Survey of 1998; some items were modified to not be leading questions. To measure beliefs about technology use I borrowed nine items from the USEiT study teacher survey; some items were modified to reflect the types of technology used in schools today. For technology practices, I borrowed fourteen items from the USEiT study teacher survey; some items were modified to reflect the types of technology used in schools today. For the seven items measuring SDL practices, four measuring SDL practices with technology, and four measuring SDL practices without technology, questions were created using the definitions of SDL found in the following studies: Knowles 1975 and Bolhuis 2003.

The final question of the survey asked respondents if they were willing to participate in a follow-up interview that would focus on their implementation of self-directed learning, and if

yes, to provide their name and email. Upon completion of the survey, respondents were redirected to a separate survey that asked them to provide their email address if they would like to be put in the running for one of three $25 Amazon gift cards. Respondents were informed of the gift card incentive in the email they received inviting them to participate in the survey.

One question in the demographics section of the survey, the question that asked at what school respondents teach, was added after the first six participants had responded. Of those six, three volunteered to participate in an interview, so their schools were determined from their email addresses, but the schools for the other three remained unknown.

Statistical Analyses

The following three hypotheses were tested using statistical analyses conducted using Stata:

1. Educators with student-centered pedagogical beliefs will implement self-directed learning to a greater degree than those with teacher-centered beliefs.
2. Pedagogical beliefs have a stronger relationship with the implementation of self-directed learning in classroom practices than technology has with its implementation.
3. Educators who teach at schools serving a larger percentage of students categorized as black or Hispanic will implement self-directed learning less than those at schools serving a larger percentage of students categorized as white.

Six types of statistical analyses were conducted to test the hypotheses. First, descriptive analyses were performed to understand the characteristics of the respondents. Next, factor analyses were run to create six scales that measure pedagogical belies, beliefs about technology

use, technology practices, SDL practices, SDL practices with technology, and SDL practices without technology. Correlation analyses were then performed to examine the relationships between the six variables, and regression analyses were conducted to examine the join effect of pedagogical beliefs, beliefs about technology use, and technology practices on self-directed learning practices. Finally, t-tests were performed to examine the differences in each variable between teachers at schools serving a high percentage of students categorized as black or Hispanic, and those at schools serving a high percentage of students categorized as white.

Interview Protocol

The interview questions were created to further explore participants' understanding self-directed learning and their beliefs about its effectiveness and benefits, as well as to provide some more specific examples of when and how they implement SDL (Interview Questions in Appendix 2). All interview participants were asked the same first two questions about their familiarity with and understanding of SDL, and then the subsequent questions were split into six questions for participants who had high levels of implementation of SDL, and five for participants who had low levels. To avoid asking them similar questions in the interview to those in the survey, participants' responses to the survey were used to document their level of implementation of SDL and categorize them accordingly.

The intended goal for the interviews was to have eight total participants, four from schools serving a majority of students categorized as black or Hispanic, two with low levels of SDL implementation and two with high, and four from schools serving a majority of students categorized as white, two with high levels of SDL and two with low. This design intended to

support comparisons not only across levels of implementation of SDL, but also across the racial composition of the school.

FINDINGS

To explore the relationship between teachers' implementation of SDL and their extent of technology integration and pedagogical beliefs, as well as whether the implementation of SDL differs based on the racial composition of the schools in which teachers work, descriptive analyses, factor analyses, correlation analyses, regression analyses, and t-tests were conducted using Stata. Interviews were also employed to explore the results further. Specifically, the following three hypotheses were tested:

1. Educators with student-centered pedagogical beliefs will implement self-directed learning to a greater degree than those with teacher-centered beliefs.
2. Pedagogical beliefs have a stronger relationship with the implementation of self-directed learning in classroom practices than technology has with its implementation.
3. Educators who teach at schools serving a larger percentage of students categorized as black or Hispanic will implement self-directed learning less than those at schools serving a larger percentage of students categorized as white.

The findings from the five statistical analyses and interviews are presented below.

Descriptive Analyses

The sample consists of teachers from Massachusetts public schools who teach grades 5-8. Originally, 75 teachers responded to the online survey, of which 27 did not complete the survey and were not included in the analyses. Responses were considered incomplete if the last

question of the survey, question 19, was left unanswered. The remaining 48 respondents were included in the analyses, although not all respondents of those 48 answered every question in the survey. Table 1 presents the demographics for those 48 participants.

Table 1: Participant Demographics

Age	**20-30** 7 (14.6%)	**31-40** 12 (35%)	**41-50** 15 (31.3%)	**51-60** 7 (14.6%)	**61 or older** 7 (14.6%)						
Gender	**Male** 8(16.7%)	**Female** 40 (83.3%)									
Yrs Teaching	**< 1** 1 (2.1%)	**1-2** 3 (6.3%)	**3-5** 5 (10.4%)	**6-10** 8 (16.7%)	**11-15** 9 (18.8%)	**> 15** 22 (45.8%)					
Subject*	**ELA** 11 (22.9%)	**Math** 13 (27.1%)	**Science** 6 (12.5%)	**History/ Social Sciences** 11 (22.9%)	**ELL** 1 (2.1%)	**Learning Specialist** 1 (2.1%)	**Library Media Research** 1 (2.1%)	**PE** 1 (2.1%)	**Spanish** 1 (2.1%)	**Special Ed** 8 (16.7%)	**Tech Engineering** 1 (2.1%)
Grade*	**5th** 3 (6.3%)	**6th** 20 (41.7%)	**7th** 28 (58.3%)	**8th** 22 (45.8%)							

*Within the sample, many respondents teach more than one subject and more than one grade, so the above statistics will not equal 100%

Table 2 shows the schools at which the respondents work and how many respondents are from each school, as well as the percentage of students categorized as black, Hispanic, and white at each school. Note that the number of participants does not add to 48. The first six respondents were not shown the question asking the name of the school at which they teach, but of those six, three provided their email to participate in an interview and their school could be determined from their email addresses. Further, not all respondents who were shown the question chose to answer it.

Table 2 indicates that most of the schools in this study served high percentages of students categorized as white and low percentages of students categorized as black or Hispanic. In fact, only 4 schools served more than 15% students categorized as black or Hispanic, and the largest percentage of students categorized as black or Hispanic was only 23.5%. Also of note is the variation in the number of teachers surveyed within schools; in most schools, only 1 or 2 teachers were surveyed, but a few schools contained 5 or 6 surveyed teachers.

Table 2: School Demographics

School	A	B	C	D	E	F	G	H
# of Respondents	2 (4.2%)	1 (2.1%)	1 (2.1%)	4 (8.3%)	1 (2.1%)	6 (12.5%)	1 (2.1%)	2 (4.2%)
% Black	3.4%	1.1%	9.7%	2.6%	0.8%	1.4%	2.1%	4.3%
% Hispanic	12%	6.6%	9.1%	1.9%	4.8%	2%	4.1%	6%
% White	77.6%	88.4%	75.3%	93.5%	88.8%	88.9%	81%	81.1%

Table 2: School Demographics cont.

School	I	J	K	L	M	N	O	P	Q
# of Respondents	3 (6.3%)	2 (4.2%)	1 (2.1%)	4 (8.3%)	2 (4.2%)	5 (10.4%)	1 (2.1%)	4 (8.3%)	5 (10.4%)
% Black	3.4%	1.2%	3.1%	2.3%	5.8%	1.3%	1.7%	3.7%	6.8%
% Hispanic	10.6%	11.7%	3.8%	9.3%	10.8%	5%	2.2%	19.8%	5%
% White	75.8%	79.7%	84.6%	85.2%	71.3%	91.1%	90.3%	66.3%	65.6%

Factor Analyses and Scale Development

The survey was designed to collect information about six constructs: pedagogical beliefs, beliefs about technology use, technology practices, SDL practices, SDL practices with technology, and SDL practices without technology. For each construct, between four and nineteen items were administered. Responses to each item were then aggregated to create a scale for each construct. Prior to creating the scales, the following items were reversed coded: questions 8-1, 8-2, 8-3, and 8-4; questions 9-7, and 9-8; questions 10-1, 10-2, 10-3, 10-4, and 10-5; and questions 26-3, 26-4, 26-6, and 26-7.

Factor analyses were performed on items associated with each construct to identify those that were most strongly related, and therefore formed the strongest scale for the construct. Table 3 shows which items formed each scale and which items were excluded from the scales. Table 4 displays the mean, standard deviation, minimum value, and maximum value for each scale. Each scale was then converted into a z-score in order to be in the same, standardized units so that their relationships could later be compared directly using regression analyses.

Table 3: Items Included and Excluded for Each Scale

Scale	Items in Scale	Items Not Included
Teachers' pedagogical beliefs	Survey questions 8 (1-4), 9 (1-10), 10 (1-5)	Survey questions 11 (1-8), 12 (1-6)
Teachers' beliefs about technology use	Survey question 26 (2-10)	Survey question 26-1
Teachers' technology practices	Survey questions 18-1, 18-2, 18-4, 18-5, 18-6, 18-8, 18-9, 19 (1-7)	Survey questions 18-11, 18-12
Teachers' SDL practices	Survey question 14 (1-7)	
Teachers' SDL practices without technology	Survey questions 17-2, 17-4, 17-6, 17-8	Survey questions 17-1, 17-3, 17-5, 17-7
Teachers' SDL practices with technology	Survey questions 18-3, 18-7, 18-10, 18-13	

Table 4: Descriptives of Each Scale

Scale	Mean	Standard Deviation	Min	Max
Teachers' pedagogical beliefs	49.87	13.04	21	78
Teachers' beliefs about technology use	35.83	7.44	21	54
Teachers' technology practices	34.61	11.13	13	61
Teachers' SDL practices	21.61	5.59	7	32
Teachers' SDL practices without technology	12.40	3.77	4	20
Teachers' SDL practices with technology	11.96	4.38	4	20

Correlation Analyses

Correlation analyses were performed on all six variables to explore the relationships among them. The results of these correlations are presented in Table 5. Teachers' SDL practices

have a moderate, negative correlation with their pedagogical beliefs, while they have weak, positive correlations with SDL use both with and without technology. Pedagogical beliefs have a moderate, negative correlation with technology beliefs, and a weak, negative correlation with SDL with technology. Teachers' beliefs about technology and their use of SDL with technology have a moderate, positive correlation. Teachers' technology practices and their use of SDL with technology have a strong, positive correlation, while their technology practices and use of SDL without technology have a weak, negative correlation. Finally, Teachers' use of SDL with technology and their use of SDL without technology have a moderate, negative correlation.

Table 5: Correlations Across All Six Variables

	SDL Practices	**Ped. Beliefs**	**Technology Beliefs**	**Technology Practices**	**SDL with Technology**	**SDL without Technology**
SDL Practices	1.00					
Pedagogical Beliefs	-0.40***	1.00				
Technology Beliefs	0.12	-0.44***	1.00			
Technology Practices	0.21	-0.13	0.11	1.00		
SDL with Technology	0.31**	-0.27**	0.40**	0.63***	1.00	
SDL without Technology	0.28*	0.16	-0.20	-0.32**	-0.42***	1.00

*p < 0.1, **p < 0.05, ***p < 0.01

Correlations were also calculated to examine the relationships between the six scales described above and the percentage of students categorized as black or Hispanic at a school. Table 6 shows these correlations, none of which are strong or statistically significant.

Table 6: Correlations Across Six Scales and %Black or Hispanic

	% Black/ Hispanic	**Ped. Beliefs**	**Tech Beliefs**	**Tech Practices**	**SDL Practices**	**SDL without Tech**	**SDL with Tech**
% Black/ Hispanic	1.00	-0.17	0.05	-0.10	0.17	0.17	-0.05

*p < 0.1, **p < 0.05, ***p < 0.01

Regression Analyses

To examine the joint effect of pedagogical beliefs, beliefs about technology use, and technology practices on self-directed learning practices, regression analyses were performed. To test the hypothesis that pedagogical beliefs have a stronger relationship with the implementation of self-directed learning in classroom practices than technology has with its implementation, the first relationship examined was pedagogical beliefs and SDL practices, presented in Table 7. The model was then expanded to include technology practices (Table 8). Given that technology practices and beliefs about technology were not correlated, all three variables were then included (Table 9). Across these three variables, the coefficient for pedagogical beliefs indicates that pedagogical beliefs is a statistically significant predictor of SDL practices ($p < 0.05$), while the other two variables are not.

Table 7: Regression Model for Pedagogical Beliefs Predicting SDL Practices

SDL Practices	Coeff.	Std. Err.	t	P > |t|	[95% Conf. Interval]
Ped. Beliefs	-0.42	0.14	-2.90	0.01	-0.71 -0.13
_cons	0.01	0.14	0.07	0.95	-0.285 0.30

R-squared = 0.1706, df = 42

Table 8: Regression Model for Ped. Beliefs and Tech. Practices Predicting SDL Practices

SDL Practices	Coeff.	Std. Err.	t	P > |t|	[95% Conf. Interval]
Ped Beliefs	-0.38	0.14	-2.76	0.01	-0.66 -0.10
Tech Practices	0.12	0.14	0.90	0.37	-0.15 0 .40
_cons	0.06	0.14	0.43	0.67	-0.22 0.33

R-squared = 0.0432, df = 38

Table 9: Regression Model for Ped. Beliefs, Tech. Practices, and Tech. Beliefs Predicting SDL Practices

SDL Practices	Coeff.	Std. Err.	t	P > |t|	[95% Conf. Interval]
Ped. Beliefs	-0.39	0.16	-2.34	0.03	-0.72 -0.05
Tech Beliefs	-0.07	0.16	-0.45	0.66	-0.39 0.25
Tech Practices	0.15	0.15	0.99	0.33	-0.15 0.45
_cons	0.09	0.15	0.57	0.57	-0.22 0.39

R-squared = 0.1907, df = 35

T-Tests

The third hypothesis examined whether educators who teach at schools serving a larger percentage of students categorized as black or Hispanic implemented self-directed learning less than those at schools serving a larger percentage of students categorized as white. To test this hypothesis a dichotomous variable was created based on the percentage of students categorized

as black or Hispanic to classify schools as lower or higher minority. Because there were very few schools in the sample serving a high percentage of students categorized as black or Hispanic, and none serving a majority of students categorized as black or Hispanic, the division in the variable was arbitrarily drawn at the mean. Schools with less than 10% of its student population categorized as black or Hispanic were assigned a 0, and schools with more than 10% were assigned a 1. While the resulting categories are not representative of the wide diversity of schools across the state of Massachusetts or the nation, this categorization was deemed the most viable approach for comparing schools within the study serving very low percentages of students categorized as black or Hispanic with those serving higher percentages of students categorized as black or Hispanic.

T-tests were then performed for each of the six scales in order to examine the differences between teachers at schools serving a higher percentage of students categorized as black or Hispanic, and those at schools serving a lower percentage. Table 10 presents the results of these t-tests. There is no relationship between any of the scales and the dichotomous variable except for that with pedagogical beliefs, in which teachers at schools serving more students categorized as black or Hispanic have slightly more student-centered beliefs ($p < 0.1$). Note that the significance levels were not adjusted for multiple comparisons.

Table 10: T-tests between Each Scale and %Black or Hispanic

	< 10% Black & Hispanic	N	Mean	Std. Error	> 10% Black & Hispanic	N	Mean	Std. Error	T-Value
Ped. Beliefs		21	53.33	2.87		24	46.83	2.54	1.70*
Tech. Beliefs		23	34.87	1.68		19	37.00	1.53	-0.92
Tech. Practices		23	33.48	2.34		23	35.74	2.33	-0.68
SDL Practices		22	21.41	0.91		24	21.79	1.36	-0.23
SDL w/ Tech		23	11.96	0.97		24	11.96	0.86	-0.00
SDL w/o Tech		23	12.30	0.83		24	12.50	0.74	-0.18

*p < 0.1, **p < 0.05, ***p < 0.01

Interviews

Six participants were interviewed in order to explore further the participants' understanding of SDL, their reasons for implementing it or not implementing it, and how exactly they implement SDL in their classrooms. Of the six participants, two were from schools with less than ten percent of its students categorized as black or Hispanic, and four were from schools with more than ten percent. Two of the participants had low levels of SDL implementation in their classroom, and four had high levels. An overview of the findings from each interview is presented below.

Low Levels of SDL - Participant 2:

Participant 2 is a 41 to 50 year old woman who has been teaching for more than fifteen years. She teaches eighth grade history/social science at School F, and does not implement SDL often in her classroom. She was somewhat familiar with the term "self-directed learning." She defined it as the students deciding on a subject, with collaboration with each other on determining learning goals, and then proposing their ideas to the teacher for feedback. She said that she does not fully implement SDL in her classrooms, but sometimes within an activity she will allow the students to be more self-directed when applicable.

One of the main obstacles to her implementation of SDL is the fact that she teaches 8th grade. According to her, eighth grade students are very dependent on the teacher to give them step-by-step instructions, and her classroom is even "more structured" than she would like. For example, when she asks her students to write a paragraph about something, they will refuse to write anything until she tells them exactly how many sentences are in a paragraph. She also felt there is an issue regarding content; she has "a certain amount of content that needs to be covered" in a certain amount of time. Because her students do not have any background knowledge on the topics covered, they would have no starting point for more self-directed learning. Participant 2 said that if her lessons were "more skills-based," or if students already had background knowledge on the content, then there would be "more opportunities for SDL in her classroom." According to her, SDL works best for students who are talented and motivated to learn. These students can master content faster than the other students, and can then explore other topics that interest them. She gave an example of one of her past students who loved horses and chose to write a research paper about medieval Japan that focused on horses during

that era. Participant 2 said that this girl was a very bright student who was able to take the initiative to explore topics that interested her in a more self-directed way, while the other students needed more teacher-led instruction.

Low Levels of SDL - Participant 4:

Participant 4 is a 51 to 60 year old woman who has been teaching for more than fifteen years. She teaches English Language Arts and history/social science to sixth graders at School J and has low implementations of SDL in her classroom. She was fairly familiar with the term "self-directed learning," and understood it as giving the students a task and a goal. The teacher would also give the students some sort of structure of how to achieve the task and goal, and then "let them get there on their own."

Participant 4 said that she uses SDL to a small extent in her classroom, but not often. To her, one of the biggest obstacles to implementing SDL in her classroom is the "demographics of the town" the school is in. Many of the students in her classroom were raised by single parents or grandparents, exposed to domestic violence, and have behavioral problems. Further, she said that her students are "not motivated to learn" and have no interest in education. She believed that if the school had enough funding for classroom aids to help her students with behavioral problems, then she might be able to implement SDL more. When she has tried implementing SDL it has failed "9 times out of 10" because of the students' lack of motivation. She said that when they are left to their own devices, the classroom is not productive at all. For some classrooms and students, Participant 4 did believe SDL can be effective. For example, she said that it is implemented in some of the 5th grade classrooms in her school, and that its effectiveness in those classrooms depends on the classroom dynamic and how well the students

can work together. She said that SDL works best for students who are "mature, responsible, value education, and have an intrinsic drive to learn something new." She stated that for the majority of her students, school is "just survival," and they are not taught an "intrinsic value of wanting to learn" at home.

High Levels of SDL - Participant 1:

Participant 1 is a 20 to 30 year old male who has been teaching for 3 to 5 years. He teaches history/social science to seventh and eighth graders at School A, and has very high levels of implementation of SDL in his classroom. He said that he is not that familiar with the term "self-directed learning," but defined it as "giving power to the students to direct their own avenues of exploration of a topic."

Participant 1 implements SDL in his classroom most often for research projects, where students are given a focus question and expected to sort through materials which are either given to them by him, or that they find online. They then must put an essay together that answers the question and find and use evidence to support their argument. He believed that SDL is needed and beneficial in classrooms because middle school students have become extremely dependent on teachers and lack "the drive to want to explore" new things or "leave their comfort zone." He said that "they expect answers to be given to them and that material is often guided toward them even though" they do not need it to be. They are "not used to being told that something is wrong or incomplete, or that they need to work harder," and SDL gives them this push to work harder and become more independent. It also "provides an outlet that allows students with greater abilities to explore what they can accomplish." His school does not have a lot of access to technology, so he does not integrate it into his lessons with SDL that often, but when his

classroom does have access to technology he makes using it a requirement, mostly to conduct research online. According to Participant 1, SDL is a very important life skill that "provides opportunities for students to [fail] and learn why they [failed]." They learn to not expect the teacher to tell them all the answers and they "develop more independence."

High Levels of SDL - Participant 3

Participant 3 is a 51 to 60 year old man who has been teaching for 11 to 15 years. He teaches eighth grade mathematics at School F, and has high levels of implementation of SDL in his classroom. He was familiar with the term "self-directed learning," and defined it as students taking "ownership of their own learning", encouraging them to struggle, and encouraging critical analysis and learning from their mistakes.

One way that he implements self-directed learning in his classroom is through homework. He gives his students the answers to their homework assignments, but not the solutions so that they can check their own work and make corrections without assistance. He said that it is fine for the students to ask him questions, but they are expected to fail and learn from those failures as independently as possible. During class he will give some direct instruction for a unit, and then the students will work through higher level questions on their own. The students also analyze their own tests, learn from their mistakes, and relearn the material that they had trouble with. For students who struggle more, he will give them slightly more direct instruction through challenging questions, but then they are expected to work through other, similar problems on their own. He said it is important to balance how self-directed the instruction is based on the student's needs. To Participant 3, SDL is beneficial because students take ownership of their own learning, and when they learn something on their

own it "sticks with them more" than if it was just told to them. He also said that many of his students enjoy the challenge and hard work that accompanies SDL, which he learned through student teacher evaluations.

Participant 3 does use a lot of technology in his activities that implement SDL. The most common and simplest form he will use is online videos, such as on Khan Academy or YouTube. He will post these videos on Google Classroom and encourages students to learn as much as they can online before coming to him for help, so that they become more self-sufficient. According to him, technology works well with SDL because it allows students to learn at their own pace, and they have many more resources and tools for learning, such as text, video, sketch pads, etc., that accommodate different learning styles. The main problems with technology are that "immature students can get distracted easily," and that it also allows "more room for cheating." Also, technology can be problematic for homework because he does not know if everyone in his classroom has access to a computer or the internet at home.

Finally, Participant 3 believed that SDL is a very important life skill because it teaches students how to learn. They learn the ability to answer their own questions using the internet or other resources, and most importantly they learn how to tell if something is credible. He did stress, though, that the best way to implement SDL in a classroom is as "a hybrid" with some direct instruction that gets students "to dig deep for their intrinsic motivation" to learn. Very few students are ready for entirely self-directed learning, but some implementation of SDL teaches students to work hard and push themselves to answer their own questions.

High Levels of SDL - Participant 5

Participant 5 is a 31 to 40 year old woman who has been teaching for 6 to 10 years. She teaches English Language Arts and history/social sciences to sixth graders at School M, and she has high levels of implementation of SDL in her classroom. She was fairly familiar with the term "self-directed learning," and defined it as students "taking ownership of their own learning," particularly in "research and project based learning activities."

She implements SDL most often in her social studies class. In that class a lot of the content is centered around learning about a region, so the students choose their regions and become experts on their region through independent research. She said that she does not have as much flexibility in ELA because of the curriculum, but she does use activities, such as writing activities, that will have different options for the students to choose from, although she still creates the options. According to Participant 5, SDL is beneficial for students because "when they have a choice" about what they are learning "they are more invested in their learning." She also believed that students understand concepts better through SDL than through more teacher led instruction. For example, she has students of "varied learning abilities" in her classroom, and SDL allows those students to learn at their own pace and comprehend the material better.

Participant 5 uses technology a lot in her classroom, especially in activities that implement SDL. She has her students use Chromebooks most often for conducting research or creating different projects. The internet allows her students to do more in-depth research on their chosen topic, and allows them to pace their own learning as well. The technology also better enhances and supports the understanding of her students with learning disabilities. To her, the main problems with allowing students to be more self-directed with technology are the number

of websites with incorrect information, and finding the balance between technology as a tool to enhance their learning, and just letting them use technology for whatever they want.

Finally, Participant 5 believed that SDL is a very important life skill because students need to be able to continue to learn new things even after they have completed their education. "It teaches them life skills to find solutions and critically think about problems that they might face in the real world," and to not just ask others to give them the answers.

High Levels of SDL - Participant 6

Participant 6 is a 51 to 60 year old woman who has been teaching for more than fifteen years. She teaches English Language Arts and mathematics to sixth graders at school C, and has high levels of implementation of SDL in her classroom. She was fairly familiar with the term "self-directed learning," and defined it as the students working "independently or cooperatively in groups" after the content has been taught to them.

Participant 6 described her implementation of SDL similarly to her definition of it. She said that first she teaches students the content, and then they work independently or in groups. She also gives her students "a pre-assessment to see what the they know or if they know anything at all." This allows her to see which students can figure out the material on their own, and which have no answers, so that she can pace them appropriately. She emphasized that sometimes the students cannot handle the independent or group work because they have too much difficulty with the content, and sometimes parents also complain about the classroom structure. She said that it is important to gauge the level of the students before deciding how to implement SDL. According to Participant 6, SDL is beneficial to students because they "have

more ownership of what they are learning." They are answering their questions on their own, and therefore "they feel more successful" and more confident.

Participant 6 uses technology in activities that implement SDL when she can, but she has very limited access to it. When she does have access, she uses online programs like Khan Academy and Google Classroom that allow the students to share their work and learn more independently. Technology gives them more resources to explore their questions on their own, and teaches them to be more motivated and independent and not to expect answers to be given to them. The main problem with using technology, aside from the lack of availability and reliability of the school servers, is that many students do not have access to computers or the internet at home, so she cannot assign homework that involves technology.

Finally, Participant 6 believed that SDL is an important life skill because it "makes students more independent and prepares them for college," where there are more self-directed lessons, and for the workforce, where "everything is self-directed." It gives them the motivation and "confidence in themselves" to learn new things on their own.

DISCUSSION

The purpose of this study was to explore whether and how teachers' implementation of SDL differs by their extent of technology integration and pedagogical beliefs, as well as whether difference in the implementation of SDL is associated with differences in the racial composition of the schools in which teachers work. This section discusses key findings from the analyses of the surveys and interviews. The significance of the findings, the limitations of the study, and implications for future research are then discussed.

Survey Findings

Correlation analyses, regression analyses, and t-tests were performed on the six scales measuring teachers' pedagogical beliefs, beliefs about technology use, technology practices, SDL practices, SDL practices with technology, and SDL practices without technology, as well as the dichotomous variable classifying schools based on the percentage of students categorized as black or Hispanic. The analyses were performed to test the following three hypotheses.

1. Educators with student-centered pedagogical beliefs will implement self-directed learning to a greater degree than those with teacher-centered beliefs.
2. Pedagogical beliefs have a stronger relationship with the implementation of self-directed learning in classroom practices than technology has with its implementation.
3. Educators who teach at schools serving a larger percentage of students categorized as black or Hispanic will implement self-directed learning more than those at schools serving a larger percentage of students categorized as white.

The findings from the statistical analyses are discussed below.

As expected, the correlations among the six scales indicate that teachers with high levels of SDL implementation in their classrooms also had higher levels of SDL implementation both with and without technology than those with low levels. These correlations, although weak, are intuitive because SDL implementation both with and without technology is a subsection of general SDL implementation. Further, the findings revealed that SDL practices had a moderate, negative correlation with pedagogical beliefs, meaning that teachers who reported implementing SDL at higher levels also had moderately more student-centered pedagogical beliefs than those with lower levels. This supports the first hypothesis that teachers with student-centered

pedagogical beliefs will implement self-directed learning to a greater degree than those with teacher-centered beliefs.

Teachers with more student-centered pedagogical beliefs had moderately more positive beliefs about student technology use in the classroom than those with more teacher-centered beliefs, and they also had slightly higher levels of implementation of SDL with technology. Unsurprisingly, teachers who had more positive beliefs about student technology use implemented SDL with technology to a moderately higher degree than those with more negative beliefs. Teachers who integrated technology to a higher degree in their classroom also had higher levels of implementation of SDL with technology, while those who integrated technology less implemented SDL without technology slightly more. Finally, teachers who had higher levels of SDL implementation with technology had moderately lower levels of SDL implementation without technology, which is also an intuitive relationship.

Regression analyses were performed in order to examine the joint effect of pedagogical beliefs, beliefs about technology use, and technology practices on self-directed learning practices. Three models were developed, each with SDL practices as the dependent variable. For the first model, pedagogical beliefs was the only independent variable. For the second model, technology practices was added as an independent variable, and finally beliefs about technology use was added in the third model. Across all three regression models teachers' pedagogical beliefs predicted their SDL practices, with more student-centered beliefs moderately predicting higher levels of SDL implementation. Neither teachers' technology practices nor their beliefs about technology significantly predicted SDL practices. This supports the second

hypothesis that pedagogical beliefs have a stronger relationship with the implementation of self-directed learning in classrooms than technology has with SDL implementation.

Finally, t-tests were performed between the dichotomous racial composition variable and each of the six scales in order to examine whether there were differences between teachers at schools serving a higher percentage of students categorized as black or Hispanic, and those at schools serving a lower percentage. These t-tests revealed no relationship between the dichotomous variable and any of the six scales, with the exception of pedagogical beliefs. Teachers at schools serving more students categorized as black or Hispanic had slightly more student-centered beliefs, which would suggest that, based on the first hypothesis that teachers with student-centered pedagogical beliefs will implement self-directed learning to a greater degree than those with teacher-centered beliefs, they would have higher levels of SDL. These findings do not support the third hypothesis, that educators who teach at schools serving a larger percentage of students categorized as black or Hispanic will implement self-directed learning less than those at schools serving a larger percentage of students categorized as white, and suggest that there is no significant relationship.

Interview Findings

The initial goal for the interviews was to have four participants who worked at schools serving a majority of students categorized as black or Hispanic, and four who worked at schools serving a majority of students categorized as white. Two teachers from each type of school were to have high levels of SDL implementation and two were to have low levels. Because of restrictions caused by the size and composition of the sample, six respondents were actually interviewed. Of those six, two were from schools serving less than ten percent of students

categorized as black or Hispanic, one with high levels of SDL implementation and one with low, and four were from schools serving more than ten percent, one with low levels of implementation and three with high.

SDL is defined as learners identifying their own learning goals and the materials needed to attain those goals, and then achieving those goals with minimal assistance from an instructor. In general, the interview participants' conceptions of SDL were similar to this definition. The two respondents with low levels of implementation of SDL emphasized structure and teacher assistance more in their definitions of SDL, while the other participants who had high levels of implementation, with the exception of Participant 6, emphasized students taking ownership of their learning to achieve goals often set by the teacher, rather than the student, with as little assistance as possible. The definitions given by teachers who had high levels of implementation of SDL in their classrooms most closely matched the actual definition of SDL, with the exception that they did not mention the students identifying their own learning goals, but rather achieving learning goals provided by the teacher as independently as possible.

The two participants with low levels of implementation of SDL both emphasized that they do not use a lot of SDL in their classroom because of their students. The described their students as unmotivated to learn or very dependent on the teacher for learning. They understood SDL as most effective for talented students who have an intrinsic motivation and desire to learn, something that most of their students do not have. Participant 2 also emphasized the fact that her class is content based, rather than skills based, as a restrictive factor to the implementation of SDL. Participant 4 discussed her students' familial backgrounds and home lives as factors that have led to their behavioral problems and lack of motivation in the classroom. She emphasized

that she might be able to implement more SDL in her classroom if she had teacher aids to help her students with behavior problems, but currently the students are not productive when left on their own.

The four participants with high levels of SDL implementation used it most often with research projects, homework assignments, and for group and individual work. They said that the benefits to implementing SDL were the fact that it allows students to self-pace, especially with technology, that students understand what they are learning better than they would with direct instruction because they worked through the material themselves, that they take ownership of their own learning and become less dependent on the teacher, and that they work harder and develop an intrinsic drive to learn. Two participants also emphasized the need to tailor the amount of SDL employed to each student, because not all students are ready for the same amount of SDL or understand the concept being taught well enough for it.

When using technology in activities that implement SDL, the participants stressed using it for research and to provide more resources that help students master content independently. The most common online resources mentioned were Khan Academy, YouTube, and Google Classroom. They emphasized that technology allows students to be even more self-paced, become more independent and self-sufficient in their learning, and become more motivated to learn. Some of the challenges to using technology were that students can be easily distracted while using it, are more likely to cheat, and, when doing research, cannot yet distinguish between good and bad sources. Two participants also mentioned that they cannot assign homework that uses technology to support SDL, or any other kind of learning, because many of their students do not have access to computers or the internet at home. Finally, two participants said that they do

not have much access to technology at their schools, but when they do they implement it as described above.

All four participants with high levels of implementation of SDL strongly agreed that SDL is an important life skill that students should learn. They believe that it teaches students the skills for lifelong learning and gives them the motivation to learn that they will need throughout their lives. They learn how to think critically, solve problems on their own, and learn from their mistakes without being afraid to fail.

All of the teachers interviewed who implement SDL often in their classroom viewed it as an instructional method that involves educators employing SDL in the classroom so that students may have more independence in their study of a topic, learn content, and naturally develop SDL skills. The two teachers who had low levels of SDL implementation, on the other hand, viewed SDL as a set of skills to which some students are more predisposed compared to others. The four participants who had high levels of SDL implementation actively used SDL as an instructional method because they believed that their students learn material better through it, as well as develop self-directed, lifelong learning skills. The two participants with low levels of SDL implementation viewed SDL as a set of skills that only certain, exceptional students are able to develop, and did not understand it as an instructional method that can help students better understand content. The belief that only more talented or motivated students can develop SDL skills is consistent with the findings of Brockett and Hiemstra 1991, Oddi 1986, and Lounsbury et al. 2009, in which the authors argue that SDL is a personality or character trait found in some students, but not all. The belief held by Participant 4 that more structure or support in the classroom, such as from teacher aids, would create an environment more suitable for SDL for her

students is also consistent with the findings of Dynan et al. 2008, which demonstrate that students who are less predisposed to SDL require more structured classrooms to develop SDL skills.

Overall, the findings from the interviews add an interesting dimension to the analysis of the first hypothesis, that educators with student-centered pedagogical beliefs will implement self-directed learning to a greater degree than those with teacher-centered beliefs. All six of the participants had relatively similar pedagogical beliefs, falling somewhere in between student-centered and teacher-centered, except for Participant 4. Participant 4, who strongly emphasized her students' lack of motivation for learning as her reason for not implementing SDL, holds entirely teacher-centered beliefs. Her stark belief that her students are not capable of SDL could shed light onto why educators with more teacher-centered beliefs have lower levels of implementation of SDL. This would have to be explored further with a larger, more diverse interview sample.

Significance

The findings of this study support the first two hypotheses, that educators with student-centered pedagogical beliefs implement self-directed learning to a greater degree than those with teacher-centered beliefs, and that pedagogical beliefs have a stronger relationship with the implementation of self-directed learning in classroom practices than does technology use. This suggests that the relationship between SDL and pedagogical beliefs is significant and should be the focus of more research on SDL. Further, it suggests that the relationship between SDL and technology use is not as straightforward as some research has tried to approach it, but

should be studied in relation to pedagogical beliefs. This is not surprising, however, because past research has shown that pedagogical beliefs affect how technology is used in classrooms.

The third hypothesis, which was grounded by Critical Race Theory, that educators who teach at schools serving a larger percentage of students categorized as black or Hispanic will implement self-directed learning less than those at schools serving a larger percentage of students categorized as white, was not supported. It should be noted, however, that the composition of the sample was limited such that there was not a sufficient number of schools represented that served high percentages of students categorized as black or Hispanic. Further, schools that were placed in the higher category actually served relatively low percentages of students categorized as black or Hispanic compared to other schools in Massachusetts and in the nation. As a result, this hypothesis could not be fully examined.

The practices described in the interviews demonstrated that teachers who have both high and low levels of SDL implementation have a better understanding of the concept of SDL than they initially believed when asked to define the term "self-directed learning." Teachers who have high levels of SDL implementation hold the belief shared by many scholars that SDL is a very important lifelong learning skill. They stress the importance of using it in their classrooms in order to help students learn better and become more independent in their learning, thus valuing it as an instructional method. Teachers who have low levels of SDL implementation used students' dependence on teachers and lack of motivation as reasons not to implement SDL often, rather than as reasons to do so like their counterparts. They saw the benefit in implementing SDL, but believed that it was only effective in certain types of classrooms and for certain types

of students, understanding it not as an instructional method to teach content as well as develop skills, but only as a set of skills that certain students are more predisposed to than others.

Limitations

The two biggest limitations of this study were in the sample. The sample size was only 48 teachers, and not all of those 48 respondents answered every question in the survey, limiting the generalizability of the results of this study. The sample was also spread thinly across public schools in Massachusetts, with many schools in the sample that only had one respondent. In addition, no schools serving a majority of students categorized as black or Hispanic were in the sample due to a response bias that favored teachers who worked at schools serving a majority of students categorized as white. This bias limited the ability to test the third hypothesis, that educators who teach at schools serving a larger percentage of students categorized as black or Hispanic implement self-directed learning less than those at schools serving a larger percentage of students categorized as white. In this study, schools serving a high percentage of students categorized as black or Hispanic had more than ten percent of such students, which is noticeably less than a majority and limits the applicability of the results concerning a school's racial composition.

The lack of respondents from schools serving a majority of students categorized as black or Hispanic also limited the interviews. The initial goal of the interviews was to have four participants from schools serving a majority of students categorized as black or Hispanic and four from those serving a majority of students categorized as white in order to compare the responses across schools based on racial composition. This comparison was not possible, however, and although the interviews still provided valuable insight into the implementation of

SDL in Massachusetts middle schools, they did not add insight to how SDL practices might differ across schools with different racial compositions. Further, the number of interviews was limited to six, two less than what was initially planned, and the level of implementation of SDL by the interviewees was not balanced. Four participants in the interviews had high levels of SDL implementation and two had low levels. These limitations were due to the difficulty of finding an equal number of participants with high levels of SDL implementation and those with low levels among the respondents to the survey willing to participate in an interview.

Finally, the survey was limited by the addition of the question asking at what school the respondents worked after the first six participants had responded. The SDL questions were also created for this survey and were never pilot tested, so the reliability of those questions is not confirmed. Further, there were a small number of SDL questions, so the number of items comprising the SDL practices, SDL practices with technology, and SDL practices without technology scales was small (seven, four, and four respectively), limiting the reliability of those scales.

Implications for Future Research

The relationship between pedagogical beliefs and SDL should be studied in more depth with a larger, more diverse sample in order to better understand the impact of those beliefs on the implementation of SDL. The relationship between how a teacher understands SDL, either as an instructional method that teaches content as well as develops lifelong learning skills in all students, or as a set of skills that certain students are better able to acquire than others, and their implementation of SDL should also be explored further. Understanding why educators implement SDL is important in order to understand how to more effectively implement it to the

benefit of the students. This relationship should also be examined beyond middle school students to students of all ages so that they can start developing this lifelong learning skill as soon as it can be effectively implemented.

In addition, the relationship between the implementation of SDL and the racial composition of a school is very important and should be examined in greater detail. If there is a difference in the implementation of SDL by the racial composition of a school, then this could add to our understanding of how black and Hispanic students and white students are taught differently and are held to different expectations. It could also have implications for their readiness for college and the workforce, where self-directed learning is an even more necessary life skill. In turn, such a finding may inform training and other professional development provided to teachers to help reduce differences.

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APPENDIX 1

Email to Contacts

Dear [insert name of contact at school],

Thank you for agreeing to reach out to teachers at your school to ask them to participate in my study. Below is the email that I would like you to forward to any teachers who you believe may be interested in participating. Teachers of any subject or middle school grade are welcome to participate.

[For contacts who are teachers]
As a middle school teacher, you are also welcome to participate in the study. Please see the email below for more information about my research and what your role would entail as a participant.

Thank you,

Catherine Stampfli

Boston College Sociology Honors, Class of 2019

Email to Principals

Dear Massachusetts Middle School Principals,

I am a senior at Boston College and I am writing a senior thesis on public middle school teachers in Massachusetts. My study will look at how teachers implement self-directed learning in their classrooms, if they do at all. I am most interested in the relationship between pedagogical beliefs and the implementation of self-directed learning, and I would very much appreciate your assistance in my research.

The email below contains a link to my survey and I would be very grateful if you would send it to teachers at your middle school. Teachers of any subject or middle school grade are welcome to participate.

Thank you,

Catherine Stampfli

Boston College Sociology Honors, Class of 2019

Email to Participants

Dear teachers at [insert school name here],

I am conducting a study on public middle school teachers in Massachusetts, and I invite you to participate. The study, entitled "How Self-Directed Learning Relates to Technology Integration and Pedagogical Beliefs in Middle School Classrooms," was approved by Boston College's Institutional Review Board on 10/29/2018.

The study will look at how teachers implement self-directed learning in their classrooms, if they do at all. I am most interested in the relationship between pedagogical beliefs and implementation of self-directed learning, and in determining if there is a positive or negative correlation between certain beliefs and levels of implementation.

The study involves a survey that will take about 20 minutes to complete and the link to which has been attached to the bottom of this email. At the end of the survey you will be asked if you are willing to participate in an interview over Skype and, if yes, to give your name and email. The interview will last about 30 minutes.

During the interview I will ask you further questions about your implementation, or lack of implementation, of self-directed learning in order to understand your perceptions about self-directed learning.

All identifying information will be kept in a secure, password-protected file that will be kept separate from your survey and interview data.

Participating in this study is a great way to contribute to the understanding of self-directed learning in middle school classrooms.

If you choose to participate, at the end of the survey you will be asked to provide your email if you would like to be placed in the running to win one of three $25 Amazon gift cards.

Participation is completely voluntary, and if you would like to complete the survey please click on the link below.

[link to Qualtrics survey]

Thank you,

Catherine Stampfli

Boston College Sociology Honors, Class of 2019

APPENDIX 2

Survey

Technology, Pedagogy, and SDL

Start of Block: Survey Consent

Q1

Boston College Consent Form

Boston College Sociology Department

Informed Consent to be in study "How Self-Directed Learning Relates to Technology Integration and Pedagogical Beliefs in Middle School Classrooms"

Researcher: Catherine Stampfli

Type of consent: Teacher Consent Form

You are being asked to participate in a research study titled "How Self-Directed Learning Relates to Technology Integration and Pedagogical Beliefs in Middle School Classrooms." You were selected to participate in this project because you are a middle school teacher in Massachusetts.

The purpose of this study is to determine how teachers' implementation of self-directed learning in their classrooms (or lack thereof) is related to their extent of technology integration and their pedagogical beliefs. This study will be conducted through this online survey. The survey should take you approximately 20 minutes to complete. **At the end of the survey, you**

will be asked if you would like to participate in an optional interview and, if yes, to provide your name and email.

There are no direct benefits to you, but you may feel gratified knowing that you helped further the scholarly work in this research area. At the end of the survey, you will be asked to provide your email if you would like to be placed in the running for one of three $25 Amazon gift cards. There are no costs to you associated with your participation.

The Principal Investigator will exert all reasonable efforts to keep your responses and your identity confidential. All electronic information will be coded and secured using a password-protected file. I will assign to each participant a unique, coded identifier that will be used in place of actual identifiers. I will separately maintain a record that links each participant's coded identifier to his or her actual name and email but this separate record will not include research data. **Each participant's name and email will only be collected if he or she opts to provide this information in order to participate in an interview. Once the survey data has been exported, all responses, including name and email, will be destroyed. Emails provided in order to be put in the running for one of three $25 Amazon gift cards will be stored in a separate survey, to which participants will be sent at the end of the original survey, and will not be linked to the participant's data from the original survey.** Please note that regulatory agencies, the Boston College Institutional Review Board, and Boston College internal auditors may review research records.

Your participation is voluntary. If you choose not to participate it will not affect your relations with Boston College. You are free to withdraw or skip questions for any reason. There are no penalties for withdrawing or skipping questions.

If you have questions or concerns concerning this research you may contact Catherine Stampfli at Stampfli@bc.edu or (774)266-4087, or Professor Michael Russell at russelmh@bc.edu or (617)552-0889. If you have questions about your rights as a research participant, you may contact the Office for Research Protections, Boston College, at 617-552-4778 or irb@bc.edu.

This study was reviewed by the Boston College Institutional Review Board and its approval was granted on 10/29/2018.

If you agree to the statements above and agree to participate in this study, please answer, "Yes," to the "Consent Given" question below.

O Yes (1)

O No (2)

Skip To: End of Survey If Q1 = No

Skip To: End of Block If Q1 = Yes

End of Block: Survey Consent

Start of Block: Demographics

Q3 Please mark the appropriate range for your age.

O 20 to 30 (1)

O 31 to 40 (2)

O 41 to 50 (3)

O 51 to 60 (4)

O 61 or more (5)

Q4 To which gender identity do you identify most?

O Male (1)

O Female (2)

O Transgender Male (3)

O Transgender Female (4)

O Not listed: (5) _____

Q5 How many years have you taught throughout your career?

O Less than 1 year (1)

O 1 to 2 years (2)

O 3 to 5 years (3)

O 6 to 10 years (4)

O 11 to 15 years (5)

O More than 15 years (6)

Q6 What subject(s) do you teach?

☐ English Language Arts (1)

☐ Mathematics (2)

☐ Science (3)

☐ History/Social Science (4)

☐ Not listed: (5) _____

Q7 What grade(s) do you teach? (Select all that apply)

☐ 5th (1)

☐ 6th (2)

☐ 7th (3)

☐ 8th (4)

Q27 What is the name of the school at which you teach?

_____

End of Block: Demographics

Start of Block: Pedagogical Beliefs

Q8 The following paragraphs describe observations of two teachers' classes, Ms. Hill's and Mr. Jones'. Answer each question below by checking the box under the column that best answers that question for you.

"Ms. Hill was leading her class in an animated way, asking factual questions that the students could answer based on the reading they had done the day before. After this review, Ms. Hill taught the class new material, again using questions that could be answered quickly to keep students attentive and listening to what she said."

"Mr. Jones' class was also having a discussion, many of the questions were raised by his students. Though Mr. Jones could clarify students' questions and suggest where the students could find relevant information, he couldn't answer many of the questions himself."

	Definitely Ms. Hill's (1)	Tend towards Ms. Hill's (2)	Can't decide (3)	Tend towards Mr. Jones' (4)	Definitely Mr. Jones' (5)

Which type of discussion are you more comfortable having in class? (1)	O	O	O	O	O	
Which type of discussion do you think most students prefer to have? (2)	O	O	O	O	O	
From which type of class discussion do you think students gain more knowledge? (3)	O	O	O	O	O	
From which type of class discussion do you think students gain more useful skills? (4)	O	O	O	O	O	

Q9 Indicate how much you disagree or agree with each of the following statements about teaching and learning.

	Strongly Disagree (1)	Moderately Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Moderately Agree (5)	Strongly Agree (6)

Teachers know a lot more than students; they shouldn't let students spend time with too many questions when they can explain the answers directly (1)	O	O	O	O	O	O
A quiet classroom is generally needed for effective learning (2)	O	O	O	O	O	O
Students are not ready for "meaningful" learning until they have acquired basic reading and math skills (3)	O	O	O	O	O	O
It is better when the teacher–not the students–decides what activities are to be done (4)	O	O	O	O	O	O

Student projects often result in students developing misconceptions (5)	O	O	O	O	O	O
Homework is a good setting for having students answer questions posed in their textbooks (6)	O	O	O	O	O	O
Students will take more initiative to learn when they feel free to move around the room during class (7)	O	O	O	O	O	O
Students should help establish criteria on which their work will be assessed (8)	O	O	O	O	O	O

Instruction should be built around problems with clear, correct answers, and around ideas that most students can grasp quickly (9)	O	O	O	O	O	O
How much students learn depends on how much background knowledge they have—that is why teaching facts is so necessary (10)	O	O	O	O	O	O

Q26 Indicate how much you disagree or agree with each of the following statements about teaching and learning.

	Strongly Disagree (1)	Moderately Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Moderately Agree (5)	Strongly Agree (6)
Instruction is most effective when teachers collaborate (1)	O	O	O	O	O	O

Students create better looking products with laptops or tablets than with other traditional media (2)	O	O	O	O	O	O
Use of laptops or tablets in the classroom encourages students to avoid doing important school work (3)	O	O	O	O	O	O
Laptops and tablets encourage students to be lazy (4)	O	O	O	O	O	O
Laptops or tablets help students grasp difficult curricular concepts (5)	O	O	O	O	O	O
Laptops and tablets have weakened students'	O	O	O	O	O	O

research skills (6)						
Students' writing quality is worse when they use word processors (7)	O	O	O	O	O	O
Students work harder at their assignments when they use laptops or tablets (8)	O	O	O	O	O	O
Students are more willing to do second drafts when using a laptop or tablet (9)	O	O	O	O	O	O
Students interact with each other more while working with laptops or tablets (10)	O	O	O	O	O	O

Q10 Teachers know that different approaches sometimes work for different types of students and that a mix of approaches is often the best. Between the two basic approaches shown, what mix of lesson time do you think is best for each of these types of students?

	90% - Giving students background factual knowledge and directly teaching concepts (1)	70% - Giving students background factual knowledge and directly teaching concepts (2)	50-50 (3)	70% - Using active learning approaches like student discussions, projects, and presentations (4)	90% - Using active learning approaches like student discussions, projects, and presentations (5)
For 5th grade students learning American history (1)	O	O	O	O	O
For 11th grade students in a college prep science class (2)	O	O	O	O	O
For 8th grade students who are not doing much work but enough to "get by" (3)	O	O	O	O	O
For an enthusiastic learner in	O	O	O	O	O

one of your classes (4)					
For a struggling and unmotivated student whom you teach (5)	O	O	O	O	O

Q11 Which THREE of the following do you believe are the most important objectives that middle and high school education should have? Please check the 3 most important objectives.

- ☐ Mastery of content in science, history, algebra, and literature (1)
- ☐ Developing talent in the performing arts or athletics (2)
- ☐ Competence in writing and in oral communication (3)
- ☐ Learning to reason carefully and use evidence well (4)
- ☐ Being able to work well in groups, and understand different views (5)
- ☐ Being interested and able to learn independently (6)
- ☐ Wanting to help others and contributing to the general community (7)
- ☐ Developing skills in using computers to analyze and present ideas (8)

Q12 How useful are each of the following kinds of assessments for you in judging how well students are learning?

	Not Useful (1)	Slightly Useful (2)	Moderately Useful (3)	Very Useful (4)	Essential (5)
Short-answer and multiple-choice tests (1)	O	O	O	O	O
Essay tests (2)	O	O	O	O	O
Open-ended problems (3)	O	O	O	O	O
Individual and group projects (4)	O	O	O	O	O
Standardized test results (5)	O	O	O	O	O
Student presentations/performances (6)	O	O	O	O	O

End of Block: Pedagogical Beliefs

Start of Block: Use of Technology and Self-Directed Learning in the Classroom

Q14 During classtime, how often do students perform the following?

	Never (1)	Less than once per week (2)	Once per week (3)	3 times per week (4)	Always (5)
Determine independently their learning goals in an activity. (1)	O	O	O	O	O
Identify independently the knowledge they seek to gain within an activity. (2)	O	O	O	O	O
Take responsibility of their learning process in order to move towards their goals in an activity. (3)	O	O	O	O	O
Identify independently the skills they need to improve within an activity. (4)	O	O	O	O	O
Identify independently the resources that they will require for an activity. (5)	O	O	O	O	O

Determine independently the tasks that will help them achieve their learning goals in an activity. (6)	O	O	O	O	O
Evaluate independently what they have learned after the completion of an activity. (7)	O	O	O	O	O

Q17 During classtime, how often do students perform the following activities?

	Never (1)	Less than once per week (2)	Once per week (3)	3 times per week (4)	Always (5)
Students work individually on school work without using laptops or tablets. (1)	O	O	O	O	O
Use non-technology resources to independently execute the tasks they have identified in an activity. (2)	O	O	O	O	O

Students work in groups on school work without using laptops or tablets. (3)	O	O	O	O	O
Use non-technology resources to independently identify resources that might be helpful in the learning process in an activity. (4)	O	O	O	O	O
Students perform research or find information without using a laptop or tablet. (5)	O	O	O	O	O
Use non-technology resources to independently fill gaps in their knowledge or skills within an activity. (6)	O	O	O	O	O

Students present information to the class without using a laptop or tablet. (7)	O	O	O	O	O
Use non-technology resources to independently achieve their learning goals in an activity. (8)	O	O	O	O	O

Q18 In your classroom, how often do your students do the following?

	Never (1)	Less than once per week (2)	Once per week (3)	3 times per week (4)	Always (5)
Students use a laptop or tablet for writing. (1)	O	O	O	O	O
Students perform research or find information using the internet. (2)	O	O	O	O	O
Students use a laptop or tablet to independently fill gaps in their knowledge or skills within an activity. (3)	O	O	O	O	O

Students work in groups on school work using laptops or tablets. (4)	O	O	O	O	O
Students work individually on school work using laptops or tablets. (5)	O	O	O	O	O
Students use a laptop or tablet to solve problems. (6)	O	O	O	O	O
Students use a laptop or tablet to independently achieve their learning goals in an activity. (7)	O	O	O	O	O
Students use a laptop or tablet to play educational games. (8)	O	O	O	O	O
Students present information to the class using a laptop or tablet. (9)	O	O	O	O	O
Students use a laptop or tablet to independently execute the tasks they have identified in an activity. (10)	O	O	O	O	O
Students use a spreadsheet/database to record, explore, or analyze data. (11)	O	O	O	O	O

Students use probes (e.g. thermometers, etc) attached to a laptop or tablet. (12)	O	O	O	O	O
Students use a laptop or tablet to independently identify resources that might be helpful in the learning process in an activity. (13)	O	O	O	O	O

Q19 How often do you ask students to produce the following using technology?

	Never (1)	Less than once per week (2)	Once per week (3)	3 times per week (4)	Always (5)
Reports and term papers (1)	O	O	O	O	O
Multimedia projects (2)	O	O	O	O	O
Web pages, web sites or other web-based projects (3)	O	O	O	O	O
Pictures or artwork (4)	O	O	O	O	O
Stories or books (5)	O	O	O	O	O

Graphs or charts (6)	O	O	O	O	O
Videos or movies (7)	O	O	O	O	O

End of Block: Use of Technology and Self-Directed Learning in the Classroom

Start of Block: Interview

Q20 If you are willing to participate in a follow-up interview that will ask you about your implementation, or lack thereof, of self-directed learning in your classroom, please fill out the information below.

O Name (1) _____

O Email (2) _____

End of Block: Interview

Email for Gift Card

Start of Block: Email

Q1 Please provide your email so that you can be placed in the running for one of three $25 Amazon gift cards.

O Email (1) _____

End of Block: Email

Interview Guide

Interview Questions:

1. How familiar are you with the term "self-directed learning"?
2. What does "self-directed learning" mean to you?

For teachers who implement SDL:

3. Your answers to the survey questions indicate that you implement self-directed learning in your classroom activities; please describe one or two examples of self-directed learning in your classroom?
4. What are your reasons for implementing self-directed learning? What are some of the benefits self-directed learning brings to your classroom activities?
5. Please describe one or two examples of how students use technology in self-directed learning activities?
    a. What are the benefits of using technology in activities with self-directed learning?
    b. What are the challenges of using technology in activities with self-directed learning?

6. Do you believe that self-directed learning is an important life skill for students to learn? Why or why not?
    a. If yes, please describe one or two examples of how self-directed learning benefits your students?

For teachers who don't implement SDL:

3. Your answers to the survey questions indicate that you currently do not implement self-directed learning in your classroom activities. Have you ever tried to implement self-directed learning in your classroom activities?

a. If yes, why did you decide not to continue doing so?
b. If no, why have you never considered doing so?

4. Do you know of any teachers at your school who implement self-directed learning in their classroom practices?

a. If yes, how do you perceive their implementation of self-directed learning, for example do you find it effective?

5. Do you believe that self-directed learning is more effective for some students than for others? If yes, for what kinds of students is self-directed learning more effective?