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## Supplemental Instruction and Beyond: An Evaluation of SI and Developmental Education Theoretical Alignment

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**Abstract**

Supplemental instruction (SI) has been around for nearly five decades and was introduced as a practice for "high-risk courses." Little attention has been paid to the applicability of SI to developmental education contexts; however, the rapid expansion of developmental education reforms, including acceleration and integration, increases the need for us to consider the utility of this practice in a wider range of college settings. In this article, we examine alignment between SI and adult learning and development theories—the theoretical foundations of developmental education. We conclude with practical examples of how SI has been successfully applied to developmental English contexts at one community college.

Supplemental Instruction (SI), the offering of additional assistance outside the scheduled and required class time, was developed by Deanna Martin and David Arendale in 1974 at the University of Missouri-Kansas City (Martin & Arendale, 1992). An SI Leader (SIL), who is a near peer, provides interactive sessions to reinforce concepts delivered during class time. As SI has grown and developed over time, it has taken on several names such as peer-assisted learning (PAS), peer-assisted study sessions (PASS), facilitated study groups (FSG), and peer learning sessions (PLS) (Paabo et al., 2019; Dawson et al., 2014). SI was initially developed and intended for college students who were predicted to not need outside course assistance to perform well. However, SI is now utilized in undergraduate, graduate, and professional student courses, particularly to assist students who are enrolled in high-risk courses (Martin & Arendale, 1992; Dawson et al., 2014). Targeting high-risk courses (i.e., those in which thirty percent or more of the students fail, withdraw, or receive a "D" for the course) rather than high-risk students attempts to eliminate the stigma that coincides with asking for academic support and to remove the deficit language that is commonly associated with seeking help (Martin & Arendale, 1992). Furthermore, SI has been shown to be equally effective for students regardless of gender identity or ethnicity (Dawson et al., 2014; Martin & Arendale, 1992). While SI has been shown to be effective for diverse groups of students, its theoretical ties to adult learning have not been fully examined.

The purpose of this paper is to explore SI's alignment to theories of adult learning and development which are the underpinnings of

developmental education. We begin by identifying adult learning and development theories which have influenced the field of developmental education and then examine descriptions of SI in the literature to explore SI's utility as a student support strategy within developmental education contexts. We conclude by providing examples from our own application of SI, including pragmatic tools for helping both instructors and SILs be successful in the classroom. We demonstrate how these SI practices are consistent with adult learning and development research. The tools we describe were developed with a developmental education context in mind but can be applied in any SI context.

### Foundational Theories

Several theories provide the foundation for SI including constructivism (Piaget & Inhelder, 1958), the cone of experience (Dale, 1969), and the hierarchy of learning improvement programs (Keimig, 1983). Tinto's theory on college persistence also has been referenced as a major tenet of SI's theoretical framework because of SI's emphasis on persistence (Arendale, 2000; Tinto, 1987). However, in the wake of SI's growing popularity, scholars have connected the practice to additional learning theories (James & Moore, 2018). One notable addition is the integration of Vygotsky, particularly his zone of proximal development and sociocultural theory of cognitive development. The zone of proximal development posits that a learner can achieve the acquisition of new knowledge with the guidance of a person who already has that knowledge (Sanders & Welk, 2005). Through scaffolding, students can move from reliance on this more knowledgeable guide to independence. SI sessions incorporate these same techniques. Further, Vygotsky's sociocultural theory of cognitive development highlights the important role social interaction plays in human development. SI also acknowledges this importance by primarily using collaborative learning strategies during SI sessions. For a fuller discussion of the relevant theoretical literature, see Mas (2014).

### Theoretical Connections Between SI and Developmental Education

Martin and Arendale (1992) recommend that SI be used in courses where students are motivated to learn and where the course is perceived as rigorous. Indeed, they argue, "[If] students are not being successful in courses then perhaps colleges should change the way courses are taught" (Martin & Arendale, 1992, p. 1). Despite alignment between this

claim and core values of developmental education, Martin and Arendale specifically discourage use of SI in developmental education. The authors base this recommendation on their inclusion of Keimig's (1983) hierarchy of learning programs within the theoretical framing of SI. Keimig classifies programs into four types based on the comprehensiveness of provided support services and their level of institutionalization. Martin and Arendale (1992) identify SI as a part of what Keimig describes as a comprehensive learning system. Based upon Keimig's assumption that developmental education seeks to remediate academic or non-cognitive deficiencies and develop decontextualized critical thinking and academic skills, Martin and Arendale (1992) argue against pairing SI with developmental courses:

> It has been our experience that SI is least effective when it is attached to remedial classes. First, students may refuse to attend SI sessions if they do not perceive the course to be demanding. Second, SI has not been effective for students who cannot read, take lecture notes, write, or study at the high school level. Therefore, we stress to adopting institutions that they utilize SI in non-remedial settings with high-risk, demanding courses (p.5).

This recommendation fails to consider overlap between the purpose and practices of SI on the one hand and the purposes and realities of developmental education on the other. After all,-developmental education was originally defined as "the integration of remedial courses and support services guided by the principles of adult learning and development" (Boylan, 1999, n. p.; Saddlemire, 1974, n.p.), and—as we discuss below—the support offered in SI closely aligns with several adult learning and development principles.

Given the role of SI in supporting remedial and other courses, why might SI creators Martin and Arendale (1992) caution against pairing SI with developmental courses? We posit their recommendation stems from two problematic assumptions: (1) that students will not find developmental courses challenging enough and thus will not warrant attending SI, and (2) that SI is ineffective for students who lack basic secondary literacy and academic skills (e.g., reading, writing, note taking). However, the authors fail to provide sources to back their claims, suggesting that these assumptions are not supported by the literature. Only about half of all students enrolled in developmental reading continue on to their college-level coursework, suggesting that there is some level of the difficulty in these courses (Ganga et al., 2018).

Furthermore, SI can be effective for students seeking to acquire basic academic skills if modifications are made to the original model. Martin and Arendale (1992) advocate for voluntary SI attendance as outlined in the original vision for SI. Arendale (2000) argues that "students who are at risk are notorious for their reluctance to refer themselves for assistance until much too late" (2000). As a result, some SI scholars now advocate for mandatory SI sessions (Dalton, 2011; Mas, 2014). We concur with these more recent proponents of SI and further argue that SI should be a mandatory component of a developmental course. Indeed, we see SI as providing an important instructional space for introducing and practicing skills related to core aspects of developmental education, including students' self-regulated use of learning strategies (Weinstein et al., 2011) in order to develop competence and autonomy (Chickering, 1969). We base our position on the alignment between SI and the adult learning and development theories which create the foundation for developmental education, as well as the traditional definition of developmental education.

The major elements of SI (e.g., collaborative learning, funds of knowledge, etc.) are supported by adult learning theories (e.g., humanist theory, experiential learning, and transformative learning). Reardon and Valverde (2013) articulate this connection well when stating, "The Supplemental Instruction (SI) program relies on the foundations of adult education. In particular it depends heavily on peer support in difficult classes. The andragogical approach highlights the importance of addressing different learning styles and helps students to engage in collaborative learning and problem solving" (p. 382). Students who are enrolled in developmental education courses are adult learners and also need such adult learner strategies (Kasworm et al., 2000; Trotter, 2006). These learning demands are the same for students' experience in SI.

## Connections between Adult Development and Adult Learning Theories and SI

Adult theories of development and learning support the major elements of SI (e.g., collaborative learning, funds of knowledge, etc.). Developmental education courses support adult learners, and thus, instructors should apply strategies grounded in theories of adult learning (Kasworm et al., 2000; Trotter, 2006). The field of developmental education was built upon a combination of adult development theories (Saddlemire, 1974). These theories can be summarized as belonging to what Merriam and Caffarella (2006) identify as psychological (e.g., cognitive and intellectual development), sociocultural

(e.g., awareness of social roles and their influence on socially constructed identity markers on development), or integrative frames (e.g., examining the interaction and intersection of biological, psychological, and sociocultural lenses). Across these distinct theorizations of how adults grow and develop, Trotter (2006) summarizes foundational adult development literature as arguing that (1) adults' experience is a resource which should be utilized in their learning, (2) adults need to be actively involved in planning their education based on their personal interests, and (3) adult education should encourage reflection and inquiry to promote individual development. While these development theories focus on learning as it applies to progressing into and through adulthood, adult learning theories explicitly focus on how and why adults seek formal and informal learning opportunities in pursuit of personal goals.

Adult learning theories can be similarly divided into three forms: Humanist theory (Maslow, 1971; Rogers, 1969), experiential learning (Kolb, 1984; Schön, 1983), and transformative learning (Mezirow, 1985). Like other Humanist theorists, Rogers (1969) emphasized the importance of learning through doing, the learners' responsible participation in the learning process, the learners' continued openness to learning *the process of learning*. Humanists identify varying levels of learning based on the content's relation to learners' formal learning needs, sense of self-construction, and ability to reinforce autonomy (Bélanger, 2011). Rogers further outlines the role and methods of the facilitator as supporting the learning environment, providing resources (including themselves), and engaging as a participant learner. In particular, the importance of the facilitator as a resource provider and participant learner align with SI practices such as preparing review or expansion materials for students to utilize in the SI session or attending the paired class with students.

Another theoretical connection between adult learning theories and foundational SI theories can be found between Dale's (1969) Cone of Experience and adult learning theories such as Experiential Learning (Kolb, 1984) and Transformative Learning (Mezirow, 1985). Dale's (1969) Cone of Experience indicates that students learn most effectively by being actively involved in work that is relevant to their target job and suggests that instructors ought to create a learning experience that provides direct and purposeful experiences. Experiential Learning Theory views learning as occurring within a cycle of concrete experience, reflective observation, formation of abstract constructs, and active experimentation, which in turn

influences future concrete experiences. Experiential learning thus assumes that learning is an inductive process in which experience informs reflection which ultimately results in learning. Kolb argues that through practicing a reflexive attitude toward their experiences, learners transform knowledge into learning. Transformative learning similarly emphasizes the importance of a highly engaged learner who is changed by their learning experience (Mezirow, 1985). The reflective aspect of experiential and transformative learning, particularly as it relates to experimentation and moving from concrete experience to abstract understanding, is highlighted in SI practices, such as Think-Pair-Share (i.e., by having students individually read an SIL's handout before working together to fill out a chart, and then sharing what they have learned from the activity). Mezirow (1985) distinguishes between an assimilation process (conforming new experiences to one's existing knowledge structure) and a transformative process (reordering the knowledge structure itself), noting the essential role of the educator in transformation. Transformative learning can be conceptualized as a cyclical process involving questioning beliefs, learning by reexamining beliefs, transforming the frame of reference, and taking a new course of action which again leads to questioning beliefs. Bélanger (2011) emphasizes the connection between transformative learning and social change spurred by critical reflection and emancipation through consciousness raising and dialogue.

Among adult development and learning theories, there are several overlapping concepts. The modern adult learning theory scholar, Eduard Lindeman (1926) summarizes that: (1) adults' needs, and interests motivate their learning, (2) adults' approach learning through a life-centered orientation, (3) adult learning is best informed by experience, (4) adults need to be self-directed, and (5) individual differences increase with age. Other notable adult learning theorists similarly emphasize the importance of self-direction (Knowles, 1975; Mezirow, 1985). For example, Knowles' (1975) theory of Andragogy centralizes internal motivation and self-direction to learn for self-fulfillment, problem-solving, and ability to enact desired life roles. Several of these tenets are echoed in the SI literature which similarly emphasizes the importance of learning through experience and connecting learning to adults' needs and interests (James & Moore, 2018). In summary, adult learning and development theories can inform the SI model design by drawing attention to the ways adults learn, their motivation for learning, and their ability to reflect upon their learning experiences in order to meet their individual goals.

Adult learning theories are not flawless, however, and we suggest that SI may provide a practical opportunity to address some of the challenges stemming from instruction rooted in traditional adult learning theories. In particular, critical scholars have questioned some key adult learning theories for implicit assumptions that the individual learner is "insulated from the world, fully in control of his or her own learning" (Merriam & Bierma, 2014, p. 58; see also Lee, 2003; Pratt, 1993). In the tradition of critical educators, these scholars argue that individuals and their learning cannot be understood without acknowledging the historical, sociocultural, political, and economic contexts in which they learn. In the case of students enrolled in developmental education, adult learning and development theories must recognize how inequitable access to resources and prior formal and informal education influence students' preparation for college. Sandlin et al. (2011), for example, examined how traditional adult learning and development theories could be updated to include informal learning and learning which incorporates technology. Guided by critical adult learning lenses which incorporate the contexts in which adult learn and develop, SILs can intentionally draw from students' range of experiences as resources to deepen the relevance and increase the effectiveness of their instructional support.

### An Example of Practical Application of Adult Learning Theory Aligned SI

In the following section, Katy Glass describes her work as an SI Leader (SIL), connecting her work in gateway and developmental education courses to the literature discussed above.

In the fall semester of 2011, I began work as an SI Leader in an algebra-based physics class while pursuing my bachelor's degree at a regional university in a large city. At the university, the students were self-driven and afraid of failing, so they came to class prepared and fit Martin and Arendale's (1992) description of students who study and test at a high school level. The majority of students performed successfully in the class even without attending SI sessions. Although there were approximately 100 students in the course, my sessions were small: averaging about 5 students. The small number of students volunteering for my SI Session was consistent with the predictions of Martin and Arendale (1992) who stated that only those students that found a course challenging would seek out extra help. My lessons consisted of practice worksheets and quizzes, discussions, or sessions where we focused on their homework. Primarily

these students saw me as a less intimidating authority that could answer their questions, and that seemed to be enough to help them succeed.

In 2018, I started working at a community college in the same city as a tutor and SIL for English Mega Plus and Integrated Reading and Writing (INRW) courses. My experience has been drastically different from that of a university physics SIL. This is because of the difference in the type of learners I have encountered at the two institutions. At the community college, students who are placed in an English Mega Plus or Plus course, two variations of a corequisite developmental English and Composition course, are new to many learning and study strategies and may be forming their first positive relationships with educators as college students. Students that are placed in these courses commonly fit one or more of the following descriptions: learners who experience financial hardship, non-traditional adult learners, and English Language Learning (ELL) students. My lessons for these students, which I will explore in depth shortly, are creative and sensitive and far less off-putting than practice physics quizzes.

My instruction as a SIL is guided by my knowledge more than anything. How I conduct myself and the SI lab will affect how much my students trust me as an SIL, and how much they trust me determines how beneficial my sessions will be for my students. Aware of the critical adult learning theories which challenge educators to recognize the influence of learners' lives and experiences outside of the classroom, I understand that many of my students have had negative previous academic experiences and that these experiences will influence their ability to succeed in college classes. Rogers' (1969) humanist theories underline the importance of learners' openness to exploring the learning process. If my students do not feel comfortable or safe enough to share, they will have yet another barrier added to their learning. Much of a SIL's job is to gain students' trust so that they will be comfortable enough to seek advice when they need help. At the university, because my physics students knew I was an English major, I was constantly trying to prove that they could trust me to understand physics. At the community college, I find myself trying to prove to my students that they can trust me to read their writing and help them get that piece of writing to the student's best draft. Whether in class or in an SI session, some community college students remained fearful to share their assignments with me and peers. If a student shows up for SI but is afraid to share their work or to participate, the SIL should try their best to find a way for the student to comfortably gain knowledge from the lesson. Although there are differences between the type of learners I dealt with

at each school, trust and comfort were central to both relationships, and I've developed many strategies over the semesters to make my students think of SI as a reliable resource for learning and encouragement and not another stress-inducing task.

At the college, the standard SI rules of presenting myself as a near-peer, attending class, and preparing group-centered sessions for SI remain important, but I've found that paying attention to the session environment is equally important to the success of SI sessions when attending students already find college to be an intimidating or unwelcoming space. When students walk into our lab, they are immediately greeted with music, posters, snacks, and positive feedback. I prefer to have Lo-fi music playing in the background of all my lessons because I have found that my students in the developmental corequisite classes are less likely to provide answers in a room of dead silence. Similarly blank, white walls will only be more stress-inducing (Grube, 2014). Educational posters and work from past students are important instructional resources that can add a lot to an SIL's credibility and to the comfort of their students. Displaying work from past students shows upfront that an SI program is proud of the students it serves. Beginning lessons in SI with blank documents or blank poster paper is too similar to classwork and can often be met with blank stares. When students are uncomfortable because they are studying subjects they've always found challenging, the lessons, environment, and leader need to work together to create an inviting study group, not a boring and intimidating one. One strategy to ease anxieties and boost group participation in poster activities is color-blocking. Color-blocking involves using multi-colored construction paper to organize pre-grouped ideas on blank posters. When I prep a poster by color-blocking and adding titles or captions, it is easier to get the entire group to participate in writing, rather than having to appoint one reluctant person. Another participation boosting and anxiety easing strategy is to let students with writer's block type in a text to a classmate on their phones rather than a blank Word document. Yet another strategy that helps attendance and participation is the snack bowl. Students who participate during SI get to choose (at least) one snack from the coveted snack bowl. For students with food insecurity, the SI snack is a small resource, but it also is another physical reminder that students are cared for in SI. Students come to my SI sessions knowing there will be comforting music, encouraging posters, a snack, and maybe their own work on the wall.

For SI sessions with my English 1301 Mega Plus students, I find students have greater

comprehension and participation in my lessons when I gamify the curriculum in ways that provide students with a sense of power and not helplessness. This is a practical application of Rogers and Maslow's belief that lessons should reinforce autonomy and appeal to adult learner's formal needs (Bélanger, 2011). In the activity titled "Who's Getting Promoted?," I ask my students to analyze a series of emails for errors from three fake employees in a Think-Pair-Share collaborative learning format. This task references Dale's Cone of Experience by requiring participants to apply the group's combined knowledge of grammar and punctuation to sample work emails, which many of them already write or will have to write in their careers someday. "Who's Getting Promoted" follows the process of experiential learning theory as it gives the students the power to choose which of the three pretend characters will receive a promotion. During this one SI session, we will cover all four stages of the learning experience outlined in Kolb's experiential learning theory (Abdulwahed & Nagy, 2009): starting with Concrete Experience ability (CE). During CE, students assess the worksheet of fake employee emails and begin applying their own knowledge and noticing errors on an individual level. Next, during the Reflection Observation (RO) stage, students begin to share their answers and questions with the group looking for commonalities between editing processes. Abstract Conceptualization (AC) follows the small group discussions, where all of the groups and SIL come together and confirm the errors and which employee wins the promotion. Kolb's experiential learning theory completes its final stage of Active Experimentation (AE) when the learners then apply the editing knowledge acquired during the SI session to peer editing and their own writing.

The students are invested in this lesson because it allows them to act out concrete experiences and in the shoes of an employer. Learning theorists Boggu and Sundarsingh (2019) explain that students successful with experiential learning grow into autonomous learners who work well in groups or alone (see also Moon, 2013). Although there is an ultimate correct answer to this activity, the focus is more on the group editing process. Peer collaboration provides both comfort and motivation for individual students to provide their group or partner with answers that they feel confident in early in the learning process and to then discuss and work together through the difficult parts of the activity, such as determining how many errors are in each email or the job promotion winner. Additionally, by avoiding excessive cold calling on students and allowing them to edit and present in pairs, this activity and other games like it allow the

SIL or the student's partner to be discrete towards students when they make mistakes or struggle by addressing concerns within small pairs and not in front of the entire class, which can be embarrassing and discouraging to an anxious learner. The SIL can also provide additional opportunities for small successes by checking in often on groups. This way every student gets at least one "good job" per session. Throughout group activities or while working one-on-one, SILs should give praise to each instance of growth they notice, no matter how small. This way not only do students feel comfortable enough to allow themselves to learn, but they also receive encouragement each and every session. Giving specific and personal praise is imperative for SILs when working with adult learners who too frequently have been made to feel like outsiders in their own educational experiences (Henderson et al., 2019). By offering clear and individual praise, we can provide a new foundation of learning experiences for students to build upon.

### Conclusion

The major tenets of SI and the theoretical underpinnings of developmental education both align in that they are founded in adult learning theories. This alignment becomes evident when framed within the context of Katy's SI sessions. By framing the collaborative learning techniques of SI around the needs and anxieties of adult learners, educators can effectively engage developmental education students. Though there is theoretical alignment between SI theories and the foundations of developmental education, and the aforementioned practices are clearly promising, more research is needed to measure the effectiveness of SI in the developmental education classroom.

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