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Preface

It would be difficult to identify an area in which change has been more omnipresent and rampant in the 21st century than in the all-important area of technology. Just one telling example: in 1996 there were a total of four (4) internet connections on the planet. In 2013, 80 connections *per second* are being added, with 100 connections per second expected during 2014. By 2020, projections indicate that the number of internet connections will reach 50 billion--from zero to 50 billion, all during half of a human lifetime.

Our first article in this issue focuses on the fast-changing area of technology and grew out of an invited panel presentation at the Self-Directed Learning Symposium. N. Boyer, Beard, Holt, Larsen, Piskurich and Piskurich analyze the intersections of technology, self-directed learning, and everyday life. In a symbiotic relationship, new developments in technology are often mastered through self-directed learning, while technology is often used to promote and facilitate self-directed learning.

Assessment of self-directed learning has been a major interest in the field since the 1980's, with a plethora of measures being developed. S. Boyer, Edmondson, and Artis conducted a meta-analysis of SDL studies, identified the most commonly used measures, and explored possible moderating effects of assessment measures on relationships of self-directed learning to other constructs frequently examined in research.

The final piece in this issue builds on a previous citation analysis of SDL articles that have appeared in this journal, examining only citations of publications that are dated 2003 or later in order to identify emerging authors in the field.

Lucy Madsen Guglielmino, Editor

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CONTENTS

FOSTERING TECHNOLOGY AND SELF-DIRECTION: THE IMPACT ON ADULTS IN EDUCATION, BUSINESS, AND EVERYDAY LIFE

Naomi Boyer, Jeffrey Beard, Lila Holt, Joanne Larsen, Janet Piskurich, and George Piskurich

Technology has become the backbone of everyday life and is integral to our daily process. Whether the word "technology" relates to the technical infrastructure such as networks, Internet, or software programs, or the tools that we use to be productive, communicate, and learn, matters not; in all of these areas, the technological world requires individual self-direction and adaptability to remain current. Through case examples, the intersections of technology, self-directed learning, and everyday life are presented to portray the implications of technology for adult learning and development. While technology alone is not a panacea for the facilitation of learning, the coupling of self-direction with technology does provide the opportunity to fundamentally alter the way in which individuals perceive, construct, and engage with learning activities.

It is impossible to walk into a grocery store, a mall, or around a university campus without seeing a multitude of portable electronic devices (e.g., cell phones, mp3 players, laptops, tablet computers) in use. To keep pace with ever-evolving devices in this technology-rich society, individuals must become responsible for learning and adapting to the continuing changes; that is, they must self-direct their learning of and with technology. The technology may then be used to learn areas outside of the technology arena. For example, after finding solutions on the Internet for using a technology device or application, a person may begin to use the same approach to learn how to do home improvement or further hobby interests.

At the intersection of technology and self-direction are three distinct concepts: using technology to learn the technology itself, facilitation and promotion of learning, and use of the technology to scaffold the self-directed learning experience. The purpose of this article is to explore these three intersections of self-direction and technology, focusing on the breadth of impact within the adult learning spectrum in formal learning settings such as higher education, in the workplace, and in everyday life. To facilitate this discussion, background information is provided that explores the literature related to the digital learner, self-direction and the learner, the use of technology to foster self-direction,

and ways in which technology itself promotes self-direction. Case examples demonstrate how technology is impacting self-direction in higher education (engineering and medical education), business environments, and everyday life.

Background

The word "technology," for the purpose of this article, refers to electronic devices (e.g., cell phones, laptops, mp3/iPods, iPads, TV, computer, video games) and applications (e.g., computer software). The use of a variety of technology devices is on the rise among youth according to Kaiser Family Foundation research that compared data collected in 1999, 2004, and 2009 (Rideout, Foehr, & Roberts, 2010). The findings, based on 2000 children from ages 8-18, are clear that young people today are "media multitaskers," using various forms of technology an average of more than 7.5 hours per day. While the study focused on young people, the study reported an increase of technology presence in the home indicating adults are at least exposed, if not users, of these technologies.

It appears that technology use is primarily derived from interest and need and is not limited by chronological age (Horrigan, 2009). Many adults are required to use technology in the workplace and older adults often have to adapt to using technology as the need arises. Recent reports reveal that over 71% of adults use the Internet daily and over 90% of today's workforce use email for some purpose (Rainie, 2010). Horrigan (2009) additionally discovered that adults are embracing the use of electronic devices at a rate comparable to young people - especially in relation to Internet access. One only has to briefly observe public, private, and industry settings to confirm this trend. Adults can often be observed accessing the Internet on cell phones, listening to music on mp3 players, and sending email on laptops and iPads in public places. Learners of the next generation will focus on learning through different processes that are supported by technology.

The Digital Learner

Most of today's students (kindergarten to college) were raised in a world filled with computer technology and an Internet where information can be instantly obtained. This new generation of learners was born after 1980 and are commonly referred to as the Net Generation (Net Gen) or "digital natives" (Prensky, 2001). The Net Gen represents a population born between 1980 and 1994 and involves approximately 90 million people (Davidson & Goldberg, 2009; Johnson & Romanello, 2005; Notarianni, Curry-Lourenco, Barnham, & Palmer, 2009; Oblinger & Oblinger, 2005a; Sherman, 2006; Tapscott, 1998). Barnes, Marateo, and Ferris (2007) suggest that "[t]his generation is unique in that it is the first to grow up with digital and cyber technologies" (But Net Geners Learn Differently section, para. 3). Current college students have grown up in a digital world with the Internet and cell phones and communicate using various media options (Beyers, 2009; Davidson & Goldberg, 2009). These communication formats include texting, instant messaging, email, and social networking tools like Facebook and Twitter (Beyers, 2009; Horrigan, 2009; Lorenzo, Oblinger, & Dziuban, 2007). Today's students have experience with a myriad of media options that allow for immediate and portable access to a virtual world that is filled with information. A deluge of research has been conducted regarding the use of computer technology with Net Gen students. As older members of this group

are now near or over the age of thirty, how should adult-focused programs adapt to meet the needs of digital learners? According to the U.S. Department of Education, Office of Vocational and Adult Education, digital technologies must be included:

The use of digital technologies for learning both supports local efforts to educate adult learners and their teachers and extends educational opportunities to reach new groups of students. The thoughtful integration of digital technologies into the traditional scheme of education and their use to develop new ways of learning is necessary to ensure students have the tools to thrive in a complex and rapidly changing technological society. (Technology and Distance Learning, 2008)

Although younger learners have grown up with technology (Rideout, Foehr, & Roberts, 2010) and are considered digital natives, the amount of technology use rather than age may determine the effectiveness of using computer technology in learning environments (Oblinger & Oblinger, 2005b; Shulmeister 2008). While the future of adult education will need to evolve with new generations of learners, the use of technology in adult learning environments needs to be employed now (Horrigan, 2009).

Self-Directed Learning

Many have defined self-directed learning (SDL), and some of these definitions may have "been skewed by those who choose to define it as they wish" (Brookfield, 1986, p. 18). Owen (2002) attributes a distortion of the SDL definition to "haphazard nomenclature" (p. 1) leading to many names for the same general concept. Carré (1994) found well over 20 different names used for SDL, while Hiemstra (1996) discovered over 200 variations in conference proceedings. Self-direction in adult learning has been labeled as self-teaching, self-planned learning, inquiry method, independent learning, self-education, self-instruction, self-study, self-initiated learning, and autonomous learning (Owen, 2002). All of these labels give the impression of one person learning in isolation, whereas Knowles (1975) wrote that SDL usually takes place in association with various types of helpers such as teachers, tutors, mentors, and peers. SDL can involve an individual directing his or her own learning with other people involved in the process.

While some have defined self-directed learning as autonomous learning, self-direction should not be perceived only as learning by oneself. Brockett and Hiemstra (1991) caution against the myth that SDL "takes place in isolation. In order to truly understand the impact of self-direction, both as an instructional method and as a personality characteristic, it is crucial to recognize the social milieu in which such activity transpires" (p. 32).

Humans adopt methods that are most effective for use and often assume that what works for one must be the best approach for others. However, as with any idea or concept (especially in education), one must not be quick to proclaim a "one size fits all" strategy. SDL is not the "only" or "best" way to facilitate learning for self or others; however, as it pertains to learners assuming personal responsibility for their own learning, SDL is worthy of cultivation and consideration dependent upon the context and objective.

Brockett and Hiemstra (1991) make it clear that SDL is not the only approach that leads to successful learning, but one that educators of adults may choose in

order to enable learners to assume personal responsibility and involvement in their own learning. They go on to explain that the level of self-direction demonstrated by a learner upon entering a learning experience is not necessarily indicative of success; however, the adult educator can play a role in assisting adults to "assume personal responsibility for their own learning" (p. 27). In this article SDL will be defined as Knowles (1975) posited:

> a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. (p. 18)

For those engaged in formal (e.g., college course, corporate training, continuing education) or informal (e.g., personal interest, professional development, hobby) learning environments, technology can serve as a learning objective, a resource for facilitating the learning, a mechanism for developing products, and a platform for performing evaluations. Technology, then, becomes a possible bridge for connecting many aspects of SDL.

Learning to use Technology Through Self-Direction: Learning Technology Itself

In the last decade, technology has continued to evolve so fast that the next version of computer (e.g., new processor, larger hard drive), electronic device or software application (e.g., Word, PhotoShop, iTunes) is released soon after one acquires the device or application. Often there are tutorials and self-training guides released to help users with changes; however, users are expected to adapt and learn how to use the new changes on their own; thus users take personal responsibility for learning how to use the application and discover the knowledge on their own—self-directed learning.

Learning to use new applications or electronic devices involves the user's hands-on experience. Dewey (1938) suggested "there is an intimate and necessary relation between the process of actual experience and education" (p. 20). The idea of the learner gaining actual experience with a topic of study is not new, but may be more desirable when the subject is technology. Jarvis (1987) posited "all learning begins with experience" (p. 16) and Lindeman (1926) argued that the "highest value in adult education is the learner's experience" (p. 6). Today's educators are preparing students to use technology for potential jobs that do not yet exist. Technological evolution requires lifelong SDL and the minimization of fear of rapid change. It would appear an argument could be made that becoming a self-directed learner of technology is a necessary life skill.

The SDL approach is being used with good results in educational settings where students are learning to use technology. Clinton and Rieber (2010) use an SDL approach in an instructional technology master's program through a series of studio courses. The program uses an SDL approach that Candy (1991) refers to as assisted autodidaxy (self-education with instructor guidance, e.g., independent study). During the first course the students are involved in seminars and discussions on SDL and learn that SDL is not about

autonomous learning, but about making personal choices and decisions and taking action (Clinton & Rieber, 2010). The SDL approach was researched and implemented because the program content, multimedia skills, includes learning objectives that are complex and multi-faceted. Therefore, a "one size fits all" approach would not meet the different learning styles of the students. The authors reported that most students were comfortable with the approach and believed it would serve them well as professionals. Other students indicated they gained from the experience of a different approach (Clinton & Rieber, 2010, p. 769).

There is an emerging concept of "flipping" the traditional classroom or learning environment from lecture-based and teacher centered to one that is participatory and learner-centered, with learners collaborating and engaging in construction of knowledge in real-world contexts (Barab, Thomas, Dodge, Carteaux, & Tuzun 2005; Barab et al., 2000; Hurt, 2010; Land & Hannafin, 1996; Pink, 2010; Roth, 1996, 1998). This approach was implemented in a technology course in a teacher education program using podcasts (O'Bannon, Lubke, Beard, & Britt, 2011). Students purchased a textbook and were given access to supporting podcasts, step-by-step directions, and web-based resources and allowed to choose their own personal approach to learning the material. Classroom time was instructor-supported, but primarily designated as hands-on learning time with technology devices and applications for students to enable students to apply what they had learned on their own. Students were able to self-direct their learning by choosing the method of instruction that best supported their learning style. The study revealed that some students did not favor the podcasts; however, student feedback indicated the ability to choose their learning approach was effective in learning to use technology.

Using Technology to Promote and Facilitate Self-Directed Learning

In educational situations where the object is not learning to use technology but rather using technology to learn, the SDL approach has been effective as well. Adult education has embraced online learning as learning technology that is a flexible and self-directed approach (Mason, 2006). Online learning certainly embodies SDL principles, but research indicates learners with a higher level of social presence are most satisfied with online learning (Aragon, 2003).

Being exposed to the SDL approach may change one's learning habits. It is possible that learning to use technology through a self-directed approach will lead to someone becoming a self-directed learner in other areas of seeking knowledge. Over a decade ago, Peters (2000) posited that using the World Wide Web (Internet) and digital learning environments (technology) allowed for "independent and self-determined and self-regulated acquisition of knowledge based on the student's own strategies for searching, finding, selecting and applying," which could result in a "fundamental paradigm of academic teaching" (p. 16). This would suggest that while self-directing through the Internet a student's learning strategy is affected. Using a computer to access the Internet becomes a learning tool and connects to a repository of information, allowing learners to use their own methods to acquire endless nuggets of knowledge. Students learn to become self-directed and self-responsible, whether they are doing research or searching for topics

that interest them (Peters, 2000). Other web-based applications also hold great promise to provide SDL opportunities.

McLoughlin and Lee (2007) examined web-based social applications (e.g., Flickr, YouTube, MySpace, Facebook) and Web 2.0 software (e.g., blogs, wikis, peer-to-peer media sharing). They suggest social software allows learners to make decisions about which tools best meet their learning goals. By actively participating and making decisions in using social software and Web 2.0 software, learners are able to learn how to learn. Learning how to learn is part of taking responsibility for one's learning and is basic to SDL. McLoughlin and Lee (2007) reported that using social software promoted "learner choice in controlling their own learning" and "potential for enabling creativity and self-direction for learners" (p. 672). Social and Web 2.0 software also involve collaboration with other learners in online learning environments.

For technology to play a role in self-directed learning, a learner's competence to use the technology is an asset. Just because a learner is self-directed does not mean that he or she is ready for self-directed learning with technology. Comfort and ease of use with varied software and the desire to learn these technologies play a role in learner success.

Using Technology to Scaffold the Self-Directed Learning Experience

Using a SDL approach has been effective in online learning environments (Boyer, 2003; Gaspar, Langevin, Boyer, & Armitage, 2009; Mason, 2006; Ruey, 2010). Shinkareva and Benson (2006) identify SDL ability as a factor in the increase of instructional technology competency. Howland and Moore (2002) concur and note that when considering adult learners' learning abilities in higher education online learning settings, SDL strategies should be considered. Teaching technology tools can help scaffold self-directed learning by using technology to formulate and explore ideas.

The use of information literacy skills can also aid in another goal of self-directed learning – that of emancipatory learning or social action. Through the technology, individuals can be provided with voice that otherwise would not have been available. Recent political movements in the Middle East and other countries vividly illustrate examples in practice. Meikle (2002) demonstrates how the internet has been used for social activism such as for The World Trade Organization meeting in Seattle. The Internet is regularly used for social actions such as collaboration, publishing, mobilization, and observation. The ability to use technology applications such as wikis and blogs for collaboration and/or publishing, email, documents, and other organizational materials to aid in mobilization; and the Internet for observing or monitoring data and websites pertaining to actions of promoters and opposition provides global opportunities for change. Shirky (2008) explores how social media has been used to not only to inform but to organize without a formal organization (Shirky, 2008).

According to Bennett and Bell, "The knowledge society cannot be separated from the technology that enables it" (2010, p. 416). To this end, they suggest the facilitation of technical literacy, information analysis, and evaluation to develop intuition, judgment, and depth of insight that aligns to the andragogical model of adult learning. King (2010) also supports the need to develop 21st century skills in informal settings through use of technology; however, the leap to utilizing technology as a transactional tool to further

develop self-direction is not a large one. Attrition rates within post-secondary education, coupled with employer frustration at the skill level of graduates, have stimulated much discussion in the literature regarding new models for higher education. There are more indications for the need for individual self-direction to propel individual success as well as economic vitality.

There are a number of innovations that have been introduced into the educational marketplace that are being described as disruptive elements with the promise of fundamentally altering traditional higher education models (Dede, 2013; Johnson, Adams Becker, Cummins, Estrada, Freeman, & Ludgate, 2013). From whole scale, free, readily available content such as Kahn academy, MOOCs, and other open source resources to competency-based, open entry-open exit, mastery degree/certificate models, there are cataclysmic shifts occurring that propel the individual learner as a self-directed agent into the spotlight. Whether the proliferation and value of these innovations will truly disrupt post-secondary models is yet to be seen. The validity, financial frameworks, accreditation, and articulated value is still to be developed; however, there is no doubt that opportunity for individuals to assume responsibility for learning process and product has come to the forefront of legislative mandate and business/industry focus (Eaton, 2013; Lucas, 2013; Soares, 2013).

In Practice: Using Technology to Facilitate Self-Direction in Higher Education

Technology has the potential to facilitate the adoption of SDL in higher education. It has been used throughout adult education via computer-mediated instruction, technology integration in the classroom, content development, and the use of electronic forms. "Technology has revolutionized adult and continuing education in that there are more things to be learning by adults and more ways in which to learn them" (Bennett & Bell, 2010). Online learning has in itself, regardless of course design, been touted to be somewhat self-directed in nature as the learner must enact behaviors of self-regulation and intent in order to engage with any material provided within a course; however, the onus for content, context, and connection does not necessarily shift to the learner within this delivery schema. Indeed, one of the challenges of online instruction has been how to shift students from the conventional and familiar teacher-centered locus of control to self-directed learning (King, 2002). Two cases of the integration of self-directed learning into formal higher education settings are described in the following sections.

Case Example: Engineering Ergonomics Competition

With the rapid changes in technology in the workplace, the toolbox of practicing engineers must include a self-direction component to attain updated skills. As a result, the Accreditation Board for Engineering and Technology (ABET) recognizes the need for the development of an ability to engage in life-long learning. To this end, they have required self-direction to be incorporated into engineering programs to meet accreditation guidelines. In an effort to meet these expressed needs, the ABET accredited Industrial Engineering program at the University of South Florida Polytechnic, a state university

regional campus in Lakeland Florida, began a search for a self-directed learning assignment in the senior level Human Factors (Ergonomics) class.

A semester project developed by the instructor consisted of a practical application of the class topics in a service or manufacturing industry. While this type of project requires some self-direction, the framework is completely determined by the instructor, who is available to answer questions and give direction. Obviously, the majority of the skills required for the project are imparted during the semester of the class.

The hope was to find a project requiring the application of new technology, research, and creativity that could produce a final product worthy of a semester project. An opportunity presented itself in the form of a college level competition in Ergonomics, the 5th Annual Ergonomics Design Competition for Student Teams sponsored by Auburn Engineers, Inc.

The competition consisted of a preliminary problem and a final design problem with one or more "lightening round" projects also included in the preliminary round of the competition. The preliminary design included a multi-step project that took place both on campus and online. On campus, the students formed and registered a design team consisting of three to five people, with a faculty sponsor (the class instructor in this case). The team could not include faculty members and was required to work independently from its faculty sponsor, providing a rich opportunity for the facilitation of a collaborative, self-directed project. Online, the teams registered for the competition and were provided with the design case problem, competition rules and information packet, software passwords, and free tutorials on how to use Auburn Engineers Ergonomic software (eTools). The design teams were allowed to use additional resources that are normally available to ergonomic practitioners.

In the competition, titled "Battle of the Bands," the students were required to:

1. Familiarize themselves with the musical instruments in a marching band, associated with either a college or a high school.
2. Identify the various characteristic ergonomic risk factors associated with the top 5-6 instruments or instrument groups. This meant that they had to develop a framework matrix of instrument groups, determine associated ergonomic risks to playing the instruments, and justify their framework.
3. Analyze and evaluate those ergonomic risks associated with the instrument groups using eTools, a software package developed by Auburn Engineers, Inc., and other technology. On campus, they used testing equipment to determine the pressure associated with each musical instrument group.

The timeline for the competition was very demanding, with the preliminary problem released upon enrollment after Labor Day and completed by the end of October. Then the final design requirement was released, with the final design submission due in early November. There were two "lightning rounds" that required a two-day response.

The student teams were provided eTools software with video introduction and an online manual about the use of the software. They were allowed to contact the competition mentor to ask questions and obtain direction. Each team was required to submit a report, associated drawings, video, and/or prototypes to illustrate their solution. To develop those solutions, the teams had to find their own resources such as online technology, library resources, and/or professional experts. The submitted preliminary solution included, at a

minimum, a written report with the problem statement, all of the analyses, solution path of development, and the specific design recommendations. The judging criteria for the preliminary round included: justification for the solution, creative use of technology, and the use of eTools and other applicable technologies that provide an ergonomic analysis and technological design tools.

Lightning rounds during the preliminary round competition provided opportunities for the teams to earn extra credit by responding to short and entertaining questions regarding ergonomics. The final design was a less complex design project of a short (48 hour) duration, in which solid ergonomic analysis and design creativity were important. The team was able to complete this time-sensitive project because of their experience and practice with eTools and with other ergonomics analysis tools in the preliminary round. To facilitate learning about the ergonomic risks involved in the problems, the students used a plethora of computer applications, including, but not limited to ergonomic software, videos, internet research, scientific measurement equipment, and presentation software.

This competition resulted in an excellent self-directed semester project in which the students applied technology to both the analysis and solution demonstration. They learned a large variety of technologies they had not used in the past, including eTools, digital video software, online research, Prezi presentation, and a layout software.

Students reported at the end of the semester that the project was daunting because it was especially time-consuming and the eTools software was too restrictive and not user-friendly. They were relieved when the project ended, but later, upon reflection, felt this unique project added tremendously to their class experience.

Case Example: Medical Education

The 1984 *Association of American Medical Colleges (AAMC) Physicians for the Twenty-first Century: Report of the Project Panel on General Professional Education of the Physician and College Preparation for Medicine* acknowledged that advances in scientific knowledge and technology were already occurring at such a rate that doctors for the new century must learn throughout their professional lives rather than simply master current information and techniques (AAMC, 1984). Recommendations were made that medical students should be adequately prepared for active, independent, self-directed learning; and that medical schools should provide opportunities for development of learning skills and evaluate students' abilities to learn independently. Almost 10 years later, the *AAMC Assessing Change in Medical Education-The Road to Implementation (ACME-TRI)* report further recommended that "faculty members' first goal should be to foster their students' life-long learning by helping them to develop their learning skills" (AAMC, 1993). The Liaison Committee on Medical Education (LCME) was formed as the nationally recognized accrediting agency for medical education programs in the U. S. and Canada. LMCE accreditation standard ED-5-A states, "A medical education program must include instructional opportunities for active learning and independent study to foster the skills necessary for lifelong learning (LCME, 2010).

Changes in medical education focused on the goal of meeting accreditation standards and graduating medical students who are skilled learners have fostered development of a number of novel medical school curriculum models. These models

include those that are strictly problem-based (Blumberg, 2000) or clinical presentation-based (Mandin, 1997), plus an increasing number of hybrid approaches. In the problem-based curriculum students read medical cases, set learning issues and independently fulfill the self-prescribed learning necessary to fully understand the aspects of each case with a learning facilitator serving only as a guide. In contrast, the clinical presentation-based curriculum relies more on experts to model and encourage inductive rather than deductive reasoning approaches toward clinical diagnoses.

Teachers and learning facilitators who foster self-directed learning in undergraduate medical education use online resources in a wide variety of ways. In a problem-based learning curriculum, a study was designed to explore why only a subset of medical students used the available online resources to fulfill their self-prescribed learning needs (Piskurich, 2004). We asked the students to describe experiences that they felt had made them better online learners. Interestingly, their comments included many of the behaviors that have been proposed for the improvement of self-directed learning (Guglielmino & Guglielmino, 2004).

Even for the more expert-driven clinical presentation-based medical school curriculum model, the effort to meet LCME accreditation standards is resulting in a push to move lecture content out of the lecture hall and to use class time for more active learning; thus more medical schools are embracing "flipped-classrooms" where various digital formats are used to move content previously delivered as in-class lectures to homework delivered online, thus freeing up class time for simulation and application exercises (Prober & Heath, 2012).

One drawback is that medical students who relied heavily on lectures delivered in lecture halls to attain the grades and standardized test scores to gain acceptance into medical school are initially reluctant to adopt these more self-directed approaches to learning. Initial resistance to self-directed learning has long been recognized (Long, 1994) and can result in poor student perceptions of faculty who employ teaching-learning interactions that foster self-direction. In the clinical-presentation model, audience response systems have been successfully utilized to give students a choice in the design of upcoming classes (Piskurich, 2012). Providing this opportunity for learner input into the class design and role of the learning facilitator had a positive impact on student level one evaluations, even when the sessions were delivered in the "flipped classroom" format.

In Practice: Using Technology to Facilitate Self-Direction in Business

Self-directed learning through technology has had a long history in business. Workplace learning professionals realized early on that multi-national and even nationwide businesses needed learning modules that could be easily accessed to ensure that consistent learning was happening across the entire organization. Finding print materials cumbersome and expensive, they quickly began to adopt technology-based delivery innovations, starting with slide/tape programs and filmstrips, followed by the initiation and soon wide use of video self-instructional packages that required self-initiation and self-pacing.

Video's ascendancy was short-lived however, as computer-based asynchronous learning programs quickly became one of private industry's major learning tools, first with stand-alone computers, then with CDs, and particularly when companies equipped their

employees' desks with a PC, and then connected them all within a network. Desktop learning became an everyday concept.

Today the marriage of self-directed learning and technology in private industry is alive and well. Computer-based training, CDs, and even DVDs have been supplanted in business's asynchronous world by Web-based training and by various blends of classroom, e-learning, e-books, and any number of other learning delivery techniques.

Workplace learning's reliance on the Web for asynchronous delivery has opened up entire new areas of technology-enhanced self-direction to business. This includes learning through mobile devices, podcasts, and programs or even personalized specific learning websites. These latter, through software packages such as Moodle, allow learners considerable choice in what they are going to learn, at what depth, and when.

Web-based internal communities of practice, where learners can not only learn from experts through postings, discussion boards, and chatrooms, but can share their own knowledge on topics of interest or concern, are proliferating in private industry. Also increasing is more informal social-network-based learning that many businesses now support, often including wikis and blogs, possibly the ultimate in technology-based self-direction.

Case Example: A Major Multi-National Energy Company

This case examines the use of technology for the delivery and augmentation of self-directed learning at a major multi-national energy company. The organization has resources located worldwide and encompasses a number of different cultures, with employee positions at all levels. Some of the cultures and countries have much lower educational standards than others, but the business has both a need and often a government-mandated requirement to deliver consistent learning across the entire corporation. The company relies upon self-directed learning in the form of asynchronous web-based training as a major component of its workplace learning process.

As the learners are required to learn on their own, with no instructors available to answer questions or explain difficult points, the programs are developed by internal instructional designers and subject matter experts who understand the content and the business. These teams work with asynchronous e-learning developers whose expertise is in programming and visualization.

These learning programs allow the company to save on the travel expenses of sending instructors all over the world or bringing learners to central locations for the learning. The programs have been so successful that the organization's orientation program now includes a segment on how to function as a self-directed learner. In its new acculturation program, which helps workers in third world countries where the educational system is inadequate to prepare for jobs with the company, there is also a section on functioning as a self-directed learner; but it is adjusted to the workers' specific culture.

To augment the asynchronous programs, the company has begun to re-purpose them as blended approaches, which might include virtual classrooms, e-books, e-videos, podcasts, and mobile learning aspects. These blended deliveries are accessed through a virtual learning environment (VLE) that provides entrance to all the component parts of the learning experience, including the asynchronous web-based training, and allows the learners to choose when to take best advantage of each part in their personal learning plan.

The VLE also provides communication mechanisms both to and from the learner and a facility for creating discussion boards, chatrooms, or simple postings, as well as question and answer facilities that connect directly to a subject matter expert's e-mail. To further enhance the self-directed aspect of the learning, the VLE posts content-based links to relevant websites for deeper exploration of concepts and links to both internal and external communities of practice, where learners can join wider-ranging discussions on issues of interest to them.

As with the theoretical construct of self-direction in learning itself, there are many components of workplace learning that have a greater or lesser degree of self-direction included. This particular example is just one of many.

In Practice: Using Technology to Facilitate Self-Direction in Informal Learning Settings

Information that is readily available through technology can become a valuable resource for a self-directed learner. For example, a YouTube video could provide a demonstration of how to lay a tile floor. There is an abundance of information provided on the Internet. Todd (1999) suggests that "Information and literacies embrace three overlapping dimensions: connecting to, interacting with, and using information. These dimensions focus on thinking, reasoning, and reflecting processes – cognitive doings – as well as behavioral doings" (p. 9). Todd goes on to point out that not only is there much information for learners to glean, there is actually an overabundance of information on the web. For transformational learning one needs to be able to search through the information using thinking, reasoning, and reflective skills to make sense of the content. The problem for a self-directed learner in using Internet resources is the ability to locate and synthesize the desired information as well as discern the validity of the information found.

Informal learning begins with a need to know how to do something (i.e., our "how to lay a tile floor" example above) and taking personal responsibility to learn how (SDL). Technology allows for instant access to both good and bad information. In the pre-Internet days one would purchase a "how to" book on laying tile. The book would have a gatekeeper (the publisher) to verify expertise of the author and quality of the provided education on how to lay tile. Today's technology allows for quick, easy, and inexpensive publishing of content to blogs, message boards, and video hosting websites. While one should take caution to examine the quality of the instruction, typically there are ratings and comment sections where previous learners have provided feedback concerning the usefulness of the information. Online resources producing good results are verified by users "liking" or giving a "thumbs up" or perhaps a "star rating," usually accompanied by comments on the instructional quality. Typically a learner will look at multiple resources, synthesize the information, and then apply the learning. The person laying the tile will put the newly learned content into practice, and the "final exam" for this SDL project will be the final product of new tile on the floor. The "course evaluation" will be the comments on the websites where the instructional resources were obtained.

Case Examples: Technology And Self-Direction In Everyday Life

Herbie's story is an example of the power of informal learning through the technology of the web. Herbie was an 8th grade school dropout. The structure of the classroom was an environment that he found oppressive. As an adult, Herbie was a general union laborer for many years. As he grew older into his late 50's the physical demands of the job became more difficult. About that time, Herbie bought a computer and taught himself to use it. Through the computer he discovered the power of the web and learning. As a result Herbie not only was able to take his GED and pass, he taught himself HTML and web design. Now in his mid 60's, Herbie has a small but thriving business building websites for small businesses.

Another example of how technology and self-direction link in everyday life is evident in this story that represents what a morning with technology might look like. Brenda awakes to the alarm clock on her cell phone and gets out of bed with her phone in hand. While she is getting dressed she uses her cell phone to check the local weather and check her agenda for the day. She opens an email from a client with the address of the office she will visit that morning, and she notices a new text message from a fast food restaurant with a coupon for a free breakfast item. Heading out the door, she grabs her iPad and puts it in her briefcase.

After starting her rental car, Brenda uses a touch screen on the dash of the car to search for a satellite radio station and then access a global positioning system (GPS) to get directions to her client's office. Typing in the address, she learns the estimated time to drive to the destination and receives a traffic update. She has never used this GPS, but discovers an option for "Restaurants" and is able to find the restaurant location she has the text coupon for. She can stop by on the way to her meeting. The audio directions take her through a maze of roads and highways, avoiding construction and a multi-car accident, to arrive at the restaurant in good time. She thinks "I never would have figured this out without the GPS guidance."

The efficient directions to the restaurant allow for extra time before her meeting. She is able to show the text message and get her free breakfast. She finds a seat and pulls out her iPad and is able to access the Internet through the free Wi-Fi provided. She discovers an urgent e-mail from her colleague at the home office. There is an attached updated presentation, as there was a critical error in the one she was originally going to use. Brenda reviews the new slide show she will present to her client and discovers content she does not understand. She searches the Internet and is able to learn what she needs to know. The remaining time during breakfast she works on a school project for an online course she is taking.

This case describes formal and informal learning in practice and Brenda's self-direction in using technology. However, perhaps there is even more SDL going on here. Perhaps Brenda is a middle-aged adult in a new career and just a year ago she had never used technology other than emails and word processing. Like many in her situation, she may have been somewhat fearful of trying new technology, fearing she might break it. While learning to use her new smart phone (her old "simple phone" died and the smart phone was the only option) and the Web-based learning environment for the online degree program she enrolled in, she discovered she could figure out how to use various technology devices. She comes to the conclusion that most of the software features

function similarly in that they contain drop down menus where eventually she can find what she needs. If she has trouble she can always go to an Internet search engine (e.g., Google) and search for tutorials and help guides. It would appear that learning to use the technology fostered a SDL approach to learning in all areas of her life.

As previously discussed, technology is being integrated into many higher education classrooms to extend access to information, implementation of productivity tools, and exposure to technology that will be found in the workplace. While students often need to be taught how to utilize technological tools in the educational process, most have had access to a plethora of technology that is utilized for entertainment, communication, and information. Many high school and college students now will search the web, while chatting (instant messaging) with a classmate, while listening to music, and talking on the phone with a friend. The technology has become ubiquitous so that the constant and ready access to current information, help seeking, portable communication, and a variety of applications have shifted learning in a variety of ways. TV's are now full computers with access to the internet. If you want to talk or instant message with an expert on a topic, click on the website real-time connection at any point in time, day or night. Use Skype or Facetime to see and hear in real time to interview or plan with those at a distance. Herbie, as mentioned above, can now learn whatever is required, to the depth and extent of interest, whenever is personally determined, at the space, place, and time of individual convenience.

The emergence of Massive Online Open Courses (MOOCs) has also begun to shift access to information and radically impact learning opportunities in everyday life. Despite the ongoing controversy regarding the leveraging of the readily available online learning materials on a wide array of content to transform higher education, the high quality of the expertise provided within existing MOOCs can be utilized as part of an independent quest for information. Couple these tools with Facebook, blogs, wikis, and other Web 2.0 technologies that bridge social elements to otherwise static learning options and the technology that surrounds us to support informal learning becomes robust in the ability to accommodate different learning styles and methods. Learning about technology and using technology to learn are a means for facilitating self-direction that can also transfer over to learning in other contexts, including but not limited to: formal and informal settings, a variety of disciplines, and the pursuit of individual and collective goals.

Conclusion

Technology permeates our society; one can hardly avoid using some form of technology on a daily basis. The rate of technological change has accelerated at such a pace that those who are not comfortable taking risks, engaging with, and integrating technology tools will be at a significant disadvantage in regard to access to information and productivity. To remain current and competitive, it becomes necessary to engage in self-directed learning in either autonomous or social ways, to assume responsibility for new technological developments as they enter the marketplace. While there are formalized options for learning how to use new technology, the rapid entry of new versions of software and devices such as the latest smartphone or tablet requires responsive and timely means of gaining knowledge and invites hands-on exploration. When using technology in everyday life, the learner must often take responsibility for gaining the skill to use new

devices or applications. Gaspar et al. (2009) claim that being a self-directed learner is essential for professionals in technological fields to stay current in their field. Technology users cannot be expected to learn the specifics of each individual application or device. Instead they need to learn to rely on a basic understanding of technology and take responsibility to learn what they need to know to fully incorporate new technology into their lives.

Information is a significant commodity that is now much more readily available through a number of technology tools. The Internet serves as a conduit to data, history, how-to-videos, articles, books, expertise, and other learners. Through the advent of MOOCs, YouTube videos, Facebook, and how-to websites, a simple search can provide information on anything you want or need to know. From how to make a cake pop to a scholarly source supporting the need for new guidelines on aviation training, the information is accessible at any time and any place with an available Internet connection, mostly for free. These resources open knowledge to those who historically would not have the means to come in contact with technology tools for facilitating independent learning. In addition to the web, there are a number of software tools, hardware tools, and help-seeking options that can assist learners in gaining access to information required for self-directed formal and informal learning projects.

The connections between technology, self-direction, and learning exist in multiple layers that, when enmeshed together, are difficult to separate and yet can independently provide a means for enhancing each of the other areas. While technology can be used as a medium for gaining access to information, as well as a content area to be learned about, it can also be used as a tool to facilitate self-directed activities. Specifically, in online learning and workplace explorations, individuals need to use learning strategies such as metacognition, time management, and self-regulated behaviors to be successful. The independent nature of anytime, anywhere, computer-mediated training propels learners into the need for and potential of an increase in self-directed behaviors.

Examples in higher education, business, and everyday life can be used as a vehicle to understand the vast array of ways that technology can be used to facilitate learning and expand self-direction. The age of the learner may be a variable that impacts the extent to which technology is used for educational purposes; however, learners of all ages now have greater access to both the tools and the connectivity that can fundamentally impact the learning process. While technology alone is not a panacea for learning challenges, the coupling of self-direction with technology does provide the opportunity to fundamentally alter the way in which people think about and conduct learning activities.

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THE MODERATING EFFECT OF THE SELF-DIRECTED LEARNING MEASUREMENT TOOL: A USER'S GUIDE

Stefanie L. Boyer, Diane R. Edmondson, and Andrew B. Artis

The relationship between self-directed learning (SDL) and other constructs varies depending on the measurement tool used in data collection and analysis. A meta-analysis of SDL research studies is used to explore the moderating effect of the measurement tool between SDL and constructs from adult education. This paper outlines the most commonly used measures to assess SDL and provides advice to researchers, trainers and employers on the appropriate tool given the goals of the assessment. Using multiple measures of SDL (contextual, behavioral and personal) along with output measures (job performance and learning effectiveness) will provide the most accurate assessment of SDL.

It is widely accepted that self-directed learning (SDL) promotes adult learning success in both academia (Brockett & Hiemstra, 1991; Knowles, 1975; Long, 2001; Speck, 1996) and practice (Artis & Harris, 2007; American Society for Training & Development, 2009; Boyer & Lambert, 2008; Burns, 1995; Durr, Guglielmino, & Guglielmino, 1996). There are over 1,600 articles and 600 dissertations on the topic in academia alone (Edmondson, Boyer, & Artis, 2012). Self-directed learning is measured in many ways, so in order to accurately understand the link between SDL and other constructs, it is important to identify how differences in the measurement tools impact results. Moreover, researchers and practitioners should identify the goals of measuring and using SDL for more successful assessment and effective implementation. This paper identifies the various forms of SDL measurement, explores any moderating effects of the measurement tools, and provides advice for employers, trainers, educators and researchers in selecting a tool to measure SDL.

Theoretical Background

In general, adult learning theory suggests that learners will be more successful in their learning efforts when given more control of the learning and when learning is applicable to the real world (Knowles, 1975; Speck, 1996). In fact, use of SDL transforms the paradigm of learning and training from teacher/trainer-centered to student/trainee-centered (Artis & Harris, 2007). Self-directedness can be innate, stemming from personal characteristics; it can be learned independently through practice; and its development can

be facilitated by an instructor. In fact, transformation theory (Mezirow, 1985) suggests that when people learn, develop new skills, and acquire knowledge, they change because their basic assumptions about the world evolve; in this way, their level of self-directedness can change.

Scholars conduct empirical research on SDL across the globe. Some of the constructs investigated alongside SDL and reported here include curiosity (the desire for knowledge; Barnes, 1998); life satisfaction (the extent to which a person likes him/herself, is happy with the way he/she is leading his/her life, and is generally satisfied with the way he/she is; Brockett, 1982); motivation (the degree to which an individual is self-motivated and achievement oriented; Livneh, 1988); SDL competence (knowledge and skill required for SDL; Savoy, 2004); self-efficacy (judgment of a person's own capability for successfully executing a course of action; Tuksinvarajarn, 2002); and support (the ability to get independent assistance related to learning; Yu, 1998). In addition, other demographic factors have been reviewed in relation to SDL, such as age and level of education. Since most of the research on SDL stems from the adult education literature, this research will extend our understanding of SDL by investigating whether SDL varies by age and if changes in SDL may be expected based on education level. The main focus of this research is to determine whether the scale type measuring SDL moderates the relationship between SDL and the constructs listed.

Purpose and Hypothesis

The focus of this meta-analysis was to investigate how the SDL measurement type moderates the SDL-construct relationship. The SDL literature examines a wide range of relationships between SDL measures and other constructs. For instance, the variance of correlations between SDL and curiosity is .1 to .79. With such a large variance, it is possible that a moderator exists that would help explain such a large range (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005). The authors propose that the variances in the relationships are due to the measurement type, given the various forms of measurement of SDL. Since there was so much emphasis on using the Self-Directed Learning Readiness Scale (SDLRS; Guglielmino, 1978) in the literature, the investigation focused on those studies using the SDLRS vs. those studies using another form of measurement of SDL. The following hypothesis was tested:

H1: Measurement type moderates the relationship between SDL and (a) age, (b) curiosity, (c) education, (d) life satisfaction, (e) motivation, (f) SDL competence,(g) self-efficacy and (h) support.

Literature Review Methodology and Outcomes

Prior to completing the moderator analysis, a detailed investigation of the measures used in self-directed learning research was completed. In order to ensure that the final

database was as representative and complete as possible, a multi-sampling approach was undertaken. First, a computer search of *ABI/Inform; PsycINFO; Wilson Web; Emerald; Science Direct; Ingenta; ERIC; OVID; Wiley Interscience*; OCLC First Search; *Web of Science* and *Dissertation Abstracts* was completed in order to identify relevant published and unpublished studies. These databases contain published articles, conference proceedings, and unpublished doctoral dissertations and master's theses. Any study containing the term self-directed learning, SDLRS, SDL, and self directed learning (no hyphen) in its title, abstract, and/or full text was considered. Second, the reference section of each article or dissertation identified from the above searches was reviewed. Third, manual searches of all issues of the *International Journal of Self-Directed Learning* were completed. Finally, we contacted leading researchers and knowledge centers on SDL to obtain information and lists on SDL research.

SDL Measures Used

The initial search process yielded over 1,400 articles and over 600 dissertations. Appendix A details measures from the literature and provides a brief description of each to provide a comprehensive list of SDL measures. These SDL measures were used to assess different variables within SDL research, such as those measuring personal characteristics like SDL readiness, and a factor related to underlying context and drivers of self-directed behaviors or tendencies. Some measures include other elements of SDL such as use of SDL in the form of hours spent, type of projects, number of projects, SDL related to work or other factors, and SDL competency.

Although there were a variety of self-directed learning measures used in the literature, based on our meta-analysis, there were five measures used most often to assess SDL. The SDLRS (Guglielmino, 1978) has been used more than any other instrument (800 times). The Oddi Continuing Learning Inventory (OCLI; Oddi, 1984) comes in as a distant second in usage compared to the SDLRS (about 25% usage in comparison). The number of hours spent using SDL based on Tough's (1979) recommendation of at least seven hours in the previous six month period was used to measure SDL 78 times, the BISL (Bartlett, 1999) was used 65 times, and the number of learning projects used within a specific period was assessed 41 times.

Studies Eligible for Inclusion in the Meta-Analysis

To be eligible for inclusion in the meta-analysis, a study must report a Pearson's correlation coefficient (r) or other statistics that can be converted to r (F value, t value, P value, and chi-square, χ^2). Additionally, for a construct to be considered, there had to be a sufficient number of studies that used either the SDLRS scale or one of the other measures listed in Table 3 (i.e., minimum of two studies per measurement type) This second criteria significantly reduced the number of variables that could be included in this meta-analysis, as a majority of studies used the SDLRS scale. The time frame of eligible studies included all studies available prior to August 2010.

Although the initial search process yielded over 1,400 articles and over 600 dissertations, only 273 studies included correlations or the appropriate statistics that can be converted to correlations. Unfortunately, due to the second criteria on SDL measurement type, only 82 studies were included in this analysis. These 82 studies included at least one

of the following constructs being investigated with SDL: age, curiosity, education, life satisfaction, motivation, SDL competence, self-efficacy, and support.

The authors coded each study on nine variables: sample size, industry, job type, average age, average educational level, SDL measurement type (SDLRS or Not SDLRS), reliability of both the SDL measure and the other variable scale, and the effect size (correlation). In order to check for coding quality, two researchers coded each study independently. All minor differences were resolved through discussion.

The 82 studies included in the meta-analysis rendered 126 correlations. The average study sample size across all constructs is 156. The average age and educational level, weighted by sample size, for the respondents in the meta-analysis were 32.25 and 15.8 years, respectively. A majority of the participants were college students from a wide variety of disciplines (i.e., community college students, nursing students, etc.).

Meta-Analytic Procedures

Because the SDLRS was the dominant scale used to measure self-directed learning in the literature, it was impossible to do moderator analyses for each individual SDL measure. Instead, moderator analyses were conducted examining the differences in the relationships between SDL and age, life satisfaction, SDL competence, self-efficacy, and support for those studies using the SDLRS and all other SDL measures.

After correcting for attenuation bias (Hunter & Schmidt, 2004) and Lipsey and Wilson's (2001) r-to-z transformation procedure, homogeneity analyses using the Q-statistic were completed for each of the SDL-variable relationships under investigation. A homogeneous or fixed-effects model implies that there are no other moderators that explain the relationship between SDL and the construct of interest while a heterogeneous or random-effects model implies that at least one moderator exists which allows one to generalize the findings to a wider population of studies (Field, 2001; Hedges & Vevea, 1998; Lipsey & Wilson, 2001). The Q-statistics ranged from 27 to 426.2 and each Q-statistic was found to be highly significant. This indicates a lack of homogeneity; therefore, a random-effects model was employed when analyzing each relationship.

Results

Meta-Analytic Results

Meta-analyses were conducted for each of the eight constructs listed in the hypothesis. Table 1 displays the results of the meta-analyses, including the number of independent studies (k), number of respondents in the sample (N), average weighted correlation corrected for attenuation (r), the standard error, the range of correlations, the Q-statistic, and the estimated fail-safe N statistic (also known as availability bias) for each construct. The fail-safe N's ranged from 72 to 378, with an average fail-safe of 213; therefore, all of the constructs passed the $5k + 10$ criterion set forth by Rosenthal (1979). The high numbers for fail-safe N's indicate that studies not included in the meta-analysis do not represent serious threats to the validity of the findings.

All eight of the SDL-variable relationships had correlations significantly different from zero. Using Cohen's (1977) rule of thumb for interpreting effect size magnitude, curiosity ($r = .40, p < .001$) and self-efficacy ($r = .41, p < .001$) exhibited strong positive relationships with SDL. The results also revealed a moderate positive relationship between SDL and age ($r = .18, p < .001$), education ($r = .20, p < .001$), life satisfaction ($r = .35, p < .001$), motivation ($r = .26, p < .001$), SDL competence ($r = .17, p < .001$), and support ($r = .21, p < .001$).

Table 1. *Summary of Meta-Analytic Results*

Construct	***k*[1]**	***N*[2]**	***r*[3]**	**SE[4]**	**Range of *r***	**Q Statistic[5]**	**Failsafe *N***
Age	36	6411	.18***	.04	-.27 - .69	426.2***	378
Curiosity	6	999	.40**	.14	.01 - .79	90.2***	154
Education	32	5557	.20***	.03	-.07 - .53	77.2***	313
Life Satisfaction	11	2036	.35***	.05	.18 - .62	44.5***	245
Motivation	8	1985	.26***	.06	.02 - .50	28.0***	96
SDL Competence	5	1402	.17*	.07	-.03 - .37	27.0***	72
Self-Efficacy	18	2292	.41***	.07	.13 - .60	148.1***	351
Support	10	1822	.21**	.07	-.10 - .46	67.3***	95

[1]Number of Studies; [2]Sample size; [3]Correlation corrected for attenuation bias and weighted by the inverse of the variance; [4]Standard error of the corrected average correlation r; [5]Q statistic for corrected average correlation *r*

* $p < .05$; ** $p < .01$; *** $p < .001$

SDLRS vs. Non-SDLRS Moderator Results

Results from the analyses examining the moderating effects of the SDLRS scale versus non-SDLRS measures are provided in Table 2. Five of the eight relationships were significantly moderated by the measurement used (SDLRS vs. non-SDLRS). Measurement type moderated the relationships between SDL and age (r_{SDLRS} =.21 vs. $r_{NonSDLRS}$ = .01), life satisfaction (r_{SDLRS} =.26 vs. $r_{NonSDLRS}$ = .42), SDL competence (r_{SDLRS} =.09 vs. $r_{NonSDLRS}$ = .22), self-efficacy (r_{SDLRS} =.37 vs. $r_{NonSDLRS}$ = .58), and support (r_{SDLRS} =.05 vs. $r_{NonSDLRS}$ = .41). Measurement type did not moderate the relationships between SDL and curiosity, education, and motivation.

Table 2. *Moderator Results*

Construct	Q-Statistic	SDLRS			Non-SDLRS		
		k	*R*	SE	*k*	*r*	SE
Age	36.97***	30	.21***	.01	4	.01	.03
Curiosity	.01	4	.40**	.05	2	.40***	.04
Education	1.69	23	.25***	.04	5	.20***	.02
Life Satisfaction	16.17***	5	.26***	.03	6	.42***	.04
Motivation	3.46	2	.35**	.06	5	.23**	.03
SDL Competence	5.85*	2	.09	.04	3	.22**	.03
Self-Efficacy	34.93***	15	.37***	.03	3	.58***	.04
Support	60.10***	5	.05	.03	4	.41***	.04

* $p < .05$; ** $p < .01$; *** $p < .00$

Conclusion and Discussion

The study illustrates that the type of measure used to assess SDL moderates the relationship between SDL and age, life satisfaction, SDL competence, self-efficacy and support. The discussion is very limited, since insufficient studies were found to do one-on-one comparisons of the various measures. Some of the non-SDLRS measures assess self-reported personal characteristics, such as attitudes, beliefs, and usual behaviors, as does the SDLRS, while others report on completed behaviors, such as hours spent in SDL or numbers of learning projects completed.

It is important to note that the relationships between SDL and some of the constructs used in the study do change depending on how SDL is measured. Therefore, factors such as age may implicate that learners will be more ready for SDL; however, as the data illustrate, age may not relate significantly to other measures of personal characteristics or other components of SDL such as the amount of time spent practicing SDL or the number of SDL activities completed, with the same strength. This is also true for life satisfaction, SDL competency, self-efficacy and support. However, since relationships with curiosity, education, and motivation did not change significantly depending on the measurement instrument, it is possible that the constructs are important in both readiness for SDL and other components of measurement of SDL, such as use of SDL and time spent using SDL. Therefore, these three components yield consistent results when measuring SDL using different measures. It is possible that there is an underlying factor that unifies them related to SDL since there is a positive relationship between SDL and each construct. While this is an interesting topic for examination, the relationship between SDL and the constructs is not the focus of the study. Rather, the study sought to determine if the measurement type moderated the relationships between SDL and constructs examined. The results can provide a foundation for future research and theory building.

Limitations

The limitations of the study are typical for meta-analytic research. Since a meta-analysis is a summation of research, it is only as strong as the original research that was collected and combined to create the meta-analysis. Given the large number of variables investigated with SDL and the various tools used to measure SDL, it was difficult to find enough studies to test the relationship and moderation of SDL. Therefore, it was only possible to analyze the studies that used the SDLRS vs. those that used other measures (non-SDLRS). While hundreds of constructs have been studied in conjunction with SDL over the past 50 years, eight constructs had sufficient studies to use in the meta-analysis exploring moderation. To fully understand the impact of measurement type moderation against a greater number of constructs, more research is needed to specify the findings. In addition, it is important to cast a wide net when conducting a meta-analysis in order to include all the relevant research on the topic. Although the level of methodological rigor varies in these studies, we are confident that it does not significantly impact the results.

Implications

The benefits of SDL have led to its widespread adoption. Over the past decade SDL has spread throughout the world and found its way into career development and training for diverse professions: managers (Rhee, 2003), physicians (Prado, Falbo, Falbo, & Figueiroa, 2011), nurses (Brydges, Carnahan, Rose, & Dubrowski, 2010), engineers (Jiusto & DiBiasio, 2006), teachers (Lom & Sullenger, 2011), athletic trainers (Armstrong, 2010), and trade union members (Kopsen, 2011). In order to get the most out of SDL, it is vital for organizations and educational and training institutions to not only measure SDL, but also to do it effectively.

Appropriate Uses of the Most Popular Measures

In order to effectively measure SDL, it is important to investigate the strengths and weaknesses of each of the major SDL measures. The measures of SDL should be selected based on the goals of the institution, the motivation for assessing SDL, the type of data collected and research questions presented. For instance, if the goal of the research is to understand how likely employees are to adopt a SDL culture in the workforce or academic setting, then a personal characteristic measure may be more appropriate.

If the intent is to understand if employees/students use SDL and how effectively they are using SDL, then it might be more appropriate to assess behavioral measures such as how often they use SDL, what types and number of projects they use, SDL competence, and an output measure of performance. Table 3 outlines the five most popular measures including what they measure and practical advice in deciding which one to deploy. These measures were selected because they were the most frequently used in published academic research. At the time of the study, each measure was implemented at least 40 times. Rank is based on the total number of times the measure was used in published academic research

Table 3. *SDL Measurement Usage Suggestions*

Scale	Rank [1]	What It Measures	Most Appropriate Usages
SDLRS	1	Eight underlying psychosocial factors of readiness for SDL: • Love of learning; • Self-concept as an effective, independent learner; • Tolerance of risk, ambiguity, and complexity in learning; • Creativity; • View of learning as a lifelong, beneficial process; • Initiative in learning; • Self-understanding; and • Acceptance of responsibility for one's own learning.	• Initial assessment: before beginning SDL training program or hiring a new employee. • Diagnostic assessment: when trouble or success with SDL usage; if there is a disparity based on contextual expectations. • The tool is administered and analyzed through the author of the scale, at Guglielmino & Associates. **MEASUREMENT CLASSIFICATION**: PERSONAL CHARACTERISTICS **WHERE TO USE:** WORK AND EDUCATION
OCLI	2	Personality characteristics regarding learning: • Proactive learner/drive, • Cognitive openness, • Commitment to learning.	• Initial assessment: before beginning SDL training program or hiring a new employee. • Diagnostic assessment: when trouble or success with SDL usage; if there is a disparity based on contextual expectations. • This may be very appropriate when motivational barriers to learning are detected. **MEASUREMENT CLASSIFICATION:** PERSONAL CHARACTERISTIC **WHERE TO USE**: WORK AND EDUCATION
SDL Hours	3	Number of hours spent on SDL in a specific period of time	• Pretest: before training to compare after training. • Assess training program: during and after the program to identify how much time individuals spend on SDL. • Should be used with another measure to explain (ex. the type and number of projects). **MEASUREMENT CLASSIFICATION:** BEHAVIORAL **WHERE TO USE**: WORK AND EDUCATION
BISL	4	Multiple factors: • time management, • extrinsic motivation, • external support, • self-efficacy at work, • peer learning, • supportive workplace, • attitude toward technology, • performance, • help-seeking, and • intrinsic motivation	• Initial assessment: before beginning SDL training program or hiring a new employee. • Diagnostic assessment: when trouble or success with SDL usage; if there is a disparity based on contextual expectations. • This scale adds multiple unique factors more appropriate for certain workplaces such as technology, which may not be relevant to all work environments and adds rich details about the learner in the form of help-seeking, contextual understanding and support. **MEASUREMENT CLASSIFICATION:** PERSONAL CHARACTERISTIC, CONTEXTUAL **WHERE TO USE**: WORK

# LP	5	Number of learning endeavors specific to the type of SDL under investigation: Examples include: • number of books read for professional development, • number of seminars/workshops attended, • number of self-implemented or self-planned learning experiences, etc.	• Pretest: before training to compare after training. • Assess training program: during and after the program to identify how many different SDL endeavors were taken on. • Should be used with another measure to explain (ex. the type of project categories, time spent on each). **MEASUREMENT CLASSIFICATION:** BEHAVIORAL **WHERE TO USE**: WORK AND EDUCATION

[1] Rank is measured by total number of times the measure was used in published academic research.

It should be noted that each of the measures has its own advantages. The most accurate forms of measurement can be taken through multiple assessments, and tell a richer story. This can be compared to diversifying a portfolio in the stock market to diminish risk. When measuring SDL variables, risk comes in the form of inaccurate measurement. Measuring behavioral use of SDL through the types and number of projects used can complement the measures linking back to personal characteristics, such as the SDLRS and OCLI. In addition, measuring personal characteristics such as in SDLRS and OCLI can explain to managers, educators and researchers why some individuals succeed while others fail, in addition to providing insight into what support is necessary for the learner. Using both provides more information for those who are serious about implementing SDL and seeing its benefits in training, education, and in the workplace. More specific implications are given below for employers, educators, and researchers.

Employers and HR

Personal characteristic measures can be used in the hiring process to assess how likely employees are to find success in using SDL to pursue the stated goals of the organization and their individual professional goals. These measures, coupled with contextual measures, can be used to fit employees into appropriate training programs with more or less support. In addition, if training programs and implementation fail or succeed, these measures can be employed to help explain these outcomes. Behavioral measures indicate effort; and, together with output measures of performance and learning, can provide support and justification for the SDL program.

Educators

Personal characteristic measures for assessment may be useful to determine if trainees/students are ready to use a SDL approaches while contextual measures may indicate important elements that impact the success of learners in a SDL environment. Also, while using SDL, it is important to assess outcomes through the number of projects, hours, and activities with appropriate performance measures related to the job or training. Educators can use multiple measurements of SDL to provide a more complete picture and analysis of individual learning.

Researchers

For researchers, the field is open. More quantitative data is necessary to conduct more sophisticated analyses. The measurement choice depends on the research questions to be answered and the goal of the researchers. Future research should assess the relationship among the measurement types at different time periods and within industries and stages of the training process. Researchers should consider measuring SDL multiple ways to compare the impact measurement has on the relationship between SDL and constructs of interest. In addition to this, researchers should focus their efforts to identify causality through their research and to use more sophisticated techniques to analyze the data.

In summary, the study illustrates that the type of SDL measure used moderates the relationship between SDL and some of the constructs examined. In assessing SDL, a multiple measure approach based on a clear expectation of what is to be measured should be implemented. Measuring usage and outputs like performance provide explanation about success. Personal characteristics and context are effective at diagnosing why a program succeeds or fails, and at determining the characteristics that may lead to successful implementation such as the support required for the individual learner.

Appendix A
Self-Directed Learning Measures

The variable names reflect the description of the measure in the literature. All of the items represent a form of measurement of SDL. Some of these are count measures, some are general scales that can be used in a variety of applications, and others have been specialized for implementation in a specific setting, such as on the job. A sample reference using each of these measures is included in the reference example column.

Measure	Variable	Description	Reference Example
Count: behaviors, activities, hours related to SDL	Number Events	Number of continuing education events	Swanson, 1987
	Number LP	Number of learning projects	Zabari, 1985
	Participation	Self-directed learning participation	Fisher, 1988
	SDL Hours	Number of hours spent on learning projects	Zabari, 1985
	SDLA	Self-directed learning activities	Savoy, 2004
General measures of personal characteristics, preferences, and other SDL-related constructs	APSI	Resource Associates Adolescent Personal Style Inventory	Lounsbury, et. al., 2003
	BISL	Bartlett-Kotrlik Inventory of Self-Directed Learning Scale	Bartlett, 1999
	Character	Characteristics of self-directed learning	McCoy, 2001
	Competency	Self-directed learning competency	Singh, 1993
	Concept	Concept of self as a learner	Moore, 1987
	Goal	Self-directed learning goal setting	Savoy, 2004
	LAL	Learning activity level	Heisel, 1985
	LPA	Learning Preference Assessment, same as Guglielmino's SDLRS (used when administered to avoid biased response)	Wall, Sersland, & Hoban,1996
	LPI Abstract	Learning Preference Index, Abstract Subscale	Purohit, 1979
	LPI Concrete	Learning Preference Index, Concrete Subscale	Purohit, 1979
	LPI Independent	Learning Preference Index, Independent Subscale	Purohit, 1979
	LPI Interpersonal	Learning Preference Index, Interpersonal Subscale	Purohit, 1979
	LPI Student	Learning Preference Index, Student Structured Subscale	Purohit, 1979
	LPI Teacher	Learning Preference Index, Teacher Structured Subscale	Purohit, 1979
	LPQ	Learning Profile Questionnaire	Confessore & Park, 2000
	LSI	Learning Styles Inventory	Carney, 1985
	LSI Activity	Activity subscale of LSI	Deroos, 1982
	LSI Concept	Concrete subscale of LSI	Deroos, 1982
	LSPQ	Learning Style Preference Questionnaire	Wang, 1998
	OCLI	Oddi Continuing Learning	Oddi, 1984

		Inventory	
	OCLI-General	OCLI-General Factor	Mast, 2000
	OCLI-Read	OCLI-Avidity for Reading	Mast, 2000
	OCLI-Reg	OCLI-Self Regulation	Mast, 2000
	Performance	SDL performance	Jude-York, 1991
	PRO-SDLS	SDL measure based on Personal Responsibility Orientation Model	Stockdale & Brockett, 2010
	Rates	Rates of personal independent learning	Moran, 1977
	SDLC-KS	Self-directed learning competencies	Savoy, 2004
	SDLC-OE	Self-directed learning competencies	Savoy, 2004
	SDLCSAF	Self-directed learning competencies self-appraisal form	Singh, 1993
	SDLPS	Self-Directed Learning Perception Scale	Pilling-Cormick, 2002
	SDLR	Self-directed learning readiness measure for nursing	Fisher, King, & Tague, 2001
	SDLR-K-96	Self-Directed Learning Readiness - K-96	Cho & Kwon, 2005
	SDLRS	Self-Directed Learning Readiness Scale	Guglielmino, 1978
	SDLRS-A	Self-Directed Learning Readiness Scale- Adult version	Johnson, 2001
	SDLRS-ABE	Self-Directed Learning Readiness Scale- General Population	Hoban, 1997
	SDLRS-child	Self-Directed Learning Readiness Scale- Child version	Hudson, 1986
	SDLRS-E	Self-Directed Learning Readiness Scale- elementary version	Cloud, 1992
	SDLS	Modified version of Makers Checklist	Milam, 1991
	SLAAP	Jarvis's 7 concepts	Nuckles, 1997
	Strategies	Motivational strategies for learning	LeJeune & Director-Stevens, 2002
Specialized situation-specific SDL scale	ENL/SDL	Extent of nutrition learning that is self-directed	Darling, 1991
	JAS	Job Activities Survey	Kalnins, 1986
	Job SDL	Job-related self-directed learning	Beard, 1991

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EMERGING SCHOLARS IN SELF-DIRECTED LEARNING: A FURTHER EXAMINATION OF IJSDL CITATION ANALYSIS DATA

Lila L. Holt, Becky C. Smeltzer, Ralph G. Brockett, Connie K. Shih, and Julia M. Kirk

This paper is a follow-up to a previous study, in which we presented a citation analysis of the *International Journal of Self-Directed Learning*. In this follow-up study, we focus specifically on citations of works that were published in 2003 or later. Our purpose is to identify major trends relative to emerging scholars and publications.

In a previous study, we reported on a citation analysis of the first 15 issues of the *International Journal of Self-Directed Learning* (Kirk, Shih, Smeltzer, Holt, & Brockett, 2012). By examining all citations from each article published in the journal, we were able to uncover trends relative to the most prominent contributors and most frequently cited publications in self-directed learning from this one publication devoted specifically to the study of self-directed learning. In doing this original analysis, we realized that many unanswered questions remained, which could be explored through further analysis.

Therefore, the purpose of this follow-up investigation is to gain an understanding of the emerging scholars and publications that have been influential specifically during the past decade. To do this, we have reexamined the original citation analysis data, focusing only on citations of publications dated 2003 or later in the first 15 issues of the *International Journal of Self-Directed Learning*.

The following research questions guided this investigation:

1. What are the most frequently cited publications dated 2003 or later in the first 15 issues of the *IJSDL*?
2. In the first 15 issues of the *IJSDL*, who are the most frequently cited authors of publications dated 2003 or later?
3. What do the patterns, frequency, and chronological distribution of citations dated 2003 or later reveal about more recent influences and current trends in the study of self-directed learning?

Literature Review

For more than a decade, members of the University of Tennessee Self-Directed Learning Research Group have undertaken a host of studies examining different areas of literature in SDL. The first of these studies was a content analysis of SDL literature appearing in 18 adult and continuing education periodicals published between 1980 and 1999 (Brockett et. al., 2001). Subsequent content analyses included studies of the International Self-Directed Learning Symposium proceedings (Stockdale, Fogerson, Robinson, & Walker, 2003), dissertation abstracts, (Canipe & Fogerson, 2004), and ERIC documents (Canipe, Fogerson, & Duffley-Renow, 2005). These studies provided descriptive information about major themes and trends in the SDL literature, including article types and research methods utilized.

Citation analysis differs from content analysis in that while the latter addresses the actual content of the publications being studied, the former focuses specifically on the reference lists of the articles under investigation. Thus, citation analysis makes it possible to identify the authors and publications that have influenced subsequent scholarship in an area of study. A study by Donaghy, Robinson, Wallace, Walker, and Brockett (2002) was an initial effort to undertake a citation analysis of the same articles identified by Brockett, et al. (2001) in their initial *content* analysis. However, it has been acknowledged that this study may have been flawed "due to inconsistencies among the researchers with data entry and analysis" (Kirk et. al., 2012).

In an effort to address problems in the earlier study, Conner, Carter, Dieffenderfer, and Brockett (2009) reviewed the citations in the articles identified in the Brockett et al. (2001) study, but extended the review to include articles published between 1980 and 2008. Using this study as a basic foundation, Kirk, et al. (2012) focused on the citation patterns of articles from one periodical established in 2004 that focuses specifically on self-directed learning. The current study is a further analysis of the data from this investigation.

To summarize, the UT SDL Research Group to date has conducted four *content* analyses: (a) articles on SDL from18 adult and continuing education periodicals (Brockett, et al., 2001), (b) several years of International Self-Directed Learning Symposium proceedings (Stockdale, et al., 2002), (c) SDL dissertation abstracts (Canipe & Fogerson, 2004), and (d) ERIC documents dealing with SDL (Canipe et. al., 2005). In addition, group members have presented three *citation* analysis studies: (a) a preliminary study (Donaghy, et al., 2002), (b) a more recent study covering the period 1980-2008 (Conner, et al., 2009), and (c) the citation analysis of the *International Journal of Self-Directed Learning* upon which the present study is based. For more detailed reviews of literature related to citation and content analysis, see the studies by Brockett, et al. (2001), Conner, et al. (2009), and Kirk, et al. (2012).

Procedure

This study is a secondary analysis of data reported by the authors (Kirk, et al.) in 2012. We conducted a citation analysis of the first 15 issues of the *IJSDL* in order to determine trends relative to the most frequently cited authors and publications. Our findings revealed that the most frequently cited sources were published in the 1960s, 1970s, and 1980s. More recent publications and authors did not make our list, in part because they had not been in the literature as long as the earlier sources. By focusing on those citations from publications that have appeared more recently (2003 or later), it is possible to determine which authors and publications that have appeared in the literature more recently have contributed substantially to the current literature of SDL.

The same verified data from the initial study were used for this paper. As described before, citations from the journals were entered into a relational database designed specifically for this project. The normalized data were entered, then verified and corrected during a three round process with totals checked. The data were also analyzed to provide consistency for authors and titles. At each step of the process an analysis of check totals within the database were run to help confirm item consistency and correctness.

Results

The scope of this study covered all 15 issues of the *IJSDL* published through early 2012. Within those issues, 82 articles were examined, which contained a total of 1,881 unique citations. Of these unique citations, 507 were published within the last 10 years – that is 2003 and after. Within these citations, there were a total of 653 authors. From the 82 articles examined, 71 articles contained citations from works published during 2003 and after. The 71 articles ranged from a low of one citation to a high of 38 citations. The average number of citations per article from 2003 and after was approximately 9. In addition to basic descriptive statistical information, the research questions were addressed to discover trends within the issues.

Question 1: What are the most frequently cited publications in the first 15 issues of the *IJSDL* published since 2003?

Of the 507 items cited that were published in 2003 or later, twelve items were cited four or more times in the IJSDL. They are listed in Table 1.

Question 2: In the first 15 issues of the *IJSDL*, who are the most frequently cited authors of publications dated 2003 or later?

Within citations dated 2003 and after that were referenced in the IJSDL, 26 authors were cited more than six times with ten authors being cited ten or more times. The citations demonstrate a continuity of established scholars in SDL continuing to publish in the last ten years who remain in the top tier of authors cited, while another group of authors shows trends of emerging as being consistently cited.

Table 1. *Publications Dated 2003 or Later That Are Cited Four or More Times in the IJSDL*

Rank	Citation	# Cited
1	Merriam, S., Caffarella, R., & Baumgartner, L. (2007). *Learning in adulthood: A comprehensive guide*. (3rd ed.). San Francisco: Jossey-Bass.	10
2*	Ponton, M., Derrick, G., Hall, J., Rhea, N., & Carr, P. B. (2005). The relationship between self-efficacy and autonomous learning: The development of new instrumentation. *International Journal of Self-Directed Learning*, *2*(1), 50-61.	6
2*	Confessore, G., & Park, E. (2004). Factor validation of the learner autonomy profile, version 3.0 and extraction of the short form. *International Journal of Self-Directed Learning* (1), 39-58.	6
4	Connolly, R. A. (2004). *The correlation between self-directed learning behavior and leadership effectiveness in a business environment* (Doctoral dissertation*). Dissertation Abstracts International, 65*(07) 2454.	5
4	Guglielmino, P. J., & Guglielmino, L. M. (2006). Culture, self-directed learning readiness, and per capita income in five countries. *SAM Advanced Management Journal*, *71* (2) 21-57.	5
4	Ponton, M. K., Derrick, M. G., & Carr, P. B. (2005). The relationship between resourcefulness and persistence in adult autonomous learning. *Adult Education Quarterly*, *55* (2), 116-128.	5
4	Stockdale, S., (2003). *Development of an instrument to measure self-directedness* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3092836)	5
8	Liddell, T. (2007). *Leading and learning: Approaches to leadership self-development among women executives of philanthropic organizations* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3296545)	5
8*	Guglielmino, L. M. (2008). Why self-directed learning? *International Journal of Self-Directed Learning*, *5* (1), 1-14.	4
8	Kandarian, F. (2004) *Executive learning related to high performance in two companies* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3135353)	4
8	Zsiga, P. L. (2007). *Self-directed learning readiness, strategic thinking and leader effectiveness in directors of a national nonprofit organization*. (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3269548)	4
8*	Guglielmino, L. M., Asper, D., Findley, B., Lunceford, C., McVey, S., Payne, S., Penney, G., & Phares, L. (2005). Common barriers, interrupters and restarters in the learning projects of highly self-directed adult learners. *International Journal of Self-Directed Learning, 2* (1), 71-96.	4

* Published in the IJSDL

Table 2 demonstrates authors rising into the top 25 of authors cited. It provides the author's rank in number of citations dated 2003 and after, the author's rank in the original study (number of citations regardless of date), and the total number of cites dated 2003 and after. Authors rising into the top 25 are denoted with an asterisk.

Table 2. *Emerging Authors from Publications Dated 2003 and After*

Rank	Original	# Cites	Author		
1	8	27	Ponton	MK	
2	2	25	Guglielmino	LM	
3	14	21	Derrick	MG	
4	11	18	Carr	PB	
5	10	12	Merriam	SB	
6	6	11	Guglielmino	PJ	
7	14	10	Caffarella	RS	
8	33	10	Baumgartner	LM	*
8	7	10	Confessore	GJ	
8	17	10	Park	EA	
10	3	9	Hiemstra	R	
10	1	9	Long	HB	
13	18	8	Bulik	RJ	
13	26	8	Oliveira	AL	*
13	20	8	Stockdale	SL	*
16	44	7	Lounsbury	JW	*
16	44	7	Phares	LT	*
16	44	7	Reio Jr	TG	*
16	44	7	Rhea	NE	*
20	51	6	Boyer	NR	*
20	4	6	Brockett	RG	
20	24	6	Fogerson	DL	
20	51	6	Gibson	L	*
20	51	6	Hall	JM	*
20	51	6	Liddell	TN	*
20	39	6	Peters	JM	*

* Authors rising into top 25

Question 3: What do the patterns, frequency, and chronological distribution of citations dated 2003 or later reveal about more recent influences and current trends in the study of self-directed learning?

While some of the data below may be expected, the data are offered for completeness of the analysis. Figure 1 indicates the number of citations from articles

published in 2003 and after in each journal issue. As might be expected, the number of citations increased with time.

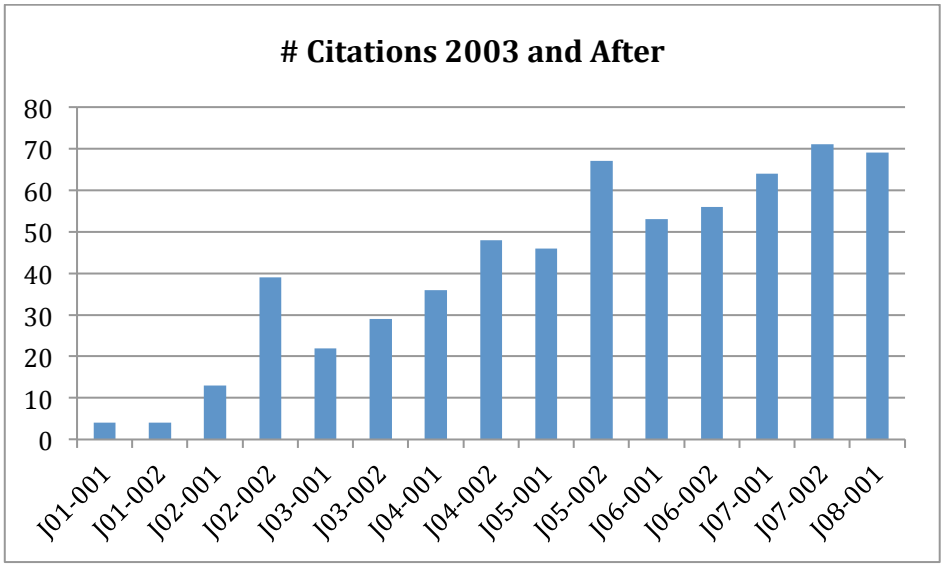

Figure 1. *Number of citations from articles published in 2003 and after*.

Table 3 provides a further breakdown of the data above, showing each journal, the number of citations, and the year the citations were published.

Table 3. *Number of Citations Per Year Published for Each Issue of IJSDL*

Journal	Journal Year	Total	2003	2004	2005	2006	2007	2008	2009	2010	2011
J01-001	2004	4	3	1							
J01-002	2004	4	3	1							
J02-001	2005	13	7	5	1						
J02-002	2005	39	11	14	14						
J03-001	2006	22	3	8	7	3	1				
J03-002	2006	29	7	7	7	3	5				
J04-001	2007	36	5	5	6	9	11				
J04-002	2007	48	7	9	4	15	10	3			
J05-001	2008	46	8	4	14	4	11	5			
J05-002	2008	67	12	18	16	11	5	3	2		
J06-001	2009	53	3	4	4	13	16	8	5		
J06-002	2009	56	4	2	8	9	11	8	9	5	
J07-001	2010	64	9	7	5	12	8	9	8	6	
J07-002	2010	71	9	8	11	7	9	7	7	11	2
J08-001	2011	69	7	4	8	7	10	6	11	10	6

Table 4 includes a breakdown of the top 12 citations from Table 1 above and indicates which journals contain those citations. The articles were distributed across the journals. Table 5 provides a more in-depth look at these 12 citations and includes the title and author of the citations as well as the titles and authors of the articles referring to the citations.

Table 4. *Top 12 Citations and When Cited*

Title	Total	J01 - 02	J02 - 02	J03 - 01	J03 - 02	J04 - 01	J04 - 02	J05 - 01	J05 - 02	J06 - 01	J06 - 02	J07 - 01	J07 - 02	J08 - 01
Learning in adulthood: A comprehensive guide	10				1	2	1	1			1	1	2	1
The relationship between self-efficacy and autonomous learning: The development of new instrumentation	6		1					1		1	1		2	
Factor validation of the learner autonomy profile, version 3.0 and extraction of the short form	6	1	2	1								2		
Culture, self-directed learning readiness, and per capita income in five countries	5							1	1	1		1		1
Development of an instrument to measure self-directedness	5				2							1	1	1
Learning and leading: Approaches to leadership self-development of women executives of philanthropic organizations	5							2		1			1	1
The correlation between self-directed learning behavior and leadership effectiveness in a business environment	5						1	1	1	1			1	
The relationship between resourcefulness and persistence in adult autonomous learning	5				1			1	1	1	1			
Common barriers, interrupters and restarters in the learning projects of highly self-directed adult learners	4				1			1			1		1	
Executive learning related to high performance in two companies	4						1		1	1			1	
Self-directed learning readiness, strategic thinking, and leader effectiveness in directors of a national nonprofit organization	4									2			1	1
Why self-directed learning?	4								1	1		1		1

Table 5. *Top 12 Citations and Where They Were Cited*

Citation #	Cited	Citation Title		Authors
1	**10**	***Learning in adulthood: A comprehensive guide.* (3rd ed.)**		***Merriam, S., Caffarella, R., & Baumgartner , L.***
		Journal Volume Cited In		**Citing Authors**
		1	J03-002	Scott, K.W.
		2	J04-001	Boyer, N. R.
		3	J04-001	Ricard, V. B.
		4	J04-002	Guglielmino, L. M., & Hillard, L. C.
		5	J05-001	Hollingsworth, G. M., & Scott, K. W.
		6	J06-002	Peters, J. M., Taylor, J. E., & Doi, M.
		7	J07-001	Francom, G. M.
		8	J07-002	McDonald, N. D., & McLaughlin, I.
		9	J07-001	Phares, L. T., & Guglielmino, L. M.,
		10	J08-001	Guglielmino, P. J., & Guglielmino, L. M.
2	**6**	***The relationship between self-efficacy and autonomous learning: The development of new instrumentation.***		***Ponton, M., Derrick, G., Hall, J., Rhea, N., & Carr, P.***
		Journal Volume Cited In		**Citing Authors**
		1	J02-002	Ponton, M., Derrick, G., Confessore, G., & Rhea, N.
		2	J05-001	Ponton, M., & Schuette, C. T.
		3	J06-001	Ponton, M., Schuette, C. T., & Confessore, G.
		4	J06-002	Bouchard, P.
		5	J07-002	Kop, R., & Fournier, H.
		6	J07-002	Ponton, M., Carr, P. B., Schuette, C. T., & Confessore, G.
3	**6**	***Factor validation of the learner autonomy profile, version 3.0 and extraction of the short form.***		***Confessore, G., & Park, E.***
		Journal Volume Cited In		**Citing Authors**
		1	J01-002	Park, E.
		2	J02-002	Ponton, M., Derrick, G., Confessore, G., & Rhea, N.
		3	J02-002	Confessore, G., Park, E., & Idrobo, I.
		4	J03-001	Park, E., Christmas, C., Schmaltz, H., & Durso, S. C.
		5	J07-001	Ng, S. F., & Confessore, G.
		6	J07-001	Francom, G. M.
4	**5**	***The correlation between self-directed learning behavior and leadership effectiveness in a business environment.***		***Connolly, R. A.***
		Journal Volume Cited In		***Citing Authors***
		1	J04-002	Zsiga, P. L., & Webster, M.
		2	J05-001	Liddell, T. N.
		3	J05-002	Zsiga, P. L.
		4	J06-001	Guglielmino, L. M., Gray, E., Arvary, K. L., Asen, J., Goldstein, D., Kamin, F., Nicoll, M., Patrick, N. E., Shellabarger, K., & Snowberger, D.
		5	J07-002	Phares, L. T., & Guglielmino, L. M.

Table 5. *Top 12 Citations and Where They Were Cited (continued)*

Citation #	Cited	Citation Title			Authors
5	**5**	***Culture, self-directed learning readiness, and per capita income in five countries.***			***Guglielmino, P. J., & Guglielmino, L. M.***
		Journal Volume Cited In		**Citing Authors**	
		1	J05-001	Guglielmino, L. M.	
		2	J05-002	Zsiga, P. L.	
		3	J06-001	Rowe, B.	
		4	J07-001	Oliveira, A. L., Silva, J. T., Guglielmino, L. M., & Guglielmino, P. J.	
		5	J08-001	Guglielmino, P. J., & Guglielmino, L. M.	
6	**5**	***The relationship between resourcefulness and persistence in adult autonomous learning.***			***Ponton, M. K., Derrick, M. B., & Carr, P. B.***
		Journal Volume Cited In		**Citing Authors**	
		1	J03-002	Scott, K. W.	
		2	J05-001	Ponton, M., & Schuette, C. T.	
		3	J05-002	Taylor, J. E.	
		4	J06-001	Confessore, G., Schuette, C. T., & Ponton, M.	
		5	J06-002	Hyland, N., & Kranzow, J.	
7	**5**	***Development of an instrument to measure self-directedness.***			***Stockdale, S.***
		Journal Volume Cited In		**Citing Authors**	
		1	J03-002	Fogerson, D. L., & Canipe, J. B.	
		2	J03-002	Brockett, R. G.	
		3	J07-001	Francom, G. M.	
		4	J07-002	Gibson, L. W., Lounsbury, J. W., & Kirwan, J. R.	
		5	J08-001	Hiemstra, R.	
8	**5**	***Leading and learning: Approaches to leadership self-development among women executives of philanthropic organizations.***			***Liddell, T.***
		Journal Volume Cited In		**Citing Authors**	
		1	J05-001	Guglielmino, L. M.	
		2	J05-001	Liddell, T. N.	
		3	J06-001	Guglielmino, L. M., Gray, E., Arvary, K. L., Asen, J., Goldstein, D., Kamin, F., Nicoll, M., Patrick, N. E., Shellabarger, K., & Snowberger, D.	
		4	J07-002	Phares, L. T., & Guglielmino, L. M.	
		5	J08-001	Guglielmino, P. J., & Guglielmino, L. M.	
9	**4**	***Why self-directed learning?***			***Guglielmino, L. M.***
		Journal Volume Cited In		**Citing Authors**	
		1	J05-002	Biasin, C.	
		2	J06-001	Guglielmino, L. M., Gray, E., Arvary, K. L., Asen, J., Goldstein, D., Kamin, F., Nicoll, M., Patrick, N. E., Shellabarger, K., & Snowberger, D.	
		3	J07-001	Francom, G. M.	
		4	J08-001	Hiemstra, R.	

Table 5. *Top 12 Citations and Where They Were Cited (continued)*

Citation #	Cited	Citation Title			Authors
10	**4**	***Executive learning related to high performance in two companies.***			***Kandarian, F.***
		Journal Volume Cited In		**Citing Authors**	
		1	J04-002	Zsiga, P. L., & Webster, M.	
		2	J05-002	Zsiga, P. L.	
		3	J06-001	Guglielmino, L. M., Gray, E., Arvary, K. L., Asen, J., Goldstein, D., Kamin, F., Nicoll, M., Patrick, N. E., Shellabarger, K., & Snowberger, D.	
		4	J07-002	Phares, L. T., & Guglielmino, L. M.	
11	**4**	***Self-directed learning readiness, strategic thinking and leader effectiveness in directors of a national nonprofit organization.***			***Zsiga, P. L.***
		Journal Volume Cited In		**Citing Authors**	
		1	J06-001	Guglielmino, L. M., Gray, E., Arvary, K. L., Asen, J., Goldstein, D., Kamin, F., Nicoll, M., Patrick, N. E., Shellabarger, K., & Snowberger, D.	
		2	J06-001	Zsiga, P. L., Liddell, T. N., & Muller, K. E.	
		3	J07-002	Phares, L. T., & Guglielmino, L. M.	
		4	J08-001	Guglielmino, P. J., & Guglielmino, L. M.	
12	**4**	***Common barriers, interrupters and restarters in the learning projects of highly self-directed adult learners.***			***Guglielmino, L. M., Asper, D., Findley, B., Lunceford, C., McVey, S., Payne, S., Penney, G., & Phares, L.***
		Journal Volume Cited In		**Citing Authors**	
		1	J03-002	Scott, K. W.	
		2	J05-001	Guglielmino, L. M.	
		3	J06-002	Bulik, R. J.	
		4	J07-002	Phares, L. T., & Guglielmino, L. M.	

Discussion

This study, like the previous investigation, was designed to contribute to an understanding the literature of SDL and, furthermore, is intended to identify scholars and publications that have made prominent contributions in the IJSDL through citations of their publications dated 2003 or later. The previous study of the complete set of articles indicates that several long-time SDL scholars made influential contributions. The findings of this study indicate that there may be a cadre of "next generation" scholars whose work may be likely to continue, influence, and expand scholarship in SDL in the foreseeable future. This finding addresses the first two research questions, as demonstrated in Tables 1 and 2.

The third question asks, what do the patterns, frequency, and chronological distribution of citations dated 2003 or later reveal about more recent influences and current trends in the study of self-directed learning? When examining the patterns and trends of articles cited within the ISJDL, one would expect that, over time, the

number of citations from more recent articles would increase. To verify this assumption for completeness of the analysis, Figure 2 and Table 3 are included within the results. While some variability is noted within individual years, the overall trend for more recent citations (those citations with date of 2003 or after) does increase throughout the journal articles. Table 3 expands on the information from Figure 2 to ascertain whether any one or two years dominate these citations. The results indicate that as time progresses, so does the use of more recent citations. Again, while there is some variation within the table results, the overall pattern indicates that as time advances so does the use of more recent literature within articles published in the IJSDL.

To further expand on the more recent influences and trends in SDL, Tables 4 and 5 examine the top 12 most frequent citations. Table 4 presents the number of times the references are cited per journal. While on occasion one of the top 12 articles will be cited twice within a single journal, more often each citation is referenced only once. Thus, the top 12 articles are continually being cited. The trending pattern of newer works continually being cited may indicate research is evolving and becoming a foundation of subsequent research.

Also interesting is a consideration of who is citing the top 12 citations. Upon examination of the top 12 citations a distinct pattern of authors emerged. These groups of authors appear to evolve from three distinct researchers. That is, the groups trend toward a primary author who has done much work in the areas of SDL. To best explore these groups of authors and research, an education "lineage" was created in Figure 2. Two of the groups emerged from students of H. B. Long; these include students who have worked with L. M. Guglielmino and G. Confessore. In these articles, each of the two had a distinct group of authors with whom they published. The third notable group draws from students of R. Hiemstra, through his former student, R. G. Brockett. In Table 5 (an expansion of Table 1) above, L. M. Guglielmino and her research group accounted for eight of the top citations, Confessore's group accounted for three, and Brockett's group accounted for one of the 12 most-cited articles. While further examination of this question is beyond the scope of the present discussion, we believe that a genealogy of scholarship in SDL could be a viable topic for future research.

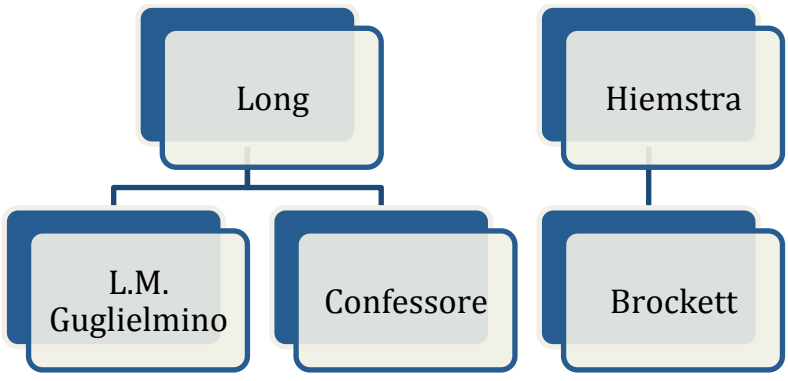

Figure 2. A preliminary "lineage" of SDL scholarship.

Conclusion

The findings of this study make a modest contribution to the study of the self-directed learning literature. Obviously, those scholars whose contributions were made prior to 2003 do not appear in the results. At the same time, there is a certain degree of continuity with certain authors who were active both prior to and since 2003 (e.g., L. M. Guglielmino, P. J. Guglielmino, H. B. Long, G. J. Confessore, R. Hiemstra, and R. Brockett). But the intent of this study was to determine whether a cadre of "emerging scholars" in self-directed learning could be identified. It appears that such a trend was found, as M. K. Ponton, M. G. Derrick, and P. B. Carr occupy three out of the top four positions.

One cannot claim that trends in a single journal necessarily reflect trends across an entire field of study. However, the IJSDL focuses exclusively on self-directed learning; thus, this study may be a starting point for future exploration. We recommend further investigation of citation patterns of SDL in other journals to inspect these and other trends in the field.

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