International Journal of Self-Directed Learning®

Volume 19, Number 1
Spring 2022

The *International Journal of Self-Directed Learning* (ISSN 1934-3701) is published biannually by the International Society for Self-Directed Learning. It is a refereed, electronic journal founded to disseminate scholarly papers that document research, theory, or innovative or exemplary practice in self-directed learning. Submission guidelines can be found at www.sdlglobal.com.

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Cover design by Gabrielle Consulting

International Journal of Self-Directed Learning

Volume 19, Number 1, Spring 2022

International Journal of Self-Directed Learning

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CONTENTS

THE ROLE OF SELF-DIRECTED LEARNING IN THE RELATIONSHIP BETWEEN MOTIVATION AND ACADEMIC SELF-EFFICACY OF TEACHER CANDIDATES IN TURKEY

Kasim Karataş

This study investigated the relationship between motivation and academic self-efficacy of teacher candidates during the COVID-19 pandemic period. In addition, the mediating role of self-directed learning skills was also explored. In this study that is based on a correlational design, data were collected from 992 teacher candidates studying in various undergraduate programs of 48 different faculties/colleges of education in Turkey. The data were analyzed using structural equation modeling and bootstrapping method. According to the findings, the significant relationships among the variables show that high motivation of teacher candidates is necessary for high academic self-efficacy, and their academic self-efficacy increases even more when they have self-directed learning skills. As a result, during the pandemic candidate teachers with high self-directed learning skills were able to keep their motivation and maintain their academic self-efficacy at a high level. Accordingly, such results could be useful for improving teacher training policies and program content during the pandemic.

Keywords: self-directed learning, motivation, academic self-efficacy, teacher candidates, COVID-19

Over most of the world, education and training processes have been disrupted because of the COVID-19 pandemic. Regardless of the educational level, all students from preschool to higher education have been negatively affected by the COVID-19 pandemic (Crawford et al., 2020). Undoubtedly, teacher training institutions and teacher candidates have also been negatively affected (Assunção Flores & Gago, 2020). In many countries, the training of teacher candidates continued and still continues using distance education tools. However, teacher training institutions in a number of countries could not successfully complete the technological transformation required in creating online learning opportunities (Akat & Karataş, 2020; Moyo, 2020). Similarly, all courses in teacher training programs could not be adapted to fit with the requirements of online learning (Osman, 2020; Van Nuland et al., 2020). In addition, teacher candidates were often unprepared for the online learning process. As a result of this, teacher candidates have been faced with incomplete and insufficient learning situations during the COVID-19 pandemic. Therefore, teacher candidates experienced a loss of

motivation during this process (Karakaya et al., 2020) and their academic self-efficacy was negatively affected (Alemany-Arrebola et al., 2020).

In the online learning process, there are certain skills that learners should have in order to achieve academic success, maintain their motivation, provide self-control over learning, and have academic self-efficacy. One of these skills is self-directed learning. It is stated that learners with self-directed learning skills will have high readiness for online learning (Fauzi & Khusuma, 2020; Karataş & Arpaci, 2021). In the same way, research has found that these skills have positive effects on learner motivation (Loizzo et al., 2017; Zhu et al., 2020), academic performance (Karataş & Başbay, 2014; Khalid et al., 2020; Rashid & Asghar, 2016) and academic self-efficacy (J. Kim, 2020; Yang et al., 2020). In this respect, teacher candidates should be self-directed learners.

There has been no previous study in the literature examining the relationship among teacher candidates' motivation levels, self-directed learning skills, and academic self-efficacy during the COVID-19 pandemic period. This study aimed to investigate the relationship between motivation and academic self-efficacy of teacher candidates during the COVID-19 pandemic period. The current study construction is based on self-determination theory (SDT; Ryan & Deci, 2020), explaining the dynamics of human needs and motivation within the social context and the terms of autonomy, relatedness, and competency as determinants of motivation. This theory and a number of studies based on this theory (Buch et al., 2015; Riley, 2016) imply that learners should have self-directed learning skills in order to be autonomous, to be motivated to the learning process, and to be able to persist with their academic tasks. Therefore, the assumptions of SDT were tested by examining the relationship among teacher candidates' motivation levels, self-directed learning skills, and academic self-efficacy. Furthermore, the mediating role of self-directed learning skills was also explored in the relationship between teacher candidates' motivation levels and academic self-efficacy. The original aspect of this study was that there has been no previous study examining the relationship among these three variables and that this relationship can be tested by establishing a model. In addition, it was thought that the research findings will make a significant contribution to teacher training programs and policies.

Literature Review

Motivation

Motivation is the process of initiating a targeted behavior and maintaining this behavior willingly. Motivation is multidimensional (Ryan & Deci, 2020) and is influenced by the physical and psychological needs of the person, previous experiences, and environmental variables. In addition, "motivation is an essential dimension of self-regulated learning" (Schunk & Zimmerman, 2012, p. 1). According to SDT, motivation is the degree of autonomy that individuals exhibit during the learning activity. SDT argues that supporting the needs of learners enhance intrinsic motivation and internalization, resulting in higher achievement. Theorists have stated that the intrinsic motivation level of learners positively affects their self-directed learning skills

(Willems & Lewalter, 2012). It has also been stated that learners with intrinsic motivation should be supported with extrinsic motivation sources to develop learner autonomy (Núñez & León, 2015). Alkan and Arslan (2019) suggested that motivation is required for autonomy and academic self-efficacy. In a similar way, the student must have the necessary motivation level to overcome online learning difficulties (Mahande & Akram, 2020; Shih et al., 2013). On the whole, motivation is an important element for academic self-efficacy, academic achievement, and self-directed learning.

Academic Self-Efficacy

Self-efficacy answers the question, "How well can I do that?" In other words, self-efficacy is the learner's belief regarding their competence in a particular action or field (Bandura, 1997). Self-efficacy is an important psychological consideration for learners to achieve learning goals, to choose learning strategies, and to achieve learning success (Ormrod, 2016). Within an academic context, self-efficacy is frequently described in terms of academic self-efficacy, which defines a learner's judgement concerning the ability to successfully attain educational goals (Elias & MacDonald, 2007). Learners with high academic self-efficacy are more likely to dedicate themselves to completing learning tasks. They are less likely to feel disappointed when faced with difficulties. Conversely, students with low levels of self-efficacy often cancel the learning tasks they have to face. Even if they are supported by their teachers or parents, they are less likely to devote themselves to these tasks (Britner & Pajares, 2006; Kiran & Sungur, 2012; Schunk, 2012). Over the years, theorists and researchers have reported that students' self-efficacy beliefs are correlated with motivational constructs and with students' academic achievement (Gün et al., 2020; Pajares, 1997; Zysberg & Schwabsky, 2020). Similarly, metacognitive thinking, problem solving, and self-directed learning skills are factors that increase academic self-efficacy (Lin et al., 2019). At the same time, an important component for academic self-efficacy is the learner's capacity to use online learning tools effectively (Abdous, 2019).

Self-Directed Learning

In the 21st century, in addition to the rapid increase in information technology, access to information has become easier thanks to the Internet and technology tools. Teachers are no longer the only source of information for learners. In the same way, school is not the only learning environment. Therefore, 21st century individuals are expected to conduct their own learning. Conceptualized as self-directed learning (SDL) in the literature, this learning strategy is a process of independently finding and acquiring knowledge (Garrison, 1997). In the literature, different scholars and theorists have presented different perspectives on SDL. Some scholars see SDL as a process of organizing instruction (Harrison, 1978) and is referred to as a goal that focuses on "a learner's desire or preference for assuming responsibility for learning" (Brockett & Hiemstra, 1991, p. 24); this includes the perspectives of SDL as a personal attribute as well as a learning process (Garrison, 1997). Personal attributes are robust cognitive strategies and characteristics that are brought by the learner to a specific learning

context (e.g., intrinsic motivation and resourcefulness; Song & Hill, 2007). Long (1989) identified three dimensions of self-directed learning: sociological, pedagogical, and psychological. Psychological self-direction is about the personal characteristics of the learner, skills to carry out self-directed learning. In the SDL process, it is related to the attributes of the learner about how much they can keep their control over the learning, how they provide their intrinsic motivation, and how much they can take responsibility for learning.

Knowles (1975) described SDL as 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). According to theorists, SDL involves a range of cognitive and metacognitive activities and fosters autonomy, choice, self-initiative, and decision-making strategies by the learner (Beach et al., 2020). Self-directed learners make plans by determining their learning goals and organizing how to access learning resources (Du Toit-Brits & Van Zyl, 2017). There are many cognitive and psychological structures associated with SDL skills (Karataş, 2017; Karataş & Zeybek, 2020). According to the assumptions of SDT, it is suggested that individuals have the necessary level of motivation to be self-directed learners (Power & Goodnough, 2019). Autonomous motivation is associated with individuals acting with a sense of volition and self-endorsement because they identify with an activity's value (Ryan & Deci, 2020). On the other hand, another factor that should accompany the motivation level of the individual in the process of self-directed learning is self-efficacy (Schumacher et al., 2013). Previous studies report that high self-efficacy beliefs are required for individuals to both attempt the SDL process and to cope with the difficulties they face (O. Kim, 2020; Saeid & Eslaminejad, 2017).

In light of the above information and according to assumptions regarding SDT; motivation, academic self-efficacy, and SDL skills are seen to be interrelated structures. The following hypotheses were tested in this study to verify these theoretically interrelated structures:

H_1: There is a positive relationship between motivation and SDL skills.
H_2: There is a positive relationship between motivation and academic self-efficacy.
H_3. There is a positive relationship between SDL skills and academic self-efficacy.
H_4. SDL skills mediates the relationship between motivation and academic self-efficacy.

Method

Research Design

This study which investigated whether or not SDL skills mediates the relationship between motivation and academic self-efficacy was designed with correlational research using quantitative techniques. Correlational research examines the relationships between variables without attempting the affect the relation between two

or more variables (Fraenkel et al., 2012). This study used structural equation modeling to test the hypothesized model.

Research Group

Data were collected from 992 teacher candidates studying in various undergraduate programs of 42 different faculties/colleges of education in Turkey. A total of 992 students voluntarily completed the survey; 73.6% of the participants were women while 26.4% were men. Their ages ranged between 18 and 46 years whereas the majority (80.6%) were aged between 20 and 23. In addition, 43 participants were freshmen, 238 sophomores, 537 juniors, 117 seniors, and 57 graduate students.

Instruments

The Self-Directed Learning Scale developed by Lounsbury et al. (2009) was used to determine SDL skills. The scale was adapted into Turkish by Demircioğlu et al. (2018). The scale's reliability and validity were examined using a sample of 272 university students. The scale consists of 10 items and has a single dimension. Within the scope of reliability studies, the test-retest correlation was .82 and the Cronbach alpha coefficient was found to be .85. Sample items are "I set my goals myself for what I will learn" and "If there is something I need to learn, I will quickly find a way to learn it." The measurement items are based on a 5-point Likert-type scale with values ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

The Brief Regulation of Motivation Scale developed by Kim et al. (2018) and adapted into Turkish by Saricam and Erdemir (2019) was used. The scale adaptation study was conducted using 312 university students. The scale has 12 items and two subdimensions including regulation of motivation (8 items) and willpower (4 items). A sample item for the regulation of motivation subdimension is "Even when working is difficult, I can find a way to keep myself going." A sample item for the willpower subdimension is "I force myself to continue reading even when a reading passage is really boring." The Cronbach alpha internal consistency coefficient was found to be $\alpha = .92$ for the entire scale, $\alpha = .93$ for the regulation of motivation subscale, and $\alpha = .93$ for the willpower subscale. The measurement items are based on a 5-point Likert-type scale with values ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

The Academic Self-Efficacy Scale developed by Jerusalem and Schwarzer (1981) and adapted into Turkish by Yilmaz et al. (2007) was used. The scale adaptation study was conducted with 672 university students. The original structure of the scale was confirmed as a result of the analysis. The scale consists of 7 items and has a single dimension. The measurement items are based on a 5-point Likert-type scale with values ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The Cronbach alpha reliability value of the scale was found to be .79. Sample items in the scale are "I am always in a position to accomplish what needs to be done in my education" and "I know very well what I have to do to get good grades."

Findings

Measurement Model Assessment

Cronbach's alpha and composite reliability (CR) was used to test measurement reliability. The Cronbach's alpha values ranged between .73 and .93, which exceeds the threshold value of .70 (Nunnally & Bernstein, 1994). Similarly, the CR values should be above .70 (Hair et al., 2014), and they are above .70 for all of the scales as shown in Table 1. These results suggest that the reliability of the scales is tenable (Kline, 2015). Furthermore, convergent validity was investigated to test the validity of the scales. To test convergent validity, an average variance extracted (AVE) of .40 or greater is considered acceptable in the social sciences (Scherer et al., 1988). The results shown in Table 1 indicate that the AVE values range between .42 and .46; thus, the convergent validity is considered satisfactory.

Table 1

Reliability, Divergent and Convergent Validity Results

Scale	α	CR	AVE
Self-Directed Learning (SDL)	.93	.89	.46
Academic Self- Efficacy (ASE)	.73	.83	.46
Motivation (MOT)	.89	.87	.42

A confirmatory factor analysis was carried out using SPSS AMOS (ver. 23) to assess factor structures of the instrument models and structural model. Considering the reference values suggested by Hair et al. (2006), the model fit indices presented in Table 2 indicate a good fit between the models and the data.

Hypothesis Testing

Structural equation modeling was used to test the mediating role of SDL in the relationship between motivation and academic self-efficacy. Bootstrapping with 5,000 bootstrap samples and 95% confidence interval (Hayes, 2017) was used to test direct, indirect, and total effects. The results shown in Table 3 suggest that motivation has a direct positive relationship with SDL skills (β = .637, t = 11.793, p < .001); thus, H_1 is supported. The results also indicate that motivation has a direct positive relationship with academic self-efficacy (β = .162, t = 3.974, p < .001); thus, H_2 is supported. The results indicate that SDL has a direct positive relationship with academic self-efficacy (β = .683, t = 12.637, p < .01); thus, H_3 is supported. Standardized indirect effects indicate that the lower limit and upper limit of the confidence interval did not include 0 (β = .435, LCL = .367, UCL = .511, p < .01); thus, the results suggest that SDL skills

significantly mediates the relationship between motivation and academic self-efficacy thereby supporting H_4.

Table 2

Model Fit Indexes

Fit Indices	Instruments Models			Structural Model	Ref. Value
	SDL	ASE	MOT		
χ^2 (*df*)	104.589 (25)	14.102 (4)	133.534 (46)	473.84 (121)	
p value	<.001	<.001	<.001	<.001	
χ^2/df	4.18	3.52	2.90	3.91	<5
GFI	.98	.99	.98	.95	≥ .90
AGFI	.95	.98	.96	.92	≥ .80
NFI	.98	.99	.98	.95	≥ .90
TLI	.97	.98	.98	.95	≥ .90
CFI	.98	.99	.99	.96	≥ .90
IFI	.98	.99	.98	.96	≥ .90
RMSEA	.05	.05	.04	.05	≤ .08
SRMR	.02	.01	.02	.03	≤ .08

Table 3

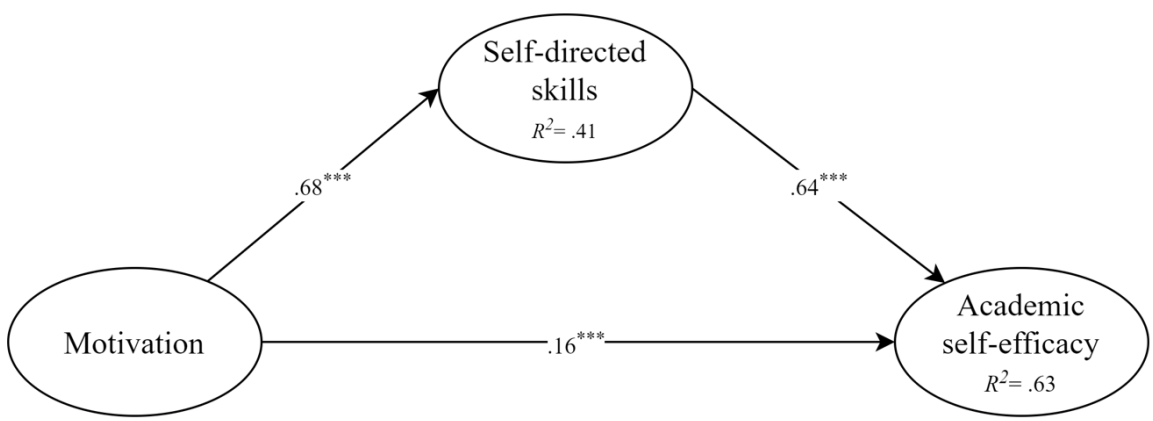
Hypotheses Testing Results

Direct, Indirect, and Total Effects	Estimate	*SE*	*LCL*	*UCL*	*p*
Standardized Direct Effects					
MOT→ SDL (H_1)	.637	.036	.563	.703	< .001
MOT → ASE (H_2)	.162	.052	.063	.270	< .001
SDL → ASE (H_3)	.683	.047	.586	.772	< .001
Standardized Indirect Effect					
MOT→ SDL→ ASE (H_4)	.435	.037	.367	.511	< .001
Standardized Total Effects					
MOT→ SDL	.637	.036	.563	.703	< .001
MOT → ASE	.597	.039	.516	.670	< .001
SDL → ASE	.683	.036	.586	.772	< .001

SE= Standard Error, *LCL* = Lower Confidence Limit, *UCL* = Upper Confidence Limit

Figure 1

The Structural Model



***p<.001, Indirect effect, β = .435, %95 BCA; MOT [0.367, 0.511]**

According to the results shown in Figure 1, it can be said that SDL skills have a mediating role in the relationship between motivation and academic self-efficacy. According to the R^2 values shown in Figure 1, motivation and SDL together explained 63% of the variance in academic self-efficacy; motivation explained 41% of the variance in SDL.

Discussion

This study investigated the relationship between motivation and academic self-efficacy of teacher candidates during the COVID-19 pandemic period. Furthermore, the mediating role of SDL skills was also explored. According to the findings, the significant relationships among the variables show that a high motivation of teacher candidates is related to high academic self-efficacy and that their academic self-efficacy increases even more when they have SDL skills. These findings indicate that the assumptions of SDT are supported. At the same time, these findings overlap with previous research findings in the literature (Khalid et al., 2020; J. Kim, 2020; Loizzo et al., 2017; Power & Goodnough, 2019; Rashid & Asghar, 2016; Saeid & Eslaminejad, 2017; Zhu et al., 2020). In addition, SDL skills were found to have a mediating role in the relationship between motivation and academic self-efficacy. In other words, if the individual's motivation for learning is supported by SDL skills, the level of academic self-efficacy is higher.

School climate, learning strategy, teaching method, and environmental and social characteristics shape a learner's perception of academic self-efficacy (Zysberg & Schwabsky, 2020). In order for learners to successfully complete an academic task, they must have motivation and academic self-efficacy (Ferla et al., 2009; Schunk & Pajares, 2002). Hyomin (2018) stated in his research that there is a positive correlation between SDL and academic achievement, and the factor that contributes to this increase is self-efficacy. Similar studies report that high level academic self-efficacy will bring high academic performance (Honicke & Broadbent, 2016; Yokoyama, 2019). On the other hand, in the SDL process, individuals determine their learning goals, determine their resources for learning, and try to reach the learning goal by determining various strategies. According to SDT, identification and integration of learning goals are a prerequisite for self-determined action. Motivational factors such as the importance of learning goals, strength, and relevance in shaping this SDL process are seen as precursors of the effective use of SDL skills (Kormos & Csizer, 2014). In this context, it is important for teacher candidates to have high motivation for learning and then gain SDL skills for their academic self-efficacy. Indeed, Kaulback (2020) found in his research that SDL abilities and learning motivation are positively correlated. The training process of teacher candidates has been mostly conducted via distance education during the COVID-19 pandemic period. A number of studies conducted in different countries show that teacher candidates could not get necessary, efficient training from online education and that learning permanence could not be achieved, meaning that their learning motivation decreased (Carrillo & Flores, 2020; Ozkaral & Bozyigit, 2020). In the same way, it has been reported that teacher candidates are not satisfied with the professional development process and have anxieties about acquiring the

profession's competencies (Duban & Sen, 2020; Sepulveda-Escobar & Morrison, 2020). It is vitally important that teacher candidates' journey to become qualified teachers is not interrupted. In this sense, a priority should be to train teacher candidates to increase their cognitive and affective capacities. While teacher training policies are shaped, teacher candidates should be trained to be self-directed learners. In fact, in the 21st century's age of information and technology, it has become inevitable for teacher candidates to be self-directed learners (Karataş & Zeybek, 2020). Mahlaba (2020) emphasized the importance of SDL skills for learners during the COVID-19 pandemic. He also stated that

> the COVID-19 pandemic has given learners a chance to take responsibility for their learning by diagnosing their learning needs, setting their own learning goals and executing individualized methods of learning to achieve identifiable learning goals and to evaluate their own learning. (p. 131)

Therefore, those who make the best use of this chance will be self-directed learners. Inevitably, the personal and professional development of teacher candidates who could not acquire SDL skills are negatively affected. They also encounter the risk of not being able to gain personal and professional qualifications. It is estimated that all these risky situations and negativities will negatively affect teacher candidates in the short term as well as the education system in the long term. Teachers who have not gained professional competence will not be able to provide efficient, effective instruction to their students. In this respect, teacher training programs should be restructured so that teacher candidates can be trained as self-directed learners. First of all, teacher candidates should be aware of the importance of being self-directed learners. Learning-teaching activities should be designed to increase their motivation and academic self-efficacy. Likewise, they should be equipped with knowledge and skills about how to use online learning tools. Teacher candidates should be trained in environments where technological learning tools are integrated. Teaching staff should encourage teacher candidates to become self-directed learners.

Limitations

Although this study is original in terms of showing that SDL has a significant indirect effect on the relationship between motivation and academic self-efficacy, the study has a number of limitations. Firstly, one limitation of this study is that it is a cross-sectional study. Another limitation is that teacher candidates responded according to their own perspectives while responding to the measurement tools. Therefore, longitudinal studies could be conducted to reveal and examine in-depth the factors that affect SDL. In addition, studies could be carried out by conducting qualitative research techniques. By conducting interviews with teacher candidates, instructors and other stakeholders affected by teacher training policies could get an answer to the question, "How can we train teacher candidates as self-directed learners?" These opinions are important in terms of guiding policy makers for teacher training. Finally, the generalizability of the

study's findings is possible for Turkey; however, this study should be repeated with teacher candidates from other countries or even with different variables related to SDL.

Informed Consent

Informed consent was obtained from all participants included in the study. Before data collection, an informed consent form was prepared to inform the students about the aim and cover of the study. The scientific use of the data was also emphasized in this form. Participation in the study was voluntary, and personal data were secured.

Acknowledgments

I would like to give my sincere thanks to Dr. Yakup Öz, Dr. Feyza Gün, and Muhammet Akat for their invaluable comments and suggestions that were very guiding and useful during the preparation and revision of the current article.

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"I HAD TO CHANGE": EMPOWERING STUDENTS THROUGH SELF-STUDY RESEARCH

Amy L. Damrow and Theodore P. El Faye

Many students find the transition to college coursework stressful and challenging. Decades of research in the cognitive sciences have provided data regarding effective ways to obtain and retain information; however, many students do not use these strategies. In this article, we embed a self-study designed, conducted, and written up by Teddy (second author) as an assignment in a course titled Educational Psychology taught by Amy (first author). This self-study sought to answer the following question: If I change my study methods and approaches to learning the material, will my test scores rise and my test anxiety sink? While small in scope and scale, this article brings student voice to the forefront and offers an example of how self-study research can foster iterative self-reflection, build academic self-efficacy, and support self-directed learning. Providing such opportunities within coursework can empower students to better understand their role in the learning process and act on that information. The approach can be especially transformative for students who are underprepared for higher education.

Keywords: self-directed learning, learning how to learn, teacher education, undergraduate research, self-efficacy

In 1995, Winne stated the following: "learners should develop and have the will to exercise effective means for self-directing their learning, whether that be in social-collaborative contexts or in contexts of chosen or forced solitude" (p. 174).

In response to COVID-19 during the spring 2020 semester, about 91% of universities globally transitioned to emergency remote instruction (Lee, 2020). This was challenging for students and educators at all levels (Esposito & Principi, 2020; Hodges et al., 2020). Some students did not have internet connectivity or were disadvantaged in myriad other ways including financial hardship and psychological stress. Institutions were encouraged to emphasize care and flexibility in working with students (Daniel, 2020). Individual instructors sought to provide cognitive, social, and emotional support for students who faced different challenges and had different needs. Instructors also faced different challenges and had different needs. For many students and instructors, their new college classroom—their home—was suddenly filled with human and other distractions. Some would surely describe this new learning environment as the opposite of Winne's (1995) "forced solitude" (p. 174) and yet many

students probably felt an uncomfortable combination of freedom and isolation. Jillian Kinzie, associate director of Indiana University's Center for Postsecondary Research and home to the National Survey of Student Engagement, noted that fall 2020's incoming freshmen "realize[d] how self-directed they need to be to thrive in virtual learning" (as cited in Lederman, 2020, para. 18). While students may recognize the need to be more self-directed, many do not yet consistently use the self-regulatory processes that support self-directed learning (SDL).

Increased remote and online instruction due to COVID-19 provide a backdrop for this article; however, problems related to effective studying and learning were present prior to the pandemic. Extensive research documents the academic challenges many early undergraduates face (Boyer & Usinger, 2015; Gabriel, 2008; Gravett & Kinchin, 2018; Kinzie et al., 2008; Leamnson, 1999; Van der Meer et al., 2010). Other scholars have focused on the critical role instructors can play in providing opportunities for students to strengthen self-regulatory processes, build self-efficacy, learn how to learn, and become more self-directed in that learning (Damrow, 2021; Bandura, 1997; Fink, 2013; Leamnson, 2002; Ponton & Carr, 2016b). This is especially important for preservice teachers who will model these skills for their own students (Currie-Knight et al., 2020; Dembo, 2001; Vrieling et al., 2017; Wagner, 2018; Yang, 2015). Finally, Teddy's (the second author's) course-related paper and the course assignment in general responded to the call to include more research, inquiry, and problem solving in undergraduate education (Boyer Commission, 1998; Brew & Mantai, 2017; Kinkead, 2003).

After elaborating on each of these areas, we will introduce ourselves and our context. Then we present the heart of our article: Self-Taught: A Self-Assessment to Cure My Testing Anxiety. Teddy designed, conducted, and wrote up this small study to meet research requirements for Educational Psychology, a required teacher education course taught by Amy (the first author) in the spring 2020 semester. We conclude the article with a call for more instuctors to help students work toward SDL by providing opportunities for self-study related to learning how to learn.

Academic Challenges of Early Undergraduates

Many students face significant transition challenges during their first year of university study (Gabriel, 2008; Leamnson, 1999; Van der Meer et al., 2010). In addition to inadequate planning and time management skills, many have not yet learned how to read strategically and for comprehension, to listen well, and to make notes that will contribute to understanding the content (Damrow, 2021). Absent explicit guidance and scaffolding, students may also struggle with independent and regular study and have limited strategies for effectively preparing for tests, exams, and even class (Leamnson, 1999; Van der Meer et al., 2010). As Bandura (1997) stated, "effective intellectual functioning requires understanding factual knowledge" and "metacognitive skills for how to organize, monitor, evaluate, and regulate one's thinking processes" (p. 223).

Students' metacognitive skills and their understanding of learning influences how they see their role in the learning process. For example, repetition of facts requires something different from students than does deep learning that matters beyond the class

and the university. In a study of second semester freshmen in Australia, Devlin (2002) sought to understand students' perceptions of their responsibility for their own learning. Devlin found that most of the 82 respondents had simplistic views of learning: 50% viewed learning as "increasing quantitative knowledge"; 11% as memorizing; 27% as acquiring facts to be used; 11% as understanding; 1% as seeing things in a different way; and 0% as "changing as a person"; thus, the majority of study participants had an essentially quantitative view of knowledge and saw "learning as an accumulation of the knowledge of others" (pp. 135–136). Naïve ideas about learning create obstacles for students to engage in significant and meaningful learning both during formal schooling and beyond it.

Instructor Role in Supporting Learner Self-Directedness

Course design is a powerful tool in making changes that better support students especially those who are underprepared for higher education (Devlin & McKay, 2018; Fink, 2013). Instructors support retention and engagement and empower students when they build their capacity to learn successfully (Damrow, 2021; Fink, 2013; Devlin & McKay, 2018; Ponton et al., 2016). Fink's (2013) "taxonomy of significant learning" (Fink, 2013, p. 31) describes an integrated approach to college course design that is learner-centered and holistic. Fink identified six major categories of learning. The category of particular interest to us is "learning how to learn": "Acquiring better studenting skills, learning how to inquire and construct knowledge on a specific subject, and learning how to become a self-directing learner" (p. 280). In this article, we focus on the first and third meanings. Fink's third meaning draws on the conceptual and theoretical groundwork laid by Knowles (1975) and the active role of the learner in diagnosing learning needs and designing a learning plan. Knowles (1975) defined SDL as follows:

> A process in which individuals take the initiative, with or without the help of others, in (1) diagnosing their learning needs, (2) formulating learning goals, (3) identifying human and material resources for learning, (4) choosing and implementing appropriate learning strategies and (5) evaluating learning outcomes. (p. 18)

Learner self-directedness is a prerequisite for SDL (Ponton & Carr, 2016a). If SDL is a goal of formal education, instructors must consider how they can support and encourage learner self-directedness.

Undergraduate Research in Higher Education

Complex cognitive processes such as reasoning, critical thinking, decision making, creative thinking, and problem solving are essential 21st century skills (Darling-Hammond et al., 2019). Undergraduate research, a high-impact educational practice, draws on these processes and can have particularly positive outcomes for underrepresented students (Boyer Commission, 1998; Brew & Mantai, 2017; Kuh et al., 2010). High-impact educational practice describes educational approaches that require

students' focused time and engagement to achieve deep learning (Kuh & O'Donnell, 2013). In recent decades, many universities, including our own, have increased opportunities for undergraduate students to engage in and present their research (Brew, 2013; Kuh et al., 2010). As Kinkead (2003) noted, preservice teachers are an important target group for universities to engage in undergraduate research since those experiences can promote their own ability to incorporate inquiry and discovery learning into their work in K-12 schools.

Definitions of undergraduate research—and what counts as research—vary widely. We adopt the definition from the Council on Undergraduate Research (n.d.): "A mentored investigation or creative inquiry conducted by undergraduates that seeks to make a scholarly or artistic contribution to knowledge" (para. 2). This broad description aligns with the invitation from Kent State University's (n.d.) Office of Student Research: "We encourage all students to work closely with faculty members, and engage in scholarly research and creative activities" (para. 1).

Our Context

Kent State University at Stark is a regional commuter campus in the midwest region of the United States with an enrollment of approximately 5,000 students. The campus has an open admission policy. According to the National Center for Education Statistics (n.d.), in 2020, 80.5% of students were White, and 65% of first-time, full-time freshmen returned after their first year.

Teddy is pursuing a degree in middle childhood education with concentrations in mathematics and science. He was enrolled in the course titled Educational Psychology during his second year of college. Amy primarily teaches first- and second-year undergraduate students intending to pursue careers in teaching.

Student learning outcomes for Educational Psychology are set by the Ohio Board of Regents. Of particular interest for this article is the expectation that students will be able to "*explain* [emphasis added] effective learning strategies (e.g., study strategies)." However, "students in educational psychology courses often don't acquire, or fail to use, appropriate learning strategies in their own learning" (Dembo, 2001, p. 26). Amy had also noticed this ironic disparity. During the semester when Teddy was enrolled in Educational Psychology, Amy was participating in the university's year-long Teaching Scholars Program. In that program, she encountered numerous androgogical resources that helped her begin to systematically address underdeveloped self-regulatory skills (Damrow, 2021). Two of the most influential resources were Fink's (2013) taxonomy of significant learning and Leamnson's (2002) *Learning (Your First Job).* Fink's taxonomy invited Amy to explicitly include learning how to learn in the syllabus and create course assignments that would support learner self-dirrectedness; Leamnson's piece invited students—including Teddy—to think about learning differently.

In January 2020, Amy began the semester with an assignment in which she asked students to read Leamnson's (2002) *Learning (Your First Job)* and write a short essay on what they found interesting, what they wanted to "try out" and how that was different from what they were already doing. Teddy wrote, "most writers do not take

the time to look deep into the student's eyes, and I feel Leamnson did." In addition, in response to a question on a get-to-know-you survey, Teddy had disagreed with the statement, "quizzes can be good opportunities for me to learn about what I know and understand and what I don't (yet) know and understand." Another question had asked students about their goals and what they would need to do to achieve them. Teddy had responded, "I will need to learn the study methods you were talking about in class."

Educational Psychology is a concept- and theory-heavy course. It introduces developmental and learning theories and processes such as planning, motivation, classroom management, and assessment. At Kent State University, all students enrolled in the course are expected to participate in research or a research assignment. In Amy's section, students learn about the role of research in improving teaching and learning and action research as an approach to solving problems of practice. In addition, all students complete a small research project for which students craft questions and conduct original research. Most students interview teachers or students or observe in classrooms; a few complete self-studies.

Teddy experienced distracting test anxiety and his initial plan included this research question: "Does test anxiety negatively affect test scores?" He proposed learning about the topic by "talking to different grade teachers and possibly some students about what they think about test anxiety." In feedback on the plan, Amy facilitated a "fortuitous intersection" (Ponton, 2016, p. 91) by encouraging a self-study.

Teddy: **More Effective Learning and Less Test Anxiety**

The self-study presented below documents critical steps I took to build my academic self-efficacy. I have removed sections of the paper, such as the literature review and the references, and edited the paper for clarity; however, the text that remains is nearly identical to the paper I submitted for class. It is a very personal connection with increasing my ability to grasp concepts in classes. Upon reflection, I was a role model slacker who needed to change but never had the motivation until I did the research and wrote my paper. Regarding study strategies and learning, I used to think that if I studied the test materials the night before, I would do decent on the test and in the class, and now I know that is never true. I may have gotten lucky sometimes and performed well, but I never retained the information and actually learned the material. I just remembered it until after the test, and sometimes not even up to the test. I have learned that I need to spread out my studying and do more than just look over the information.

Self-Taught: A Self-Assessment to Cure My Test Anxiety

The yearly routine of going through class after class and taking test after test is probably the most stressful part of any student's life. Having to remember information for four to five classes and be able to retain the knowledge for the big cumulative final or other classes down the road is the average challenge for a student. When it comes to testing, I have always felt that I am an anxious mess and that I am never right when it comes to answering what is asked. This feeling makes me second guess myself at all times. Due to this, I am wondering if it is the way I am preparing for tests that causes

me to feel so anxious during the test. I want to know, if I change my study methods and approaches to learning the material will my test scores rise and my test anxiety sink?

At the start of this academic year, I approached my classes how I have since high school. I would go to class, try to stay focused on what the teacher is talking about, and then the day or two before a test, begin to review the material. Of course, I did not feel as if I was going to get a perfect score. I just felt that I was going to do decent. As tests were passed out, I began to freak out and have a mental panic attack, which led me to worry more about how much time I was taking on the questions and how three of the four answers seemed right. Many other thoughts also rambled through my head. I ended up not doing well on the tests and started my year deep down in a hole.

The class that I was having the most trouble with was a biology course. I did not know what to expect from the first test, so I did not study very hard and went into it with no expectations. I just reviewed the slides before and then took it. Of course, this was not a smart way to prepare and my anxiety spiked during the test, causing me to do poorly. I ended up getting a 62.5% on the exam. Immediately after, I blamed the professor. I did not find the lectures engaging because the class was taught by just reading off slides. Deep down I knew I could have done more, but I decided to play the blame game.

I knew that my studying habits had never been the best, and I realized I needed the motivation to change what I was doing. The first thing that was motivating me was my overall grades. I had seen that they were not something I, or my dad, was proud of. My dad is a teacher, and he is never happy when he sees that I am receiving grades way below my abilities. His disappointment was a great source of motivation to change the way I studied; I was also tired of getting an hour lecture about how I am on Xbox too much and barely ever do schoolwork. The other reason that changed my motivation was that I had to write a paper on test anxiety and study strategies. I talked with my professor about this topic, and we agreed that a good topic would be a self-study on how if I change my study habits then maybe my anxiety will lower. This assignment made it so that I had to change my methods of studying in order to write the paper.

Method

The first thing I did was a self-assessment straight out of my Educational Psychology book (Santrock, 2018, p. 277). The self-assessment showed the parts of my studying and preparation that needed adjustment, which was almost everything. I realized that I am very disorganized and procrastinate most of the time. To help reduce the disorganization, I bought a planner. This purchase has helped me plan out before the test, or any assignment, what I need to do and when to do it.

Next, I started to use the “Self-Monitoring” self-assessment to help with recording my studying habits including date, assignment, time started, time finished, where, with whom, distractions, and self-efficacy (Santrock, 2018, p. 242). It helped show distractions I have, like my phone or people, and what I was studying and for how long.

I also used ideas from Leamnson's (2002) *Learning (Your First Job)*. The idea that stuck with me the most was the "making notes" method. I realized that I have never written my own notes; I have only taken what has been read off the board, and after that I only looked at it. Leamnson wrote about the difference in taking notes versus making notes. He stated taking notes is just copying what is on the board or being presented. He wrote about how people tend to fall behind while copying and do not pay attention to what is being said. He went on to explain that this is a way to obtain information but not knowledge. Leamnson (2002) wrote the following:

> The world is awash in information. All the books in the library have information, as do journals, magazines, and the uncountable number of websites and postings on the internet. All of this information is transferable from one medium to another, sometimes with lightening [*sic*] speed. *None of it, however, is knowledge!* The reason being that knowledge can only exist in someone's head. (p. 4)

This being said, I realized that just collecting information is not transferring into knowledge, and I needed to change my note taking into note making. I started to make my own notes and my own diagrams to gain the knowledge of the information.

The big concept I wanted to take from our textbook was that I needed to strengthen my theory of mind (Santrock, 2018, p. 281). This meant that I stayed aware of my tasks and what I have learned and what I need to improve. There were many methods on how to study and obtain a better understanding of knowledge including the PQ4R (preview, question, read, reflect, recite, and review) system.

Knowing that I was weak in remembering vocabulary, I made multiple Quizlets from the three main topics in my biology course: plant diversification, fungal diversification, and microbe diversification. There were a total of 115 terms and splitting them up helped tremendously. Knowing I would not be honest with myself just flipping through notecards, I used the "learn" mode on Quizlet. This is when they give you the definition and you have to type out the vocabulary word. I was not finished until I could answer them all three times to confirm that I remembered them.

Knowing that a test is not just straight vocabulary, I ventured to the diagrams and intense information of the unit. I wrote out multiple diagrams and made drawings to see the plant parts better. I would label and describe each part of the plant. I also watched the biology Crash Course videos on YouTube to get a different voice to teach what we were learning and to get a better understanding of how all the information is connected.

Lastly, I used my peers for help. I talked to multiple people in and out of my classes. I asked questions and just talked about the material to these people. Being able to discuss in real life conversation made the information easier to retain.

Results

After I changed my approaches to learning and studying, I felt pretty confident during the test. I was quick to realize that my anxiety was more tied into not being prepared for the test and getting flustered when seeing I did not understand the information and was

not able to connect the questions to the answers. After using new strategies, I was able to retain and use a lot more knowledge than I am used to using on a test. Due to this I flew through the test feeling pretty confident almost all the way through.

I ended up getting an 84% on the exam, which is a much better grade than the first time. Even though it is a B, I was very proud of it due to the fact that I self-taught myself most of the information. I have used these study methods on other tests now and have seen stupendous improvement.

Discussion

As I started using my study tactics, making my own notes, and fully retaining information, a dramatic change happened. The coronavirus hit the world and began taking over. State schools and universities made the change to remote schooling and everyone was now having to teach and learn through technology.

Online schooling came with its own bunches of anxiety provoking materials. I was finally getting comfortable and finding my way to study and remember class material. Now the switch to online made it so that there were no face-to-face connections, and the only way to talk to the class as a whole was through online group calls like Blackboard Collaborate. I did not know what to expect with my grades, especially when I already had trouble staying on task. All my classes now met about once a week for about 30 minutes each, and we still had all the assignments.

From what I have been able to tell, it is a lot harder to obtain information from the online classes because being at home is much more distracting than being in a classroom. However, my test anxiety is still lower since I started my new approaches to learning and studying. Now most of my classes are just open book tests with a due date. Other classes have timed tests that are multiple choice, and there is still time to look things up if I am unsure of the correct answer.

Conclusion

In my many years of being a student, I have never blamed myself as the reason I have done bad until this semester. This self-assessment and change in studying habits made me realize that it was always my fault and I needed to put the blame on myself. I was a student with average grades and below average studying habits. The drastic changes I made changed my outcomes on tests and helped me retain information. My entire mindset went from taking notes and placing information into my short-term memory in order to pass a test to making my own notes and diagrams and more effectively encoding information into my long-term memory.

Overall, I feel that this research paper has made a large difference in how I will accomplish and achieve the best possible education. I will use these strategies in upcoming semesters to make sure I am the most successful I can be. I believe if I follow my new methods, I can understand all the different classes and the materials that are thrown at me.

Discussion

Teddy began his research paper with a description of going through the motions of school and performing well enough to get by (cf. Boyer & Usinger, 2015; Fink, 2013). In the introduction, he expressed extrinsic motivation to make changes; that is, he sought to earn better grades, avoid nagging from his father, and complete an assignment. Self-assessments and reflecting on those exercises helped Teddy diagnose his learning needs. He became more aware of obstacles and how to overcome them. He began to think about learning and studying in new ways and identified human and material resources to support his learning (i.e., videos on YouTube, classmates, Quizlets, course resources on effective study strategies). In describing his approach, he explained why he chose specific strategies and why they were appropriate. He wrote about the difference between information and knowledge and discussed his efforts to understand both basic vocabulary (information) and the complex connections among course concepts that build toward expertise (knowledge). And, in the end, he evaluated his learning and the results of the study he designed both in terms of his grade and in terms of his cognitive self-efficacy. In essence, Teddy's self-study followed Knowles' (1975) definition of SDL with the inquiry process and the crafting of a research question replacing the formulation of learning goals.

Although skillful, academic self-directedness is time-consuming and effortful, investing significant time to merely remember information for the short term is a poor alternative. Teddy blamed himself for shortcomings in his approaches to studying in part because he came to realize that learning takes time and that learning was something he had to do for himself. For Teddy, self-blame was the first step in empowerment. He learned to recognize when academic failures were internal, unstable, and controllable (cf. Weiner, 1986). In other words, he came to understand that he had the cognitive skills to exercise control over his learning (cf. Bandura, 1997). Teddy applied strategies from Educational Psychology to better learn the content in a course that was important for his science specialization. He also gained confidence that he could learn content in the future even under conditions that he might view as less than optimal.

Students must do their part, and instructors at all levels can do more, sometimes much more, to help their students become better learners (Damrow, 2021; Fink, 2013). Articulating strategies that help students understand what doing their part means is an important first step. In order to boost enduring learning among more students, instructors can provide opportunities for students to use various strategies appropriate to the circumstances, consider their motivation, identify obstacles, monitor learning along the way, and reflect on the entire process. Instructors can also make space for students to create and evaluate their own learning plans (Ponton, 2016) as Teddy did through his self-study. For many students, self-efficacy to learn the performance is as important as self-efficacy in regard to the performance (Ponton et al., 2016).

Conclusion

The assignment at the heart of this paper required students to ask and respond to their own genuine questions thereby providing an invitation to examine a topic of interest and engage in some level of original research. Teddy selected the powerful tool of self-study research. His efforts in setting goals, using strategies, and monitoring his efforts improved his biology test scores and gave him the confidence to tackle future challenging coursework. This is important since students with strong self-efficacy eagerly approach challenging learning tasks and are more likely to persist (Schunk, 2008; Schunk & DiBenedetto, 2016). Taking upper division math and science courses during a pandemic was such a task.

Opportunities to practice self-directedness prepares students to learn more effectively under a wider range of circumstances. Strengthening students' skills as learners boosts self-efficacy in the use of cognitive and metacognitive skills thereby also promoting success in higher education and beyond (Bandura, 1997). For those pursing teaching careers, developing and honing these skills as college students will also enable them to model effective habits and explicitly teach them in their future classrooms (Vrieling et al., 2017).

When instructors are able to convince students that their courses are more than just information and that learning connects to life beyond the classroom and the university, they are better positioned to help students accept their role in learning (Fink, 2013). Empowered students who engage in rich academic practices begin to see themselves as people who engage in that type of academic practice (Tapp, 2013). They are then primed to direct their own learning in classrooms and beyond.

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INSTRUCTIONAL TECHNOLOGY INTEGRATION AND SELF-DIRECTED LEARNING: A DYNAMIC DUO FOR EDUCATION

Bryan Artman and Sherry R. Crow

This article explores the current research on teacher integration of instructional technology in their teaching practices. The literature shows that teachers continue, as they have for decades, to be reluctant and struggle to incorporate instructional technology resources into their lessons, depriving their students of needed skills and literacies. This article explores pairing technology integration with self-directed learning environments and activities as an alternative to address this long standing issue. The literature points to the potential of self-directed learning to address instructional technology integration issues because it places the emphasis and responsibility on the learner and takes advantage of their natural inclination for technology use.

Keywords: instructional technology integration, digital skills and literacies, self-directed learning, information and media literacy, information and communications technology literacy

It cannot be disputed that in order to be successful during and after high school, students need to acquire a 21st century skill set. At one time, a technology-based skill set was not always required for career success, but technology has become such an integral part of our daily lives that this is no longer the case (Izzo et al., 2010). In a technology-driven digital economy, learners will need to develop cognitive competencies matched with technology skills. Learners will need to be adaptive, curious, and able to continually learn new things and apply old knowledge to new contexts (Gleason, 2020).

The presence of technology in the classroom (laptops, tablets, projectors, etc.) and basic technology skills are not enough however; students must also develop critical thinking skills and the ability to solve complex problems (Kay & Greenhill, 2011; Kaufman, 2013; Saavedra & Opfer, 2012), and their teachers must help them do so. Students must know how to access and analyze information (Saavedra & Opfer, 2012) as well as know how to make innovative use of that information (Kay & Greenhill, 2011). Beyond the typical technology-based skill set (research, word processing, emailing, etc.), the digital economy requires students to acquire new literacies that are developing and evolving every day. In addition to conventional forms of literacy such as reading and writing, students must now develop information and media literacy

(IML; Kivunja, 2015; Kaufman, 2013) and information and communications technology (ICT) literacy (Kivunja, 2015) in order to be competitive.

IML is defined as

> the knowledge, the attitudes, and the sum of the skills needed to know when and what information is needed; where and how to obtain that information; how to evaluate it critically and organize it once it is found; and how to use it in an ethical way. (International Federation of Library Associations and Institutions, 2011, para. 2).

ICT, on the other hand, was defined by the Joint Information Systems Committee as the learners' ability to "adopt, adapt, and use digital devices, applications, and services" (Joint Information Systems Committee, 2014, Figure 1). Educational Testing Service (2002) defined ICT literacy as "using digital technology, communications tools, and/or networks to access, manage, integrate, evaluate and create information in order to function in a knowledge society" (p. 15). The two new literacies, IML and ICT, are best taught as an integrated part of students' education (American Association of School Librarians, 2018).

Student Benefits of Instructional Technology Integration

Multiple studies have shown that instructional technology integration in education benefits students (Gülbahar, 2007; Kim & Hannafin, 2011). Hicks (2011) stated that technology is more in tune with the visual and active learning style that is preferred by today's students and is better at holding their attention than traditional methods of disseminating, reviewing, and assessing instruction (i.e., lectures, tests, and worksheets). Technology based activities can aid in the development of students' critical thinking skills by stimulating student interest, clarifying complex concepts and procedures, scaffolding practice, and applying knowledge in real world contexts (Marczak, 2019).

Instructional technology integration in the classroom can provide many academic and social benefits for students across subject areas. McGrail and Davis (2011) reported on how the incorporation of blogging tools into writing instruction helped elementary school students enhance their writing skills. The use of blogs aided the students in connecting with their audience as well as increasing a sense of empowerment, motivation, and confidence as writers. The use of electronic portfolios in the elementary school setting has been shown to positively impact student literacy and self-regulated learning (Abrami et al., 2013). The incorporation of video creation activities in classrooms can be engaging and motivating activities for students. The ease of accessibility of video recording devices has made this type of activity more feasible for students and teachers (Morgan, 2013).

Physical instructional technology-based tools have also been shown to hold great potential to help students academically. Tablet-based interventions have shown the ability to increase math gains in elementary school settings (Outhwaite et al., 2017).

The use of classroom clickers has been shown to increase participation, promote engagement and active learning, and promote thinking skills (DeBourgh, 2008).

Why Teachers Don't Integrate Instructional Technology

When teachers struggle or are reluctant to integrate technology into their instruction, they deprive their students of the benefits of technology integration and the opportunity to develop needed 21st century skills and literacies. When this happens, not only are students negatively impacted during their time in the school system but also their ability to be successful in higher education and in the digital economy workplace is negatively impacted.

The literature shows that instructional technology integration in schools is still lacking (Ertmer et al., 2015; Kwon et al., 2019; Sánchez-Prieto et al., 2019; Xu & Zhu, 2020). An analysis of the literature on instructional technology integration reveals two main reasons why: teacher struggles and teacher reluctance.

Teacher Struggles

Teachers struggle to integrate technology into their instruction for a variety of reasons. Among the struggles that teachers encounter when trying to integrate instructional technology is a lack of class time (Hébert et al., 2021; Tarman et al., 2019). Among teachers who do integrate technology, ease of use is listed as a highly important factor (McCulloch et al., 2018). The lack of technology support has been shown to limit instructional technology integration and can lead teachers to halt their integration practices (Hsu & Kuan, 2013; Khlaif, 2018). Finally, an absence of instructional technology integration training or poor quality training can play a large role in whether or not a teacher struggles to integrate technology into their instruction (Hsu & Kuan, 2013; Khlaif, 2018).

Teacher Reluctance

Based on the available literature, teacher reluctance would appear to play an even larger role in the lack of classroom technology integration than the struggles teachers have with instructional technology integration itself. Teacher reluctance refers to beliefs, attitudes, and opinions that limit or prevent teachers' integration of instructional technology. Not surprisingly, teacher attitudes and beliefs toward instructional technology are some of the biggest predictors of how teachers will integrate technology (Ertmer et al., 2015; Khlaif, 2018; Kimaiyo et al., 2016; Sánchez-Prieto et al., 2019; Sugar et al., 2004). One of the greatest influences on teacher attitudes and beliefs towards instructional technology integration is teacher self-efficacy (Brinkerhoff, 2006; Ertmer et al., 2015). Teachers with low technology self-efficacy are shown to be more reluctant to attempt integration (Kwon et al., 2019). Low teacher self-efficacy tends to be the result of a lack of confidence in their own technology skills (Xu & Zhu, 2020). Research shows that teachers who do not believe in student-centered pedagogy (Ottenbreit-Leftwich et al., 2010) are more reluctant to integrate instructional

technology. Subject/culture clash (Xu & Zhu, 2020), or the belief that technology does not enhance or play a role in the teacher's specific subject expertise, also contributes to teacher reluctance to integrate technology. Teacher suspicion, or the belief or doubt that instructional technology integration will not benefit the student and is therefore a waste of time, contributes to teacher reluctance as well. Digital distraction, the concern that students will engage in off-task behavior, also contributes to teacher reluctance (Cho & Littenberg-Tobias, 2016; Hatakka et al., 2013). Some teachers may be reluctant to change how they teach because it impacts their identity as a teacher (Howard, 2013). Finally, a lack of willingness on the teacher's part to change their current practices (Ertmer, 2005) contributes to integration reluctance. This is in part due to the fact that teachers want technology integration to be easy (Khlaif, 2018), which is not always possible.

Clearly, the literature shows that teachers struggle or are reluctant to integrate instructional technology despite the evidence that students benefit from its integration in their education. The dichotomy of this situation could have far-reaching effects on the success of students in their education, future careers, and their ability to live in a digital society. One possible solution to this problem is the increased use of student self-directed learning (SDL) activities and environments along with instructional technology integration. What follows is a definition of SDL, discussions of the benefits of SDL to both students and teachers, and a discussion of how SDL can be used to enhance instructional technology integration practices in the classroom.

Self-Directed Learning

What is SDL?

Knowles (1975) defined SDL as per the following:

> SDL is 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)

According to Merriam et al. (2007), SDL is a process where individuals take charge of planning, continuing, and evaluating their learning and experiences. Tekkol and Demirel (2018) viewed SDL as a method of organizing learning in which learners control the task of learning. SDL can also be defined as the ability for a person to formulate a plan and identify the tools, resources, and strategies needed for one's own learning (McCoid et al., 2020). In short, SDL is the pathway for learners of any age to take charge of their own learning both in and out of the formal educational process.

Student Benefits of SDL

The literature shows that students benefit from SDL and SDL environments in many ways and is specific on how this is done. SDL is believed to be more in line with natural psychological development (Siriwongs, 2015) than traditional teacher-led instruction. SDL environments are highly collaborative with increased interactions between students and teacher as well as students and peers (Guthrie et al., 1997; Temple & Rodero, 1995). SDL is widely believed to improve student learning (Gureckis & Markant, 2012) perhaps because of the natural psychological development and additional collaborative interaction.

Students in a SDL setting are given greater independence (Nadi et al., 2011) and are free to choose what they want to learn (Gureckis & Markant, 2012). This independence enables students to take control of and take ownership and responsibility for their learning (Kim et al., 2014; Li et al., 2021). Students in SDL environments have also been shown to develop self-regulatory behaviors (Ardito, 2018) and, as a result, increased intrinsic motivation for the task at hand (Guglielmino, 1977; Ryan & Deci, 2017; Teo et al., 2010). SDL enables individuals to improve their self-confidence, autonomy, motivation, and lifelong learning skills (O'Shea, 2003).

In SDL environments, students can select, manage, and access their own ways of learning (Siriwongs, 2015) and find their own way to maximize retention of what they learn (Gureckis & Markant, 2012). Students in a SDL environment demonstrate awareness of their responsibility in learning and self-monitoring (Garrison, 1997). In this environment, control shifts from the teacher to the student, which enables student independence in goal setting (Morrow et al., 1993). These student benefits can also be seen as teacher benefits as they reduce the teachers' workload and put the responsibility of learning on the actual learner.

In addition to gains in attributes such as independence, responsibility, ownership, etc., SDL environments have been shown to produce subject matter and grade level specific benefits as well. In a 2012 study, Khodabandehlou et al. showed student achievement in reading classes with SDL strategies significantly outpaced achievement in classes with teacher-directed learning activities. Students with high SDL ability tend to achieve high-quality outcomes in extensive reading activities (Li et al., 2021). Kan'an and Osman (2015) found in their research that SDL students can depend on themselves more and have greater academic achievement in science. SDL ability has been proven to have significant impact on math attitude and achievement (Park et al., 2020) as well. Lew and Park (2015) showed a positive correlation between school achievement and SDL in middle school students across the curriculum. Previous studies have shown that SDL is associated with higher level thinking skills such as creativity, problem solving, and critical thinking (Tekkol & Demirel, 2018). SDL has also been shown to encourage students to learn both inside and outside the classroom (Siriwongs, 2015). These are skills that students need and will continue to need in order to be successful in higher education endeavors and in today's digital economy.

Teacher Benefits of SDL

In a SDL environment, students are expected to collaborate more with their peers and rely less on the teacher (Yasmin et al., 2019). This shift in responsibility allows the teacher to serve not as the owner and distributor of knowledge but rather in a facilitator role (Nasri, 2019; Yasmin et al., 2019). Students as digital natives (Prensky, 2001) likely have more success understanding and using technology tools than their teachers. As such, in a SDL environment the responsibility for understanding and using technology lies more with the students than the teacher. Indeed, if less technology-adept teachers are willing to integrate both technology and SDL into their classrooms, they can become more skilled with technology as they learn from and alongside their students.

In addition to the technology benefits for both students and teachers, increased student collaboration and teacher facilitation have been shown to create a lively and engaging learning atmosphere (Nasri, 2019). A lively and engaging atmosphere is not only more likely to reduce student behavior issues but also more likely to produce the type of environment where teachers feel more comfortable taking risks and integrating new instructional technology tools. A SDL, technology-integrated environment might also release some teacher stress, workload, and time constraints, which may help teachers conserve their energy throughout the day.

Using SDL to Enhance Technology Integration Practices in the Classroom

Using SDL to enhance instructional technology integration in instruction involves two steps: (a) establishing a healthy SDL environment and (b) planning technology integration activities for students to explore in that environment.

Establishing a Healthy SDL Environment

The literature gives several recommendations on the type of environment teachers need to establish to help their students be successful in SDL. As its foundation, the teacher and the school must create a culture that promotes self-direction (Martinez & McCrath, 2013). Du (2013) emphasized the importance of creating an environment of openness and trust. This would be especially important for students who come from traditional classrooms and are new to SDL. Initially, students need to feel safe and motivated to exert personal control over their learning environments (Hiemstra, 2013; Morris, 2018). The teacher provides this safety by promoting collaborative and contextually rich learning environments (Morris, 2020) that are based in real world contexts (Morris, 2018, 2020). The literature lays out several simple strategies teachers can implement in establishing healthy SDL environments. Student learning contracts (Hiemstra, 2013; Lowry, 1989; Robinson & Persky, 2020) in which the teacher and the student agree on what the student will learn and pursue is one of the most popular. Robinson and Persky (2020) recommended having students create their own individualized learning plans. Hiemstra (2013) recommended that teachers give students freedom in picking topics on an assignment, which increases the relevancy to the students. Crow and Henning (2020)

recommended giving students choice of presentation methods, including "tactile and dramatic options as well as electronic media" (p. 9).

As mentioned before, in a healthy SDL environment it is imperative that teachers gradually scaffold instruction as they move from the role of an instructor to the role of a guide or facilitator (Saxena, 2013). As a start, Martinez and McGrath (2013) stated that teachers should lead exercises where students identify what they want to learn. In this facilitator role, the teacher can help students be successful by providing encouragement (Lowry, 1989), sourcing appropriate information (Morris, 2020), and providing resources (Morris, 2019). Teachers working as facilitators in these environments should encourage students to take individual initiative and responsibility for their learning (Hiemstra, 2013; Morris, 2018).

Hiemstra (2013; see Figure 1) suggested six teacher facilitator roles that promote responsibility in students in a SDL environment:

1. Content resource - sharing expertise and knowledge through multiple media formats as well as advising, coaching, and conversations.
2. Resource locator - locating and sharing resources based on identified needs. These may be hardcopy resources, internet-based resources, or connections to experts.
3. Interest stimulator - arranging for and employing various resources and experiences designed to gain and hold the learners' interest.
4. Positive attitude generator - helping students gain confidence in personal learning decisions via constructive feedback, encouragement, and positive reinforcement.
5. Creativity and critical thinking stimulator - stimulating creative and critical thinking skills through a variety of discussions, discussion groups, and writing activities including blogs and biographies.
6. Evaluation stimulator - using the learning contract to evaluate the learners' progress and stimulate self-evaluation by the learner.

Instructional Technology Integration Activities for an SDL Environment

Many instructional technology activities are adaptable to a SDL environment. This is because the essence of good technology integration is self-direction (Saxena, 2013). WebQuests, mind maps, and self-paced lessons are easily available on the internet, mostly at little to no cost for educators. If teachers wish to create their own self-directed instructional materials such as podcasts, videos, and digital stories, tools to do so are also abundant and easily accessible (see Table 1).

Figure 1

Teacher Facilitator Roles (Based on Hiemstra, 2013)

Table 1

Online SDL Activities and Resources

Online SDL Activity	Description	Resources: Websites and Apps
WebQuests	A collaborative, inquiry-oriented online tool for learning where students assume different roles and responsibilities to address open ended questions.	webquest.org; thirteen.org; study.com; educationworld.com; createwebquest.com; areavibes.com; teach-nology.com
Mind Mapping	A visual thinking tool or a graphical representation of ideas and concepts. A means of brainstorming and collaborating on the development of new ideas and themes around a central concept.	bubbl.us; mindmup.com; lucidchart.com; mindmeister.com; miro.com; diagrams.net; stormboard.com; canva.com; GitMind; EdrawMind; coggle
Flipped Classroom	Prioritizing class time for hands-on, differentiated, personalized learning. Students address new material independently away from the classroom setting allowing for more time in the class to work with their understanding of the material.	schoology.com; Ted-Ed; Edpuzzle; Padlet; flippedclass.com; flippedclassroomworkshop.com; symbaloo.com; explaineverything.com; duolingo; nearpod.com; playposit.com
Podcast Creation	Students use podcast creation tools to create their own podcasts. The students can choose the topic from a range of options. The student and teacher can agree to content, length, etc. Students take the responsibility for creation, editing, posting, etc.	thepodcasthost.com; podcastinsights.com; podcaster.apple.com; podcastingresourcesguide.com
Digital Story Creation	Using computers and multimedia tools to bring stories and narratives to life. Digital stories can help students explain concepts, reflect, tell stories, create new content, and express themselves.	digitalstorytelling.coe.uh.edu; bookcreator.com; MapSkip; Storykit; Storybird; Adobe Slate; Toontastic; WeVideo; Storyline Online; Toontastic 3D; Boomwriter.com; Bubblr; MakeBeliefsComix; SlideStory
Video Creation and Video-based Responses.	Students use video recording software or apps to create their videos. Videos can be created in response to teacher prompts or based on student selected topics. Students take the responsibility for creation, editing, posting, etc.	flipgrid; voicethread, padlet; screencast-o-matic.com; camtasia.com; ezvid.com; jing.com; animoto.com; screencastify.com; vmaker.com
Self-paced Lessons	Students, with guidance from their teachers, select the lessons or research topics they want to pursue independently that reflect their interests.	Helpteaching.com; Coursera; Khan Academy; Smithsonian Learning Lab; Wonderopolis

Future Research

The literature clearly establishes the need for a change in teacher practices in order for students to be successful in PK-12 education, higher education, and a society based on a digital economy. The literature also shows that SDL environments and activities have the potential to provide the catalyst to help students acquire the needed skills and literacies if paired with IML and ICT instruction. There are, however, remaining questions that need to be answered and further research that should follow.

This area of research is fertile ground for a case study where both academic results as well as teacher and student reactions and observations can be gathered. Of specific interest is how students feel about the increased control of their education in comparison to how teachers feel giving up some of that control as a result of using SDL activities. Additionally, in order to fully address this important educational concern, other topics warrant research. What do teachers know about the 21st century skills that their students need and what impact would this knowledge have on their teaching practices? The impact of state and national teaching standards such as Common Core should be studied as well. Do state and national standards and their reliance on standardized testing help or hinder the students' acquisition of needed IML and ICT skills and literacies? Finally, what professional development or support would teachers need in order to implement SDL environments and activities paired with instruction of IML and ICT skills, and are schools and districts currently capable of providing the needed support to put these environments and activities in place?

Conclusion

What the literature shows is that the instructional technology integration issues, struggles, and reluctances that have plagued teachers for many years continue to do so. When teachers fail to integrate technology into their instruction, they make it harder for their students to gain the 21st century technology and critical thinking skills they need in school and later in life. SDL environments and activities, paired with instructional technology integration, have been shown to benefit teachers and students and have the potential to effect a change in this dynamic. This change in dynamic takes advantage of the digital native students' preference for technology, allowing them to integrate it themselves into their learning and develop the needed skills and literacies to be successful both in their education and in their future careers.

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