Myint Swe Khine
Tine Nielsen *Editors*

Academic Self-efficacy in Education

Nature, Assessment, and Research

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Part I
Introduction

Chapter 1
Current Status of Research on Academic Self-efficacy in Education

Myint Swe Khine and Tine Nielsen

Abstract Academic self-efficacy is a psychological construct that deals with an individual's belief about capabilities to learn or perform educational activities at designated levels. Academic self-efficacy is a critical component in theories of motivation and learning. Studies show that academic self-efficacy is domain-, context- or task-specific and associated with student engagement, study habits, learning styles, and personality. It can also predict and explain a wide range of students' activities and achievements in culturally and linguistically diverse educational contexts. This introduction provides an overview of the chapters, describes the unique approaches and innovative methods in assessing academic self-efficacy, and synthesizes the studies reported in this book.

Keywords Academic self-efficacy · Self-regulation · Self-concept · Achievement · Learning styles

Introduction

According to Bandura (1997), self-efficacy, self-concept, and self-regulation are beliefs that students can control on their own to maximize learning in and out of school settings. Self-efficacy influences choice of activities, effort, and motivation. Zimmerman, Bonner and Kovach (1996) also noted that the students have the power to become successful learners if they use a self-regulatory process to study more effectively. Self-evaluation and monitoring are the fundamental principles of self-regulated learning. Derived from self-concept and rooted in social cognitive theory, academic self-efficacy is a psychological construct that deals with an individual's beliefs about his/her own capabilities in relation to learning or performing educational activities at designated levels. Academic self-efficacy is a crucial component in

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theories of motivation and learning. Measurement and research on academic self-efficacy are receiving increasing recognition as it influences the educational outcomes. A substantial body of literature has consistently shown that academic self-efficacy is associated with student engagement, study habits, learning styles, and personality and predicts and explains a wide range of students' activities and achievements. Many investigations have been conducted and disseminated in the literature, and studies related to the role of academic self-efficacy are growing steadily. This book aims to document recent attempts to conduct systematic, prodigious, and multidisciplinary research in the role of academic self-efficacy and share their findings and identify areas for future research directions. The book also presents the outstanding and exemplary works by educators and researchers in the field, highlighting the recent advances, creative and unique approaches, and innovative methods in culturally and linguistically diverse educational contexts. The contributions stem from 12 countries around the world, namely Australia, Denmark, Finland, Germany, Italy, Kingdom of Bahrain, Mexico, New Zealand, Spain, Taiwan, The United States of America, and the United Kingdom.

This book is divided into five parts. This introductory chapter in Part I contextualizes and presents an overview of the chapters to inform the readers about the premise of the book. Part II covers chapters on assessment and measurement of academic self-efficacy in different contexts. The empirical studies on what shapes academic self-efficacy and studies related to the influence of academic self-efficacy are described in Part III and Part IV of the book. Finally, the concluding chapter in Part V synthesizes the various threads of discussion and potential areas of future research.

Assessment and Measurement of Academic Self-efficacy

Four chapters in Part II of this book cover self-efficacy assessment and measurement methods. This part begins with Chap. 2, in which DiBenedetto and Dale Schunk describe novel approaches to assessing self-efficacy. The possible assessment methodologies include surveys, diaries, case studies, traces, videos, think aloud, and microanalyses. The authors discuss the reliability and validity, strengths and limitations of each of these methods with vivid examples. The authors also made recommendations on how these methodologies can be used to measure academic self-efficacy in education.

The question of how to nurture learner self-efficacy beliefs in STEM education through the citizen science approach is discussed in Chap. 3 by Hiller and Kitsantas. The authors describe the types and aspects of citizen science programs that can support science self-efficacy. Citizen science is known for the process in which communities and individuals are involved in designing a research question, observing experiments, and collecting data with the involvement of volunteers. In this chapter, the authors review the empirical research on self-efficacy in citizen science programs and present the current trends in this area. They note that integrating various methods such as questionnaires, microanalytical measures, interviews, observational notes,

and student artifacts is needed to assess the impact of citizen science programs on student achievement and motivation. The authors then present a sample model of a citizen science intervention program with the aims of improving student motivation and achievement in a specific science topic.

Sánchez-Escobedo's subject for Chap. 4 is grid-type measures where item stems are rated across diverse domains or subjects measuring self-efficacy. The chapter reports on the design, development, and validation of the Mexican Self-efficacy Grid Scale (MSEGS), and its psychometric properties, advantages, and limitations are discussed. The data were collected from 1460 high-school students, and the analysis showed high validity and reliability across four subjects, namely English, Maths, Science, and Spanish. Confirmatory factor analysis (CFA) also indicates a good model fit. The author concluded that measuring self-efficacy using a grid-type instrument is cost-effective and able to differentiate self-efficacy in relation to different subjects.

In Chap. 5, Nielsen, Martínez-García, and Alastor present the psychometric properties of the Spanish translation of the Specific Academic Learning Self-efficacy Scale (SAL-SE) and the Specific Academic Exam Self-efficacy Scale (SAE-SE). The original versions of the instruments show high reliability and fit to the Rasch model with a sample of Danish Psychology students. The translated questionnaires were administered to 866 psychology students from two Spanish universities, and data were analyzed using DIGRAM software and R packages. The results showed less optimal measurement properties for the Spanish translation than in the original study, as both scales contained locally dependent items and evidence of differential items functioning was also found with both scales. Reliabilities were satisfactory. The results suggest that the instruments can be used for pedagogical purposes in improving teaching and learning practices and didactic methodologies to enhance student self-efficacy. The authors suggest using a mixed-method approach where focus group interviews are conducted to obtain qualitative data.

Empirical Studies on What Shapes Academic Self-efficacy

Part III of the book consists of six chapters that describe the empirical studies on what shapes academic self-efficacy. This part begins with Chap. 6 by Macakova and Wood, which chapter explores the factors that shape academic self-efficacy. The authors review the literature and identify factors that can potentially link academic self-efficacy and academic achievement. Among these factors are: mindset, basic psychological needs, satisfaction, attachment, and parental and social supports. The authors highlight that for young learners, the social support of parents impacts academic self-efficacy. Some evidence was also found that parents' educational ambitions can positively influence teenage children's academic self-efficacy. The authors suggest that these findings have implications in designing intervention strategies to promote academic self-efficacy among learners.

In Chap. 7, Liu, Cheng, and Chen review recent literature on how culture or cross-culture experience can influence or be influenced by students' academic self-efficacy. The chapter begins by discussing academic self-efficacy, referring to the cultural dimension model postulated by renowned researchers Hofstede and Oyserman et al. The authors note that students' academic self-efficacy in the collectivistic countries in the East is lower, and in individualistic countries in the West is higher. However, the authors emphasize that it is important to define what the cultural dimensions are.

Peura, Aro, Räikkönen, Viholainen, and Aro explore children's academic self-efficacy in reading and reading development and present their findings in Chap. 8. Using Bandura's (1997) theory, the authors classify the self-efficacy beliefs at three levels—general, intermediate, and specific. While the general level refers to beliefs about one's capabilities at the general level, the intermediate level refers to certain competencies and sub-skills. The specific level of self-efficacy belief refers to one's capacity to perform a particular task. In their chapter, the authors focus on four sources of self-efficacy and children's reading skills and present some examples of how self-efficacy can be supported. The authors highlight that self-efficacy beliefs should be monitored and different strategies such as differentiated instruction for different groups should be used for improvement.

The role of motivation, positivity, and resilience in developing self-efficacy is the topic of discussion in Chap. 9. The research project by Wood, Tramontano, and Hemsley set out to examine the extent to which children's self-efficacy (academic, emotional, and social) can be explained by individual differences in motivation, positivity, and resilience. The study also explores whether the age and gender of pupils influence these patterns. The study involved 3799 students in Key Stage 2, years 3, 4, 5, and 6 in the UK schools. The 47-item Wellbeing and Attitudes to Learning Survey was administered to the children to measure the levels of motivation, positivity, and resilience. The authors found that positivity and resilience were contributing to the children's self-efficacy beliefs. The results also indicate that intrinsic motivation contributed to the children's emotional and academic self-efficacy only, and extrinsic motivation contributed to social self-efficacy alone. The authors suggest that findings will be helpful to plan intervention strategies in developing self-efficacy among students.

In Chap. 10, Stephen and Rockinson-Szapkiw discuss the importance of online students' persistence in their study and suggest strategies to promote online learning self-efficacy. The authors draw on an extensive literature review to define online learning self-efficacy and suggest high-impact practices (HIPs) to improve student success and persistence. HIPs are active learning practices, and ten practices that can promote student success through engagement are identified. One of the practices is first-year seminars, and the authors elaborate on the content of the seminar and how such activity can be organized. Some recommended practices for instructors are also provided.

Empirical Studies on Influence of Academic Self-efficacy

Part IV of the book consists of four chapters that describe the empirical studies on the influence of academic self-efficacy on academic achievement. This part begins with Chap. 11, in which Afari and Eksail present their findings on the mediating role of academic self-efficacy and its association with learning environment constructs, such as involvement and mathematics achievement. Their study used an eight-item Academic Self-efficacy Scale based on Morgan-Jinks Student Efficacy Scale (MJSES). Another eight-item questionnaire was used to measure the level of involvement in their lessons. To assess students' mathematics achievement, their final exam scores in that semester were considered. Structural equation modeling was used to determine the structural relationships between involvement, academic self-efficacy, and mathematics achievement. The resulting model suggests that 25.4% of the variance of academic self-efficacy was explained by involvement. The results furthermore suggest that students' academic self-efficacy could mediate the relationship between students' involvement and mathematics achievement.

In Chap. 12, Lin, Longobardi, and Bozzato provide the results from their study on the impact of academic self-efficacy on academic motivation. The study involves 1008 undergraduate students in a university in Italy. The participants completed the online questionnaire with the Italian versions of the Perceived Academic Self-efficacy Scale, the Academic Motivation Scale, and the Future Education Scale of the Prospective Life Course Questionnaire. Path analysis showed that academic self-efficacy positively predicted future orientation when controlling for age and academic subjects. Students' future orientation played a fully mediating role between academic self-efficacy and extrinsic motivation and amotivation and played a partial mediating role between academic self-efficacy and intrinsic motivation. The authors suggest how improvement of students' future orientation can affect their motivation to study.

Every third student in the OECD countries drops out from studying, and most of them are lost in their first year of higher education. It has previously been shown that academic self-efficacy is a strong predictor for dropout intentions. Petri and Braun (Chap. 13) use a longitudinal design to explore further the role of academic self-efficacy in dropout from higher education. Their study involves 424 freshmen and examines the trajectories of self-efficacy during their course of study. With the use of the 13-item Freshmen Self-efficacy (FSE) Scale, data were collected at three points—beginning of the first semester, end of the first semester, and finally at the end of the second semester a period that spans nine months. The students were also asked about their intentions to drop out of the study. The results show that repeated measurements of academic self-efficacy can provide useful information toward reducing dropout rates, and Freshmen Self-efficacy can be a reliable predictor of dropout.

In Chap. 14, Dixon and Ward discuss academic self-efficacy and its influence on teachers' postgraduate study experiences in the New Zealand context. The authors posit that postgraduate study expectations are significantly different from undergraduate courses and demand a higher degree of academic self-efficacy. The research is situated within the interpretivist paradigm and collected the qualitative data from

27 master graduates who are practicing teachers. The study is based on six focus group interviews conducted to enable researchers to understand the individual's belief, feeling, and their behavior. The study contributes to the knowledge of the postgraduate students' perspectives on how strong beliefs in themselves and their capabilities were a significant motivational force toward getting their teacher qualification. The authors outlined some of the practical ways lecturers can take to support the development of robust academic self-efficacy beliefs in the students.

In the final chapter (Chap. 15), the editors examined and summarized the future directions for research in academic self-efficacy as these arise from the volume chapters addressing assessment and measurement of academic self-efficacy, what shapes academic self-efficacy, and what academic self-efficacy influences. The editors also addressed the specific issues associated with research designs, models, and analyses presented in the volume chapters, and these might be addressed further in future research on academic self-efficacy. The chapter consolidates understandings about academic self-efficacy and explains the trends and future research directions on this important topic.

Conclusion

In summary, each of the studies in this book not only makes a significant contribution to the existing literature on academic self-efficacy but also provided an impetus for further studies in this area. The authors in this book critically examined the role and influence of academic self-efficacy in diverse settings, shared their findings, and suggested further research. Together, these studies indicate that academic self-efficacy influences student motivation, study habits, and achievement in academic subjects. As noted by Schunk and Pajares (2002), teachers and instructors must find their way to develop and sustain self-efficacy among students. It is hoped that the book is an informative, insightful, and indispensable resource for those who wish to study academic self-efficacy.

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Part II
Assessment and Measurement of Academic Self-efficacy

Chapter 2
Assessing Academic Self-efficacy

Maria K. DiBenedetto and Dale H. Schunk

Abstract Academic self-efficacy is a dynamic motivational belief that influences the goals we set, how hard we persist, and the amount of effort we employ. There is a great deal of research supporting the link between self-efficacy and student achievement yet educators grapple with finding ways to increase students' capability beliefs to enhance motivation for learning and performance. Traditionally, self-efficacy has been assessed using surveys administered as pre and posttests to a learning event. While these measures provide valuable information, there are several concerns about measuring self-efficacy using surveys such as that learners are reporting on future or past events, they may not fully understand or anticipate task demands at the time of pretest or over and under estimate their performance during the posttest. More recently, research has demonstrated there are other methods of assessing self-efficacy during a learning event referred to as real time such as the microanalysis, think-aloud, diaries, and trace measures. This chapter will focus on these novel approaches to assess self-efficacy and make recommendations on the ways these methodologies can be used among educators.

Keywords Academic self-efficacy · Motivational beliefs · Student achievement · Real time · Metacognition

Introduction

Self-efficacy, which is grounded in Bandura's (1986, 1997) social cognitive theory, refers to one's perceived capabilities to learn or perform actions at designated levels. Self-efficacy is predicted to influence motivation, learning, achievement, and self-regulation (Schunk & DiBenedetto, 2020; Usher & Schunk, 2018). Although there are multiple motivational variables that are linked to achievement (e.g., intrinsic interest,

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goal orientation, and outcome expectations), in this chapter, our focus is on self-efficacy. Self-efficacy has seen wide application in diverse fields such as education, business, athletics, and health. Because of its predictive power and widespread use, it is important to find valid and reliable ways to assess self-efficacy across different types of contexts and activities.

The purpose of this chapter is to discuss various self-efficacy assessment methodologies. We begin with a description of the theoretical framework of social cognitive theory including the role of self-efficacy in achievement. This is followed by a discussion of self-efficacy assessments, educational implications of these assessments, and recommendations for future research. Our hope is that this chapter will help to expand research on assessing self-efficacy.

Theoretical Framework

Triadic Reciprocity

Social cognitive theory is grounded in a model of triadic reciprocality comprising three sets of interacting processes: personal; behavioral; and environmental (Bandura, 1986). Personal processes include cognitions, beliefs, perceptions, and emotions. They help to instigate and sustain motivational outcomes. Goals, values, outcome expectations, attributions, emotions, cognitions, and self-efficacy are examples of personal processes that influence behavior and the environment and are influenced by them.

Behavioral processes are actions and verbalizations; environmental processes include influences from the physical and social environments. Importantly, social cognitive theory stresses the idea that people use vicarious, symbolic, and self-regulatory processes to strive for a sense of *agency*, or the belief that they can exert a large degree of control over important events in their lives.

The reciprocal nature of these influences can be illustrated with self-efficacy—a personal process. With respect to the interaction of self-efficacy and behavior, research shows that self-efficacy instigates achievement behaviors such as task choice, effort, persistence, and use of effective strategies (Usher & Schunk, 2018). These behaviors affect self-efficacy. As students work on tasks and observe their progress, their self-efficacy for continued learning is enhanced.

The link between personal and environmental processes can be shown with students with learning disabilities, many of whom hold low self-efficacy for learning (Schunk & DiBenedetto, 2014). People in their environments may react to them based on their common attributes (e.g., low competencies) rather than on their actual capabilities. Environmental feedback can influence self-efficacy, as when teachers provide encouragement.

The interaction of behavioral and environmental processes can be seen in instruction when teachers announce for students to direct their attention to a display. They

may do it without much conscious attention. The influence of behavior on environment is evident when learners fail to grasp important concepts, after teachers reteach content rather than moving on.

Dimensions and Sources of Self-efficacy

Social cognitive theory postulates that self-efficacy varies on several dimensions that have important implications for understanding how it operates during student learning (Bandura, 1997). Self-efficacy differs in *level*—the nature of the task demands, in *generality*—a wide range of activities or only a specific activity, and in *strength*—the degree to which one feels self-efficacious to perform an activity successfully. For example, Tabatha may feel self-efficacious about preforming well in a jazz recital but terrified about performing well at her ballet recital. The level in this situation is the capability to perform certain movements at an expert level in jazz versus ballet. Tabatha's feelings are not general, they are specific in that she feels capable of dancing jazz and not ballet. The strength of her self-efficacy is high for jazz and low for ballet. In designing an instrument to assess learners' motivation, researchers must have an understanding of what it takes to succeed at the task.

Self-efficacy does not emerge from nowhere but rather is a cognitive process where learners use information sources to create their self-efficacy beliefs (Schunk & DiBenedetto, 2020). These sources can be vicarious experiences, forms of social persuasion, physiological and emotional indexes, and mastery experiences (Usher & Pajares, 2008). Social cognitive theory postulates that by observing a successful model, one's self-efficacy can be raised, just as it can be lowered by observing someone fail. Forms of social persuasion include verbal statements and feedback from others (e.g., a coach telling a student she can catch the ball during a game of baseball). Physiological and emotional indexes can also affect self-efficacy. Feeling the thrill of going downhill on skis without falling can enhance a beginner's self-efficacy beliefs for repeating the activity successfully.

While these three sources of self-efficacy influence a learner's capability beliefs, the most enduring source is what one can accomplish (Usher & Pajares, 2008; Zimmerman & DiBenedetto, 2008). Learners' appraisal of their self-efficacy beliefs based on their past achievements and failures influences their self-efficacy for future similar activities (Bandura, 1986). Students who experience success at completing a complicated science experiment, for example, are likely to feel self-efficacious in performing well on similar future laboratory experiments. Self-efficacy is dynamic in that it develops and changes as students become more capable and achieve at higher levels (DiBenedetto & Schunk, 2018).

Usher and Pajares (2008) examined the sources of self-efficacy across quantitative and qualitative school-based studies and found that while mastery experiences were the most influential source of self-efficacy, other contextual factors must be taken into consideration. In the following section, we expand on the various measures that have been used to assess self-efficacy and recommend employing real-time measures.

Self-efficacy Assessment Methods

Since Bandura's (1986) seminal book discussing self-efficacy, developing reliable and valid assessments of self-efficacy has been an important issue. In this section, we discuss several methodologies for assessing self-efficacy and have grouped them within two categories. In the first category, we have organized *traditional* instruments for assessing self-efficacy. We are calling traditional assessments those instruments that require learners to reflect on a learning event and recall from memory. These assessments are usually administered after a learning event has taken place and typically are outside of the learning context; for example, administering tenth graders a survey asking questions about how self-efficacious they felt about computing long division problems after they completed a test on long division.

Traditional assessments may also refer to instruments that require learners to respond to questions that are asked in anticipation of an activity. These are also based on prior self-efficacy experiences and beliefs and assessed outside of the learning event; for example, administering a survey to fifth graders about their self-efficacy to earn 100% on an upcoming World War II history exam. Regardless of whether students are rating their motivation based on a past event or on the expectation of performance on a future event, self-efficacy beliefs are assessed using questionnaires that are completed outside of the realm of the learning context.

In the second category, we refer to *real-time assessments,* methodologies used during a learning event. These assessments often occur within the context of an authentic learning situation, in other words, while the learning is taking place. Real-time assessments do not require the learner to recall a previous learning event or to anticipate a future learning event; for example, asking students during a gymnastics exercise how self-efficacious they feel about being able to walk across the high beam without falling off while they are walking on the high beam.

We begin each category with a description of self-efficacy assessment methodologies we deem to fall within that category. Following the description, we provide an example, discuss the reliability and validity, and then, the strengths and limitations of that approach. While we describe several approaches, we make a case for using real-time assessments of self-efficacy, a recommendation also made by Bandura (1997) Table 2.1.

Traditional Assessments of Self-efficacy

Surveys

A common method for assessing self-efficacy is the use of surveys, inventories, or questionnaires where students respond to questions using some form of a Likert

Table 2.1 Summary of Self-Efficacy and Self-Regulated Learning Assessment Methodologies

Self-Efficacy and self-regulated learning measurement methods	Traditional versus real time	Characteristics	Strengths	Limitations
Surveys	Traditional	• Questions typically on a Likert scale • May include other variables related to self-efficacy and all three phases of self-regulated learning • Self-report based on recall	• Cost and time effective • Ease in administration and analysis • Flexibility in delivery • Larger sample size permits greater generalizability • Typically easy to establish reliability and validity	• Questions may not capture level, strength, and specificity of context • Questions may not reflect understanding of task demands • No opportunities provided for elaboration • Dependent on students' memories and ability to recall • Retrospective assessment questions • Reliability frequently established; questionable construct validity due to the nature of the survey development and the domain specificity

(continued)

Table 2.1 (continued)

Self-Efficacy and self-regulated learning measurement methods	Traditional versus real time	Characteristics	Strengths	Limitations
Diaries	Traditional	• Open-ended responses as participants write about their thoughts, feelings, and behaviors • Typically focused on the forethought and self-reflection phase • Self-report based on recall	• Easy to use and familiar to most participants • Provide data rich in qualitative information • Flexibility in administration • Students can elaborate in their entries • Reliability and validity can be established and strengthened through triangulation	• Younger students may have difficulty articulating thoughts, feelings, and behavior • Data analysis can be complicated and time consuming • Diaries administered over extended periods of time may affect student motivation to participate • Sample sizes tend to be small • Performance phase measures not taken • Dependent on students' memories and ability to recall • Retrospective results • Issues of reliability and validity require triangulation adding addition time, effort, and cost

(continued)

Table 2.1 (continued)

Self-Efficacy and self-regulated learning measurement methods	Traditional versus real time	Characteristics	Strengths	Limitations
Case Studies	Both	• Involve closely studying a participant or participants • Include a holistic approach that uses other assessment instruments such as those described in this table • Attempt to answer the how and why of behavior	• Provide in-depth understanding about participants • Allow for a combination of real-time and traditional measures • Can assess and make inferences on the dynamic changing nature of self-efficacy over time • Can be done to include all three phases of self-regulated learning and multiple iterations of the cycle during learning events • Reliability and validity can be established and strengthened through triangulation	• Do not have a standard protocol for administration resulting in concerns of sloppiness, bias, and inability to replicate • Require long periods of time and large amounts of data causing issues of time, cost, analysis, and labor intensity • Samples tend to be small leading to challenges in generalizing of results • Difficulty estimating reliability and validity on its own since data from case studies frequently come from multiple sources; ecological validity

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