A Review of Self-efficacy of Learners through Online Learning

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Abstract— E-learning has been adopted as the alternative learning mode across the board during COVID-19 pandemic to persist academic activities due to nationwide closures. Self-efficacy plays a mediated role in and is positively correlated with academic achievements of distance education. Objective factors (online connection, online learning experience and knowledge, online classroom environment, and others) and subjective factors (learning attitudes of students, interaction among students, online teaching capability of teachers, emotion and psychological states and others), influence by and large self-efficacy of learners who conduct online education. Additionally, different measurements of self-efficacy are discussed, with the result that Questionnaire of English Self-Efficacy (QESE) is a professional and valid tool to measure self-efficacy of English-major learners. There is such a paucity of studying learners' self-efficacy via e-learning that this paper fills the gap to study the topic.

Keywords— online learning, self-efficacy of learners.

I. INTRODUCTION

Past few months have witnessed the outbreak of novel coronavirus also known as COVID-19. As it rages to a global pandemic, a host of strict public health measures have been taken to contain the spread of coronavirus by governments all around the world. The whole countries have been placed under quarantine, where all public and private organizations have halted their activities .COVID-19 has also shaken up the education sector and this fear is likely to resonate across the education sector globally (Dhawan, 2020)and higher educational institutions have been compelled to discontinue classroom-based education .Online learning is defined as "learning experiences in synchronous or asynchronous environments using different devices (e.g., mobile phones, laptops, etc.) with internet access. In these environments, students can be anywhere (independent) to learn and interact with instructors and other students" (Dhawan,Singh & Thurman, 2019). The synchronous learning environment is structured in the sense that students

attend live lectures, there are real-time interactions between educators and learners, and there is a possibility of instant feedback, whereas asynchronous learning environments are not properly structured (Dhawan, 2020) .

The major part of the world is on quarantine due to the serious outbreak of this global pandemic COVID-19 which compelled numerous institutions ranging grocery stores to scenic spots to shut down. The Corona Virus has also made educational institutions to go from offline mode to online mode of pedagogy. In China, under the guidance of "Suspension of classes without suspension of learning"(quote?), online learning or e-learning platforms have been put into use to simulate a virtual classroom in which the instructor and the students can interact and fulfill the learning outcomes of the curriculum remotely.(Fawaz1 , Samaha,2020). Platforms, ranging from Tencent Meeting, Dingding to QQ, have been employed to deliver the content to the students, where faculty members have been challenged to make themselves familiar with new methods of teaching (Fawaz1 , Samaha,2020).

There has been a plethora of research concerning self-efficacy. However, few works have focused on self-efficacy in online-learning environments. Therefore，this paper aims to study factors influencing their self-efficacy of online learning, roles and correlation learners' self-efficacy of academic achievement, and the measurement of self-efficacy from perspective of different scholars so as to offer insights on improvement of self-efficacy in online language learning.

II.   DEFINITIONS AND ITS SOURCES

The definition of self-efficacy has drawn mixed views. Self-efficacy refers to one's personal judgments about his or her performance capabilities in a given domain of activity (Schunk, 1985). Self-efficacy is defined as "people's judgments of their capabilities to organize and execute a course of action required to attain designated types of performances" (Bandura, 1986, p. 391).Self-efficacy is a context-specific perception (Bandura, 1986). Self-efficacy refers to one's subjective beliefs about how well one can perform a specific task, including a judgment about one's own skills (Pajares, 1996). However, most people are approval of Bandura's perception that self-efficacy is defined as "people's judgments of their capabilities to organize and execute a course of action required to attain designated types of performances".

According to Bandura, self-efficacy beliefs are constructed from four principal sources of information: enactive mastery experiences that serve as indicators of capability; vicarious experiences that alter efficacy beliefs through transmission of competencies and comparison with the attainments of others; verbal persuasion and allied types of social influences that one possesses certain capabilities; physiological and affective states from which people partly judge their capableness, strength, and vulnerability to dysfunction (Bandura, 1997).It is clarified specifically as follows:

Enactive mastery experience is accumulated through past experience, no matter whether this is successful or unsuccessful(Truonga, Wang，2019) .Successes can intensify a robust belief in one's self-efficacy while failures will undermine it. Enactive mastery experiences are the most influential source of efficacy information because they provide the most authentic evidence of whether one can muster whatever it takes to succeed (Bandura, 1997). Vicarious experiences refer to an indirect experience that can be gained from model attainments by observing others' behaviors. Modeling that conveys effective coping strategies can boost the self-efficacy of individuals who have undergone countless experiences confirming their personal inefficacy (Bandura,1977). Verbal persuasion means a method of persuading people that they possess the capabilities to master given tasks with suggestions, encouragement, explanation and guidance to change one's self-efficacy. Persuasive boosts in perceived efficacy lead people to try hard enough to succeed and promote development of skills as well as a sense of personal efficacy. Physiological and affective states such as apprehension, stress, depression, and anxiety can dampen one's self-efficacy by changing one's beliefs in one's own competence, while positive emotions can boost self-efficacy beliefs (Truonga, Wang，2019,Woodrow, 2011).

III.   FACTORS INFLUENCING STUDENTS' SELF-EFFICACY BY E-LEARNING

There are objective and subjective factors impacting learners' self-efficacy by online education. Specific information is illustrated as follows

1 Objective factors

Objective factors were investigated from online connection (Wu,2016; Alex,2017),online learning experience and knowledge (Peechapol & Sujiva 2018; Reid&Samer 2004), online classroom environment(Peechapol & Sujiva 2018; Alex,2017), and others. Specifically, Peechapol and Sujiva (2018) examined 12 years of research by focusing on the factors that influence self-efficacy in an online learning environment. In the wake of researching in ERIC, Scopus, and Web of Science online databases by adopting systematic review method, they selected papers published in English between 2005 and 2017 with key factors that impact self-efficacy in online learning and screened further titles, abstracts of studies and remaining full texts of studies to determine eligibility for inclusion in the review. The data were extracted, organized and analyzed using a narrative

synthesis. Then it found that online learning experience and knowledge as well as social influence impact learners' self-efficacy when conducting online learning objectively. But it didn't take online connection into account. After adopting questionnaires online course and the survey and employing a comparison based on a difference in content presentation, Wu(2016) analyzed the data and concluded that the background factors and factors of actual learning experience influenced students' online learning Objective factors include interface, constraints, perceived quality of design and perceived utility of design. Nevertheless, he didn't consider online learning experience and knowledge as well as online classroom environment. Alex（2017）studied the relevant factors and employed semi-structured interviews with 17 open-ended questions for twenty-four African American and sixteen Hispanic high school students, finding that access to resources ,time convenience and opportunities for knowledge building are major objective factors to influence students' self-efficacy of e-learning without consideration of online learning experience and knowledge. Reid Bates and Samer Khasawneh (2004) surveyed 288 students enrolled in a variety of courses at a large public university in the Southern US about self-efficacy of online education, with the findings that Previous success with online learning technology is the main objective factor.

2 Subjective factors

Subjective factors were studied from learning attitudes of students(Peechapol & Sujiva 2018; Wu,2016), interaction among students(Peechapol & Sujiva 2018; Reid&Samer 2004; Alex,2017; Tien,2012),online teaching capability of teachers(Wu 2016; Tien,2012), emotion and psychological states (Reid & Samer 2004)and others. The rank is displayed in accordance to the section of objective factors. To be specific, Tien-Chen Chien(2012) adopted questionnaires in general employees in the financial services industry in Taiwan ,finding that interaction, technical skills and instructional method subjectively impact self-efficacy of e-learning. According to Chattavut Peechapol and Siridej Sujiva (2018), they concluded that learners' motivation and attitude as well as online communication and interactions, were the main subjective factors influencing students' self-efficacy in online learning.

Alex（2017）indicated that collaborative learning activities, student–teacher interactions and open communication, student-to-student interactions, improved behavior, parental support will promote online learning experiences and academic self-concept, while lack of cultural inclusion in course content and lack of social presence will constrain online learning experiences and academic self-concept .Wu(2016) summarized that individual difference, intentional behavior, perceived quality of design ,perceived utility of design are major subjective factors impacting users online learning experience.

3 Role of self-efficacy in academic achievement

Self-efficacy plays a mediating role in English-major learners' English language proficiency(Schunk,1984；Woodrow, 2011；Ting Sun, Chuang Wang，2020; Jashapara and Tai,2006). Schunk(1984a) proved that path analysis shows the mediating role of self-efficacy in mastering academic competence. He and his accompanies have adopted an informative experimental paradigm that has added greatly to our understanding of the many factors that affect children's self-efficacy and its impact on scholastic performance（Schunk,1989）.Furthermore, self-efficacy was believed to be a facilitative and mediating mechanism of human agency (Bandura, 1986). Schunk's study found that self-efficacy exerts a more substantial impact on academic performance, both directly affecting quality of thinking and good use of acquired cognitive skills and indirectly by heightening persistence in the search for solution(Bandura,1997). Similarly ,the relationship between writing performance and anxiety was mediated by self-efficacy（Woodrow, 2011）.Studies also found the mediational effect of writing self-efficacy on the association between writing proficiency and affect constructs (i.e., anxiety or motivation) (Ting Sun, Chuang Wang，2020；Woodrow, 2011; Zhang & Guo, 2012) .On top of that, self-efficacy mediated the effect of computer experience on perceived ease of use and partially mediated the effect of personal innovativeness and computer playfulness on perceived ease of use (Jashapara and Tai,2006) .It supplements the mediating effect of self-efficacy through online education.

IV.   MEASUREMENT OF SELF-EFFICACY
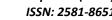
4.1 The measurement tool

The Strategy Inventory for Language Learning (SILL) developed by Oxford (1990) consists of 50 items to measure three direct language learning strategies (cognitive, memory, and compensatory) and three indirect language learning strategies (metacognitive, affective, and social strategies). According to Rebecca and Judith (1995), they gathered papers adopting SILL from 1992 to 1994 and found that reliability of the SILL is high across many cultural groups and validity of the SILL rests on its predictive and correlative link with language performance (course grades, standardized test scores, ratings of proficiency), as well as its confirmed relationship to sensory preferences(Rebecca and Judith, 1995).Nonetheless, SILL does not contain any items to measure student self-efficacy beliefs. (Wang , Kim , Bong , Ahn,2013)

Consequently, sponsored by the National Science Foundation and the Office of Educational Research and Improvement, a group of scholars at the University of Michigan (e.g., McKeachie, Pintrich,and Garcia) developed the Motivated Strategies for Learning Questionnaire (MSLQ) where one of the 15 scales is "Self-Efficacy for Learning and Performance". Teresa García and Wilbert J. McKeachi(2005) collected articles applying MSLQ from 2000 to 2004 as a sampling. It found that MSLQ have been used in different languages, in different countries, and on diverse samples and settings to address both theoretical and applied purposes. For example, previous research suggested that the Self-Efficacy for Learning and Performance subscale of MSLQ is a valid measure of student self-efficacy (e.g., Andreou, 2004; Bong, 2004; Brookhart & Durkin, 2003; Vogt, 2003).Nevertheless, the scale is best used in the context of a particular course and cannot address the specifics of language learning(Wang , Kim , Bong , Ahn,2013).

Furthermore, Wang (2004) developed a scale, Questionnaire of English Self-Efficacy (QESE), to measure English language learners' self-efficacy beliefs with 33 items. Each item asks students to make judgments about their capabilities to accomplish certain tasks using English in the context areas of listening, speaking, reading, and writing. It adopted survey, interviews, observations, and verbal protocols of young Chinese English language learners in the United States to study the validity of QESE in a sample of 167 college students in Korea.Results show that the scale measures largely satisfy the Rasch model for unidimensionality using Mean Square (MNSQ) item fit statistics .As a consequence , ranging from 0.6 to 1.4 is viewed reasonable as rating scale items (Wang ,2013, Li & Wang, 2010; Wang & Kim, 2011; Wang, Schwab, & Fenn, 2011;Bond & Fox, 2007).Since its development in 2004, QESE has been constantly adapted to fit into the cultural context of language learning in China, Korea, and Germany, and the United States (Wang ,2013, Li & Wang, 2010; Wang & Kim, 2011; Wang, Schwab, & Fenn, 2011). QESE was developed to measure English language learner's self-efficacy in particular and include items that refer to representative tasks and activities in the context of learning English as a second language(Wang, Kim, Bong, Ahn, 2013).QESE was also reported to have high levels of reliability and validity with American, Chinese, and German college students (Wang et al., 2007, 2011; Wang & Kim, 2011).Therefore, it found that QESE appears to be a reliable and valid measurement of students' self-efficacy beliefs in learning second/foreign language with its unidimensionality. The items, however, did not cover as wide a range of continuum of the latent variable as might be ideal, suggesting that adding more difficult items may be helpful to more closely match the range of ability levels of the sample.

Self-efficacy is positively associated with academic achievement(Zimmerman, Bandura, and Martinez-Pons ,1992; Wang, 2013; Hong, Tai, and Lin, 2017;Zimmerman and Bandura 1994; Pajares, Britner, & Valiante, 2000; Prat-Sala, & Redford,2012; Mills , Pajares and Herron ,2007; Ergul,2004).In details, Zimmerman, Bandura, and Martinez-Pons (1992) contend that self-efficacy can influence personal goals and grade achievements. Their predictions were confirmed by the results. In addition, students' perceived self-efficacy for academic achievement and their self-evaluative standards predicted their grade goals, which, in turn, predicted their final course grade (Wang, 2013). What's more accurate is that the test of the relationship between the degree of

progress and online learning self-efficacy was supported by a path coefficient of 0.222 (t = 2.37, p < .05)(Hong, Tai, and Lin, 2017).Zimmerman and Bandura (1994) drew similar conclusions that college students' perceived self-regulatory efficacy for writing positively predicted their perceived self-efficacy for academic achievement and their self-evaluative standards. In turn, in writing, performance-approach goals also related positively with self-efficacy, whereas performance-avoid goals related negatively (Pajares, Britner, & Valiante, 2000). Similarly, the studies of Prat-Sala, & Redford(2012)show that both self-efficacies (reading and writing) were significantly associated with actual writing performance in both first and second year psychology undergraduate students. In addition, both SEW(Self-Efficacy Writing) and SER(Self-Efficacy Reading) independently contributed to the variance in writing performance scores, with writing self-efficacy contributing after accounting for reading self-efficacy. However, their studies merely confined to writing and reading aspects. Mills, Pajares and Herron(2007) also found that self-efficacy in learning French was related to high grades, metacognitive strategy use and self-regulation. Nevertheless, the study is only involved with students taking French as foreign language rather than English-major students.

In the context of academic learning, high efficacious students are more inclined to persist longer in the face of adversity compared to less efficacious counterparts (Schunk, 1990; Bandura & Schunk, 1981; Schunk, 1983;Bong & Skaalvik, 2003).To be specific, people who hold low self-efficacy beliefs do not like to face challenges and usually avoid difficult tasks (Schunk, 1990). In contrast, those with high self-efficacy beliefs willingly take on challenging tasks and demonstrate lower levels of anxiety (Bandura & Schunk, 1981; Schunk, 1983).Moreover, strong self-efficacy leads students to feel less anxious in achievement settings, enjoy their academic work more, persist longer on difficult tasks, and, overall, feel better about themselves as a person and as a student (Bong &

Skaalvik, 2003)

In addition, at the backdrop of online education, high efficacious learners also have a positive performance (Ergul, 2004;Artino ,2008; Reychav, Ndicu, and Wu, 2016). Ergul (2004) further showed that self-efficacy in distance education was a significant and positive predictor of students' academic achievement. Artino (2008) found that students with higher self-efficacy for computer-based learning are more likely to experience learning satisfaction than students with low self-efficacy. In turn, perceived enjoyment also had a positive effect on computer self-efficacy (Reychav, Ndicu, and Wu, 2016).
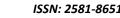
4.2 Implications in online language learning

From the objective perspective, students should place great premium on online connection, online learning experience and knowledge, online classroom environment and others when implementing online learning.

From the subjective perspective, students should attach great importance to learning attitudes of students, interaction among students,online teaching capability of teachers, emotion and psychological states (Reid & Samer 2004)and others.

V.   CONCLUSIONS

In a nutshell, the review indicated that self-efficacy plays a mediated role in and is positively associated with academic performance. Objective factors (online connection, online learning experience and knowledge, online classroom environment, and others) and subjective factors(learning attitudes of students, interaction among students, online teaching capability of teachers, emotion and psychological states and others)mainly exert substantial impact on self-efficacy of learners who conduct online education. Additionally, various measurements of self-efficacy are discussed, finding that Questionnaire of English Self-Efficacy (QESE) can measure self-efficacy of English-major learners professionally and validly. This might offer insights on improvement of English-major learners' self-efficacy in the future online learning.
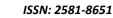
Author(year)	Research Topic	Research Design	Findings
Chattavut et al 2018	An Exploration of Factors Influencing Self-Efficacy in Online Learning: A Systematic Review	**Method:** research in database, a narrative synthesis. **Participants:** between 2005 and 2017 papers which covered factors influencing self-efficacy in online learning context	Online Learning Experience and Knowledge. Feedback and Reward. Online Communication and Interactions. Social Influence. Learner Motivation and Attitude.
Reid Bates, Samer Khasawneh 2004	Self-efficacy and college students' perceptions and use of online learning systems	**Method:** online survey **Participants:** 288 students enrolled in a variety of courses at a large public university in the Southern US. s 9% freshman, 8%sophomores, 16% juniors, 33% seniors, 30% Masters students, 3% Ph.D. students, and 2%non-matriculating students.	Previous success with online learning technology pre-course training instructor feedback fixed ability acquired ability online learning system anxiety
Y. Wu 2016	Factors impacting students' online learning experience in a learner-centred course	**Method:** Survey, Three essay questions and two questionnaires **Participants:** about 200 library professionals and library staff in America	interface (or content design), individual difference, constraints, intentional behaviour, outcome behaviour, perceived quality of design perceived utility,
Alex Kumi–Yeboah, James Dogbey & Guangji Yuan,2017	Factors impacting students' online learning experience in a learner-centred course	**Method:** Qualitative interviews **Participants:** twenty-four African American, and sixteen Hispanic high school students.	1 collaborative learning activities, access to resources, time convenience, student-teacher interactions, student-student interactions, improved academic behavior, and parental support helped to enhance online learning experiences and academic self-concept of the minority students. 2 , the lack of social presence, and the lack of cultural inclusion in course content constrain online learning experiences and academic self-concept of the students.
Tien-Chen Chien,2012	Computer self-efficacy andfactors influencing e-learningeffectiveness	Method: questionnaire Participants: eneral employees in the financial servicesindustry in Taiwan.	1 the factors ofthe e-learning system are functionality, interaction, and response. 2 The factors of the e-learning instructor are attitude, technical skills, and instructional method.
Demei Shen et al 2013	Unpacking online learning experiences: Online learning self-efficacy and learning satisfaction	**Method:** online survey **Participants:** 244 nursing postgraduate and 151 undergraduates form two universities in the Midwestern US	The number of online courses Gender academic status

Measurement of self-efficacy

Author(year)	Research Topic	Research Design	Findings
Chuang Wang Do-Hong Kim , Mimi Bong , Hyun Seon Ahn ,2013	Examining measurement properties of an English Self-Efficacy scale for English language learners in Korea	**Method:** survey, interviews, observations, and verbal protocols of young Chinese English language learners in the United States **Participants:** 167 college students in Korea.	1 the scale measures largely satisfy the Rasch model for unidimensionality. The rating scale appeared to function effectively. 2 Among the four sub-skills of English proficiency (listening, speaking, reading, and writing), listening comprehension appeared to be the most difficult. 3 the QESE appears to be a reliable measure of students' self-efficacy beliefs in learning second/foreign language with its unidimensionality
Teresa García et al 2005	The Making of the Motivated Strategies for Learning Questionnaire	**Method:** collecting articles **Participants:** current sampling (2000–2004)	1 The MSLQ have been used in different languages, in different countries, and on diverse samples and settings to address both theoretical and applied purposes.
Rebecca L. Oxford; Judith A. Burry-Stock1995	ASSESSING THE USE OF LANGUAGE LEARNING STRATEGIES WORLDWIDE WITH THE ESL/EFL VERSION OF THE STRATEGY INVENTORY FOR LANGUAGE LEARNING (SILL)	**Method:** collecting articles **Participants:** current sampling (1992–1994)	1 Reliability of the SILL is high across many cultural groups. 2 Validity of the SILL rests on its predictive and correlative link with language performance (course grades, standardized test scores, ratings of proficiency), as well as its confirmed relationship to sensory preferences.

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