Examining need-supportive contexts and motivation as psychosocial antecedents of students' self-assessment practice: Using the self-system model of motivational development as an integrative framework

by

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Statement of Originality

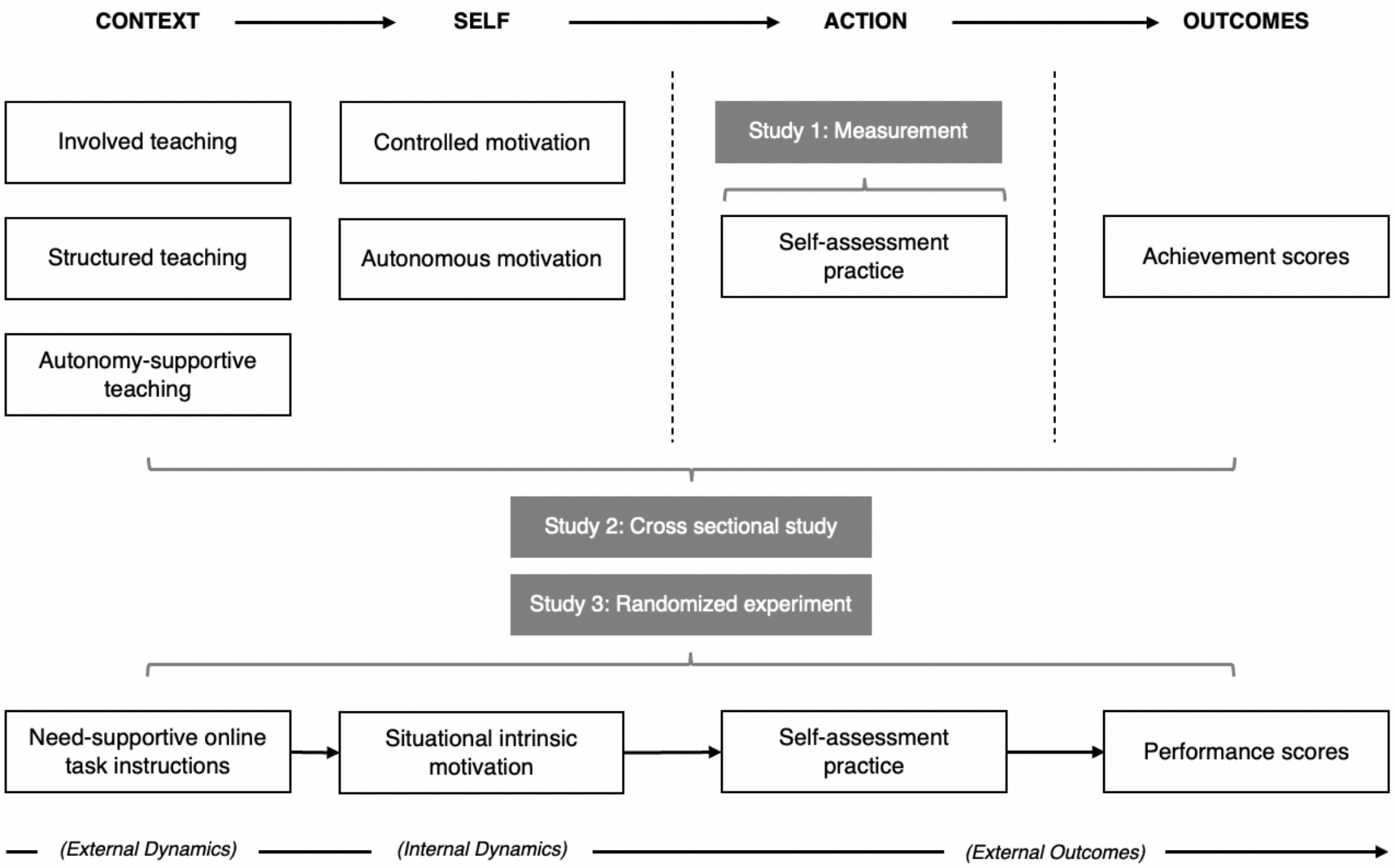
I, MENDOZA, Norman Biliwang, hereby declare that I am the sole author of the thesis, and the material presented in this thesis is my original work except those indicated in the acknowledgement. I further declare that I have followed the University's policies and regulations on Academic Honesty, Copyright and Plagiarism in writing the thesis, and no material in this thesis has been submitted for a degree in this or other universities.

Integrated Thesis Abstract

This thesis examines the social and internal factors that influence self-assessment practice and its implications on learning by integrating self-assessment practice and self-determination theory within the self-system model of motivational development. In doing so, the interplay of social contexts in school, motivational factors, and student self-assessment practice can be theoretically understood and examined. The thesis consists of three empirical studies that foreground research conducted in a Southeast Asian context and in a specific learning domain (i.e., English language learning) in secondary school. Study 1, published in the *Journal of Psychoeducational Assessment,* analysed cross-sectional data using multidimensional Rasch analysis, confirmatory factor analysis, and structural equation modelling to examine the validity of a subject-specific Self-assessment Practice Scale (SaPS; Yan, 2018) among Filipino secondary school students. The results highlight the reliability and the within- and between-network validity of the subject-specific SaPS. This instrument was used in the subsequent studies. Study 2, published in the *European Journal of Psychology of Education*, demonstrates how social (i.e., need-supportive teaching) and psychological factors (i.e., autonomous and controlled motivation) predict self-assessment practice and its impact on objective achievement scores in English language learning. In this study, self-report and objective achievement data were collected prospectively, and multilevel mediation was performed on Rasch-calibrated person measures. Finally, Study 3 is an experimental study that adopted the theoretical framework from Study 2 to design a brief online intervention to examine the differential impact of need-supportive task instructions in an online language learning task. The study involved two randomly assigned student groups (i.e., need-supportive task instructions group and control group) to test whether online task instructions that were framed to be need-supportive will generate higher intrinsic motivation for the task, compared to those in the control condition. Evidence from this study suggests that students in the need-supportive task instructions had higher intrinsic motivation than those with in the control condition. Although the intervention generated increased motivation, such did not directly predict task performance scores. Intrinsic motivation had indirect effects to performance scores via self-assessment practice. Post hoc analysis further demonstrates that such mediation was moderated by the experimental condition. This study is currently under review in *Computers & Education*. The three studies make a unique contribution to the literature on self-assessment practice by situating it theoretically within the classroom ecology and in a specific learning domain. Robust statistical approaches and rigorous methods were also implemented by using cross-sectional and experimental research designs. The significance of this study is underscored by current educational challenges in the Philippines, such as the lack of formative assessment practices among students, the decline of student motivation in secondary school, the low reading achievement in the PISA 2018, and the proliferation of online learning amid the COVID-19 pandemic.

Keywords: *self-system model; self-assessment practice; student motivation; need-supportive context; theoretical integration*

Graphical Abstract



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Chapter 1: Integrated Introduction

A brief roadmap

Despite the known benefits of students' self-assessment practice on achievement and other crucial learning outcomes in school, very few studies attempted to understand the social and internal factors that can influence it. Because of this, current self-assessment research tends to put the sole responsibility on students in terms of how they engage in self-assessment. This is a crucial research gap. To supplement existing individual-level research on self-assessment, it is important to theoretically explore the interaction of social contexts and motivational factors that can impact self-assessment within the ecology of the classroom. By incorporating self-assessment practice and self-determination theory within the self-system model of motivational development, this thesis by publication investigates the social and internal factors that influence self-assessment practice and its implications for learning.

This integrated introduction aims to foreground the connection of three studies which are included as empirical chapters in this thesis and to highlight the theoretical and empirical contributions each study holds. The following sections include (1) an introduction to the conceptualisation of self-assessment—the focal outcome in this thesis—as a formative assessment consisting of theoretically informed self-directed learning practices, (2) an overview of the self-system model of motivational development to examine self-assessment within the classroom ecology to explore its social and internal mechanisms, and (3) a discussion of the theoretical gaps and pressing educational realities requiring the urgent need for research to potentially impact educational reform. I end this introduction with a curated overview of the three empirical studies of this thesis, which consists of each of the study's aims, methods, and hypothesised research outcomes.

Conceptualising student self-assessment

"*One might say that the ability to evaluate one's own ability is the most important skill of all. Without it, improvement is impossible.*" – Ryan Holiday

In the last two decades, educational research on self-assessment has flourished, highlighting its adaptive impact on a wide range of student outcomes in school, including school achievement (McDonald & Boud, 2003; Yan, Chiu, et al., 2020), self-efficacy (Kissling & O'Donnell, 2015; Schunk, 2003; Yan et al., 2022), achievement goal orientations (Yan, 2018b), and self-regulated learning (Panadero et al., 2017; Yan & Carless, 2021). Both meta-analytic (see Panadero et al., 2017; Sitzmann et al., 2010; Yan et al., 2021) and empirical studies (Leenknecht et al., 2020; McDonald & Boud, 2003; Panadero et al., 2012; Yan, 2018b, 2020b; Yan, Chiu, et al., 2020) have also shown that students' self-assessment hold important implications for learning and achievement. Recent interventions also emphasised the effectiveness of self-assessment practice in impacting crucial success indicators of students in school (e.g., achievement, self-regulation, motivation, self-efficacy; Meusen-Beekman et al., 2016; Yan, Chiu, et al., 2020; Yan et al., 2022), supporting its role as a formative assessment. This thesis applied this conceptualisation of self-assessment consisting of self-directed learning strategies.

As will be unveiled further in the empirical chapters, self-assessment is considered a hallmark skill of 21st-century learning (see Dweck, 2009), covering all related evaluative judgement of students of their own work (e.g., self-evaluation, self-appraisal; Taras, 2010). Given that self-assessment enables students to monitor and assess their schoolwork, it effectively boosts their learning ability and achievement (McDonald & Boud, 2003; Panadero et al., 2017; Taras, 2010; Yan & Brown, 2017; Zimmerman & Schunk, 2004). The typical misconception of self-assessment, however, is that it's merely a one-off act of grading or evaluating one's own task or performance; a summative response to the question "how did I

do in this task?" which can often be inaccurate (see Brown et al., 2015). Instead, self-assessment is a formative and cyclical process that pertains to a learners' capacity to "reflect on the quality of their work, judge the degree to which it reflects explicitly stated goals or criteria, and revise accordingly" (Andrade & Valtcheva, 2009, p. 13), based on informative feedback collected from different sources (Andrade, 2019; Boud, 1995; McMillan & Hearn, 2008; Yan & Brown, 2017). Hence, self-assessment consists of self-directed learning strategies and practices that are formative—a type of assessment that elicits indicators of student performance multiple times that can be used to make decisions about future learning plans (Bennett, 2011; Black & Wiliam, 1998, 2003; Taras, 2010).

To further understand how self-assessment practice operates as a formative assessment, we used the metaphor of a runner who wants to improve his running speed in a race by checking his smartwatch:

> "In a sense, self-assessment as a learning process is similar to a runner checking his smartwatch while on the run: he gets to know how far he's run, how much farther he needs to go, whether he's running too fast or too slow, or whether he's on the right route. Had it been summative, the focus would have been exclusively on the total time at the finish line without clear and useful implications for future actions. However, when used as a formative assessment, self-assessment becomes an integral part, not just the outcome of the learning process" (Mendoza & Yan, 2021a, p. 174).

This exemplifies how self-assessment can serve as a tool consisting of several strategies and practices that can maximise opportunities for improvement.

Self-assessment is multidimensional. Past research has agreed on the intricacy of the self-assessment process, which might include multiple steps (see Andrade et al., 2008; Boud, 1995; van Diggelen et al., 2013). However, the understanding of the specific steps or practices involving self-assessment—the actions students do during the self-assessment

process—is particularly limited (cf. van Diggelen et al., 2013). Yan and Brown (2017) proposed a cyclical process model of self-assessment (see Figure 1) that explicitly outlines sequential actions with three major actions: determining assessment criteria, self-directed feedback-seeking and engaging in self-reflection. These actions are evaluated through a theory-driven instrument specifically designed for assessing self-assessment practices: the Self-assessment Practices Scale (SaPS; Yan, 2016; 2018a; see Chapter 2 for an extended description of SaPS). The four dimensions of SaPS are seeking external feedback by monitoring (SEFM), seeking external feedback by inquiry (SEFI), seeking internal feedback (SIF), and self-reflection (SR; see Yan, 2018a; Yan & Brown, 2017). The empirical chapters of this thesis adopt this definition of self-assessment practice and its dimensions, especially the first study (i.e., Chapter 2), which adapted Yan's (2018a) SaPS as a subject-specific measure among secondary school students.

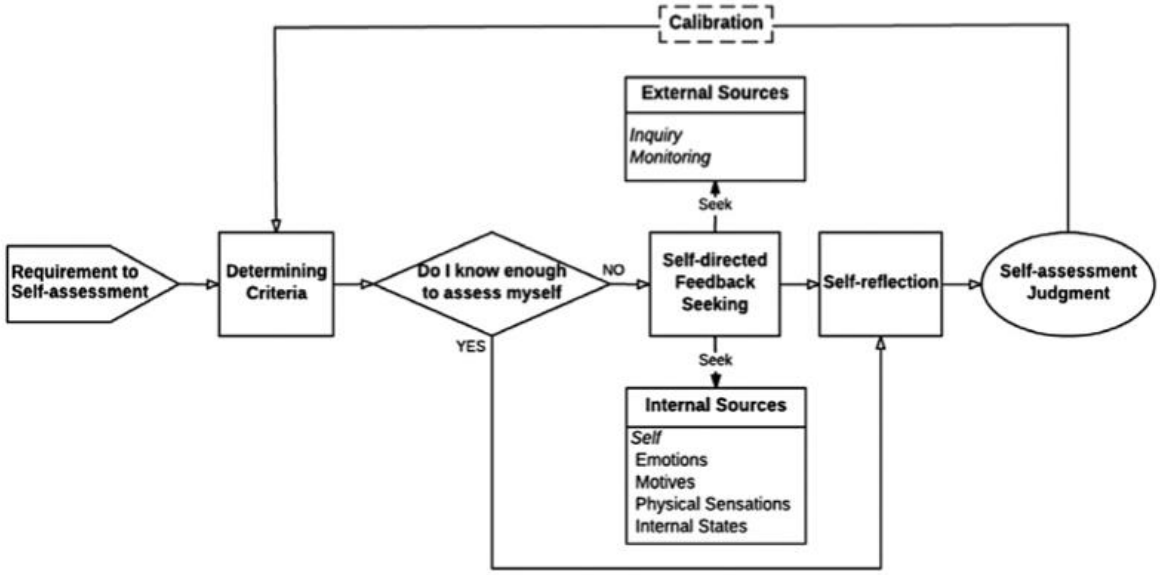

Figure 1. The cyclical self-assessment process. [Permission to reuse the figure in this thesis/dissertation was granted by Taylor & Francis free of charge]

Now that self-assessment as the central concept of this thesis is theoretically defined and conceptualised; we move on to describe the theoretical background in which self-assessment is examined. Like many other psychological and educational outcomes, self-

assessment does not exist in a vacuum. Hence, to fully understand self-assessment practice in context, it must be examined within the ecology of the classroom. This is the foundation of the second and the third study (see Chapters 3 and 4).

Theoretical Background

In an ecology, everything is connected to and affected by everything else. This is also true for schools. As Bronfenbrenner (1976) contended,

> "Whether and how people learn in educational settings is a function of sets of forces, or systems, at two levels: the first comprises the relations between the characteristics of learners and the surroundings in which they live out their lives (e.g., home, school, peer group, work place, neighbourhood, community), [and] the second encompasses the relations and interconnections that exist between these environments." (p. 5)

Hence, the classroom can be considered as an ecosystem where teachers, students, and the learning environment interact to influence each other (Bronfenbrenner, 1976; Burns et al., 2015; Skinner et al., 2008; Skinner et al., 2022). The complex ecological factors or systems that can interact to influence students' academic development are aptly termed *collective influences* (see Skinner et al., 2022). More recent research on student learning also highlights the interaction of external social context with psychological or behavioural outcomes (Elliot et al., 2017; Skinner, 2016; Skinner et al., 2022; Yeager & Walton, 2011). This area of research is critical to understanding the wide range of factors that are crucial to students' performance in school (e.g., King & McInerney, 2019; Schiefele & Schaffner, 2015; Skinner et al., 2008; Wang & Eccles, 2013; Wentzel et al., 2018), and to develop effective pathways to boost the same (e.g., Wilson & Buttrick, 2016).

However, previous studies attempting to examine how several factors interact to influence student learning have been scarce, perhaps due to the need to systematically

integrate multiple theoretical perspectives (cf. Cook & Artino, 2016; Eccles & Wigfield, 2002; Fryer, 2017). In the case of self-assessment, simply focusing on how it influences achievement may overlook other ecological factors at school. Doing so can also place the sole onus on students to improve their learning outcomes. A core aim of this thesis is to examine the social and internal predictors of self-assessment practice in the ecology of the classroom.

Unpacking the social and internal mechanisms of self-assessment

Because self-assessment is primarily viewed as self-directed, much of the earlier research has focused on individual factors (see Andrade, 2019; Brown & Harris, 2013; Panadero & Alonso-Tapia, 2013; Yan, Brown, et al., 2020). For instance, Yan, Brown, et al. (2020) found that attitude, self-efficacy, and psychological safety were critical predictors of self-assessment practices. Cognitive engagement, academic ability, mastery goal orientation, and age were also identified as significant predictors (see Brown & Harris, 2013; Yan, 2018b). Although the significance of social contexts on essential school outcomes has been emphasized (e.g., self-regulated learning; engagement; achievement goals; Boekaerts & Corno, 2005; Ciani et al., 2011; Kiefer et al., 2015; Liem & Elliot, 2018; Urdan & Schoenfelder, 2006), this perspective has eluded earlier self-assessment research (cf. Brown & Harris, 2013).

More recent studies have shown that teachers and the learning environments they co-create can also influence self-regulated learning strategies (e.g., self-assessment practice; Boekaerts & Corno, 2005; Miller & Brickman, 2004; Mouratidis et al., 2013; Sierens et al., 2009; Wang et al., 2016). In fact, a growing body of literature on models of self-regulated learning that takes into account social contexts (e.g., co-regulated learning; see Brookhart, 2016; Hadwin & Oshige, 2011), which suggests how teachers can play a key role in promoting self-regulated learning among students (Harris & Brown, 2013). It could be argued

that social contexts are crucial to self-assessment practice (see Yan, Brown, et al., 2020, which highlights the importance of psychological safety for self-assessment practice). As studies continue to highlight how teachers' instructional practices could support self-regulated learning (Ryan & Deci, 2017; Zimmerman & Schunk, 2004), it is also likely to impact self-assessment practice, which is at the core of self-regulated learning (see Miller & Brickman, 2004; Yan, 2020b; Zimmerman & Moylan, 2009).

Recent reviews on student self-assessment have continued to lobby for future research to (1) explore how schools or teachers can act as *space* or context that can encourage self-assessment and (2) examine the internal psychological mechanisms of self-assessment (Andrade, 2019; Lui, 2020; Panadero, Brown, et al., 2016; Shute, 2008). They consider this area of research to be exploring the *next blackbox* of self-assessment. Hence, to examine the interplay of social and internal mechanisms in self-assessment, we used the self-system model of motivational development as the theoretical framework (Skinner & Belmont, 1993; Skinner et al., 2008) and integrated the self-determination theory of motivation (Ryan & Deci, 2000) and self-assessment practice within it. We discuss below how the self-system model, as the focal theoretical framework of this thesis, can situate self-assessment practice within the classroom context.

The self-system model, self-determination theory, and self-assessment practice

The self-system model of motivational development (see Figure 2; Skinner & Belmont, 1993; Skinner et al., 2008; Skinner et al., 2022) broadly demonstrates how social contexts can impact a wide range of adaptive student outcomes (e.g., engagement, motivation, academic achievement; Ahn et al., 2021; Burns et al., 2021; Leenknecht et al., 2017; Olivier et al., 2021; Skinner et al., 2008; Taylor & Ntoumanis, 2007). The model contends that social contexts in school (e.g., need-supportive teaching) can support students' psychological outcomes (e.g., their basic psychological need for autonomy, competence, and

relatedness). Recent cross-cultural research has highlighted the impact of need-supportive contexts on basic psychological needs, motivation, and achievement (Haw & King, 2022; Nalipay et al., 2020). Moreover, research has shown that when students are placed in need-supportive contexts, they tend to have higher motivation (Liu et al., 2021; Pintrich, 2003; Ryan & Deci, 2017; Taylor & Ntoumanis, 2007) and practice self-regulated learning more frequently (e.g., Miller & Brickman, 2004; Sierens et al., 2009; Yan, 2020b; Zimmerman & Moylan, 2009). As the self-system model covers basic psychological needs and engagement as internal and behavioural mechanisms, self-determination theory is used to integrate student motivation and self-assessment practice into the model.

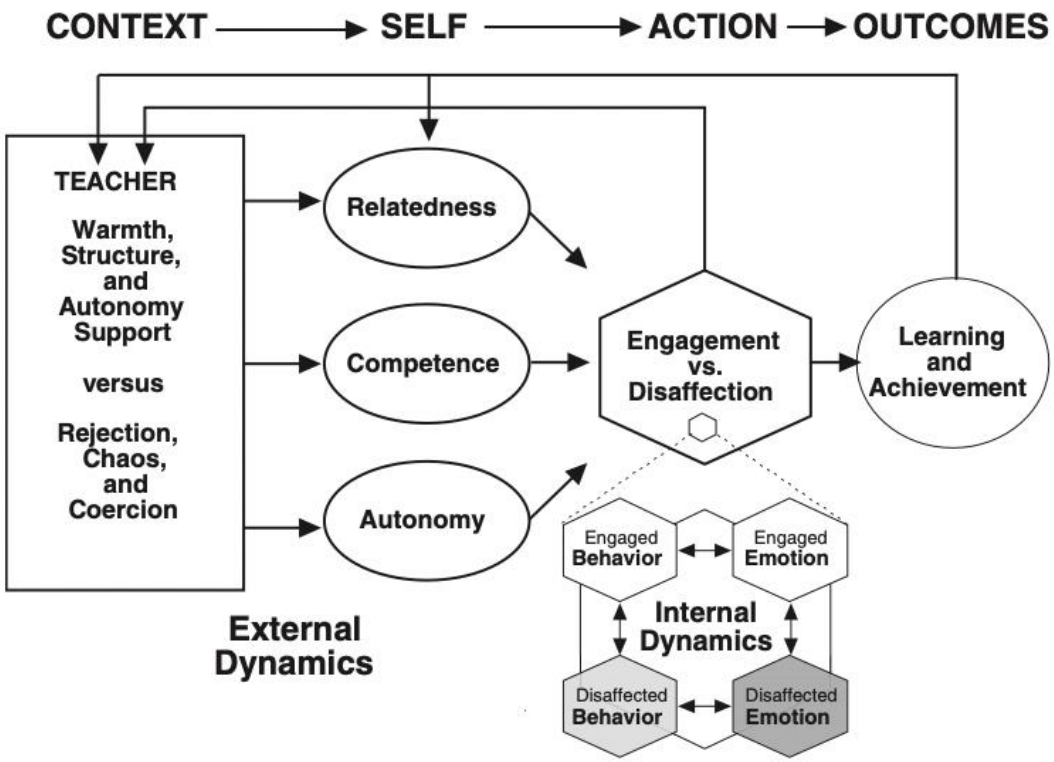

Figure 2. The self-system model of motivational development, including external and dynamics impacting student actions and outcomes [Permission to reuse the figure was granted by the *Journal of Educational Psychology*, Order Number: 5314591269402]

Self-determination theory (SDT) is a macro theory of motivation that underscores the necessary conditions to nurture intrinsic motivation (see Cook & Artino, 2016 for a review).

Specifically, a core tenet of SDT argues that students become motivated when their basic psychological needs (i.e., autonomy, competence, and relatedness) are met (Anderman & Leake, 2005; Gnambs & Hanfstingl, 2016; Reeve & Jang, 2006). It describes that need-supportive teaching practices, which consists of instructional practices that satisfy students' basic psychological needs for relatedness (e.g., sense of connection and belonging), competence (e.g., sense of mastery or efficacy), and autonomy (e.g., sense of choice and volition), can help students become motivated in school (see Leenknecht et al., 2017; Reeve, 2006; Ryan & Deci, 2000; Ryan & Deci, 2017; Vansteenkiste et al., 2012). Hence, teachers play a vital role in creating a learning context that can satisfy students' basic psychological needs and can enhance their motivation (Aelterman et al., 2014; Connell & Wellborn, 1991; Reeve, 2012; Ryan & Deci, 2000; Vansteenkiste et al., 2020).

Motivation is an innate predisposition to learn, grow, and develop, which is activated by need-supportive learning environments (see Deci, 1985; Niemiec & Ryan, 2009; Ryan & Deci, 2000; Vansteenkiste et al., 2020 for reviews). It is conceptualised to have two major forms: autonomous motivation and controlled motivation (Deci & Ryan, 2000; Howard et al., 2017). Autonomous motivation stems from a sense of choice, volition, and personal agency (Deci & Ryan, 2000; Hagger et al., 2015). Autonomously-motivated students are more attentive in class, exert more effort, and attain higher grades (see Baeten et al., 2013; Bureau et al., 2022; Shahar et al., 2003; Taylor et al., 2014; Toste et al., 2020). Controlled motivation, on the other hand, is observed when the self does not initiate behaviour (i.e., when regulated by others or external factors), which often correlates with less adaptive school outcomes (Bureau et al., 2022; Howard et al., 2017; Ratelle et al., 2007; Ryan & Deci, 2000; Vallerand et al., 1992). Although often negatively correlated (e.g., Baeten et al., 2013; Haerens et al., 2015), both forms of motivation can, at times, be positively correlated and equally adaptive (see Caleon et al., 2015; King & McInerney, 2019; King & Mendoza, 2020).

Still, when students are motivated, they are more likely to engage in activities and practices that will improve their learning outcomes (Reeve, 2012, 2013), one of which is self-assessment practices.

Following the conceptualisation of self-assessment introduced earlier, it is a behavioural outcome that could yield several optimal outcomes in schools. Although self-directed, when self-assessment practice is integrated within the self-system model, it represents actions that are influenced by the self and can impact outcomes (see Figure 3). Specifically, in the model, self-assessment takes the place of engagement as an *action* construct, which can influence achievement scores as *outcomes* and is influenced by motivation as a *self* construct. Thus, self-assessment is posed as a behavioural mechanism that can link student motivation to achievement scores.

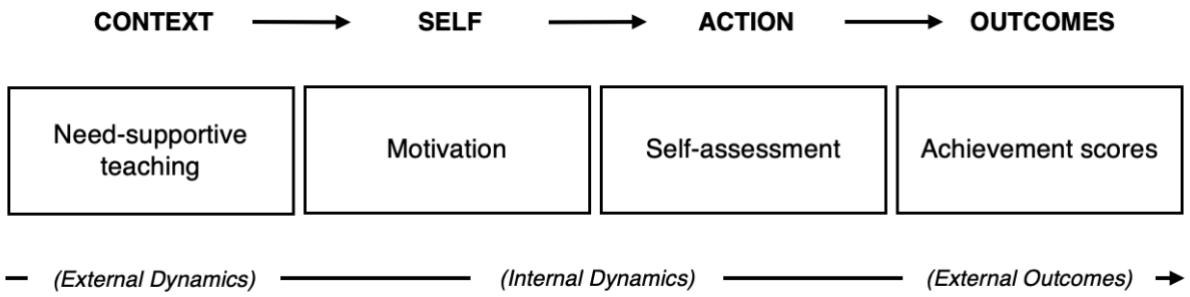

Figure 3. The self-system model with need-supportive contexts, motivation, self-assessment practice, and achievement as external and internal factors.

Overall, the self-system model of motivational development and the integration of SDT and self-assessment responds to the lacking theoretical perspective that can investigate student self-assessment within the ecology of the classroom. This provides a theoretical opportunity to move the current state of knowledge on self-assessment research for three major reasons (see Figure 3). First, it provides a broader lens that views the ecological factors or social contexts (e.g., need-supportive teaching) that can foster self-assessment practice.

Second, it can integrate internal mechanisms (e.g., motivation) to influence self-assessment practice. Finally, the potential role of self-assessment practice as a behavioural mechanism in the motivation-achievement link can be examined. The study of how self-assessment practice improves student achievement is expanded from the individual level to the ecological level. This overarching framework guides the second and third empirical studies included in this thesis (see Chapters 3 and 4).

The focus on domain-specificity is a distinct component of this thesis in that the variables under study are referenced to a specific subject (i.e., English language learning). Due to nuances and variations in the measurement of psychological and behavioural constructs, research in recent years has progressed from decontextualized or global instruments and studies toward more domain-specific instruments and studies (see Boekaerts & Corno, 2005; Orth et al., 2021; von Soest et al., 2016). The following section attempts to argue for the importance of examining the constructs under investigation from a domain-specific perspective.

Shift from global to domain-specific perspective

Inherent to the earlier conceptualization of psychological and behavioural constructs, the "first generation [instruments]" (Boekaerts & Corno, 2005, p. 199) devised to measure such constructs have been developed as global measures. For instance, instruments designed to measure students' perceptions of need-supportive teaching (Belmont et al., 1988), academic motivation (Guay et al., 2015; King & Caleon, 2021; Vallerand et al., 1992), self-assessment practice (Yan, 2018a), or engagement (Pintrich et al., 1993; Reeve & Tseng, 2011; Wolters, 2004) were assessed globally, irrespective of a target subject or learning domain (cf. Eccles & Wigfield, 2002). However, psychological, behavioural, and observational self-report outcomes can vary depending on context (see Orth et al., 2021; von

Soest et al., 2016 for meta-analytic and longitudinal evidence supporting the domain-specific evaluation of self-esteem).

Domain-specificity is vital in examining the focal constructs in this thesis since they could vary across domains. For example, in evaluating students' perception of need-supportive teaching, they should be able to clearly bring forth a referenced teacher. Merely asking whether they think their teachers generally practice need-supportive teaching may obscure self-report data since teachers' pedagogical strategies vary from one teacher to another (e.g., Aelterman et al., 2013; Burns et al., 2021; Van den Berghe et al., 2013). Similarly, students' motivation is domain-specific, that is, one can be intrinsically motivated to study science but not math (see Burns et al., 2021; Wigfield et al., 2004). This domain-specific variance also holds true for self-regulated learning strategies (Boekaerts & Corno, 2005). Given such considerations, and for practical implications to be indicated in the next section, the study of self-assessment along with its predictors and outcomes are explored within the context of English language learning.

Aside from these theoretical and conceptual perspectives that underpin this thesis, it is also motivated by real-world problems and practical gaps that require immediate research. The next and final section of this integrated discussion presents the practical contexts from which each research question is drawn.

Key research gaps and practical contexts

The research context in which the studies were grounded and the study goals that may bring solutions to key challenges in such contexts are provided below.

First, on evaluating student self-assessment. Previous research has sought to examine student self-assessment broadly (Krasman, 2010; Suh et al., 2014; Yan, 2016). The Self-assessment Practice Scale (SaPS; Yan, 2018a) was the only developed instrument to evaluate

self-assessment practices (Yan & Brown, 2017). It is currently validated and used in other learning contexts (e.g., Yan, Brubacher, et al., 2020) but is yet to expand in reach, especially in non-Western contexts (e.g., Philippines). Moreover, despite the known variations in student learning strategies in different subject domains (e.g., Wigfield et al., 1991; Wigfield et al., 2004), there remains no subject-specific adaptation of the SaPS (see Yan, Brubacher, et al., 2020, arguing for the importance of contextualizing self-assessment practices). For Study 1, we validated a subject-specific SaPS, where we sought secondary school students' self-assessment practices, specifically in English language learning. We chose to focus on English language learning given the recent performance of the Philippines in the Programme for International Student Assessment (PISA) 2018. In its first participation in the PISA 2018, the Philippines ranked among the lowest in Reading achievement (OECD, 2019). Teachers' formative assessment practices in the Philippines are still developing (see Cagasan et al., 2020; Griffin et al., 2016). The availability of valid scales to evaluate students' use of self-assessment practice can aid in monitoring, promoting, and maintaining formative learning strategies. To a broader extent, this decision to adapt a subject-specific SaPS was also applied to the second and third studies, following the value of domain-specific research.

Second, students' motivation to learn tend to decrease during secondary school (Fraine et al., 2007; Gnambs & Hanfstingl, 2016). Hence, teaching practices (e.g., need-supportive teaching) that can enhance student motivation are crucial. However, most research on need-supportive teaching has included a small number of research participants from Eastern contexts, especially in Southeast Asia (cf. King & Mendoza, 2021; Mendoza & King, 2020). As a result, educators and policymakers in non-Western contexts have limited opportunities to learn about and apply evidence-based interventions to mitigate declining student motivation that could fit their context. Aside from low student motivation and lacking research in Eastern contexts, as introduced, self-assessment research has generally focused on

individual-level factors that influence student self-assessment (e.g., Brown & Harris, 2013; Panadero, Brown, et al., 2016; Panadero et al., 2017; Yan, Brown, et al., 2020). Despite current studies identifying social factors that can catalyse student's intention and use of self-assessment practice (e.g., perceived psychological safety; teachers' promotion of self-regulated learning; Harris & Brown, 2013; Yan, Brown, et al., 2020), the mechanisms that link the learning environment and psychological factors to self-assessment has received relatively minimal theoretical research attention. As a response, Study 2 explores how teachers' need-supportive teaching (i.e., involved, structured, and autonomy-supportive teaching) influences autonomous and controlled motivation and self-assessment. Moreover, the direct effect of motivation on English learning achievement is examined, with self-assessment posed as a behavioural mediator. Culturally relevant insights can be obtained from such a framework regarding how teachers can enhance their educational strategies to boost student motivation.

Finally, the elephant in the room in current educational research is the impact of the COVID-19 pandemic on education. Due to the COVID-19 pandemic, schools in over a hundred countries have been forced to close and conduct all teaching and learning activities online (UNESCO, 2021; Van Lancker & Parolin, 2020). Naturally, the abrupt switch to online learning posed a slew of challenges to students' learning (see Chiu et al., 2021; Dhawan, 2020). The potential causal assumptions generated from Study 2 are tested in Study 3 using an experimental approach. In an online language learning task, we compared the effects of a need-supportive task instruction and a default task instruction on intrinsic motivation, task-specific self-assessment practice, and task performance. The need-supportive task instructions are derived from theoretically informed brief interventions known to impact adaptive outcomes (e.g., intrinsic motivation, prosocial behaviours; Jeno et al., 2020; Kanat-Maymon et al., 2015; Pavey et al., 2011; Sheldon & Filak, 2008; Vaughn,

2017). In doing so, a cost-effective and sustainable brief online intervention can be developed and distributed at scale to schools providing online/asynchronous learning, mitigating motivational challenges amid online learning.

Overall, the studies integrated into this thesis are theoretically and contextually informed. To reiterate, the validation of SaPS for English language learning is driven by the value of domain-specific research and the need to evaluate, monitor, and promote students' formative assessment practices, particularly in learning domains where student performance has been documented to be suboptimal. Moreover, the examination of mechanisms surrounding student motivation and self-assessment practice is driven by the paucity of research on improving motivation and learning strategies in the East. Importantly, the theoretical perspective taken in understanding self-assessment situates it within the classroom ecology, which accounts for teacher practices, student motivation, and achievement. Finally, especially in asynchronous/online learning amid the COVID-19 pandemic, online interventions to enhance intrinsic motivation in learning tasks are vital to recovering learning losses. The next three chapters present these studies, and the integrated discussion chapter confers and integrates the study findings, implications, and directions for future research. Table 1 below overviews the main details of each study.

Studies	Aim/s	Method/Analysis	Outcome/s
Study 1	Validate Yan's (2018a) Self-assessment Practices Scale (SaPS), specifically adapted for English language learning, in the Philippine secondary school context	Cross-sectional design; Complementary Rasch Analysis and Confirmatory Factor Analysis; and Structural Equation Modelling (SEM)	A subject-specific Self-assessment Practice Scale; An adapted tool to monitor/improve formative assessment strategies
Study 2	Test the contextual (need-supportive teaching practices) and psychological predictors (autonomous motivation) of student self-assessment practice Test whether the ensuing self-assessment practice positively predicts objective English learning achievement score	Cross-sectional design with objective achievement scores in English; variables under study are self-reported Multilevel mediation analysis on Rasch-calibrated person measures	Theoretical understanding of the interaction between need-supportive teaching and motivation as social and internal predictors of self-assessment practice An understanding that self-assessment practice mediates the link between motivation and achievement scores
Study 3	An experimental study examining the effect of need-supportive task instruction on motivation and self-assessment practice Examine the effect of self-assessment practice on task performance, and its mediating role between motivation and task performance	Brief online intervention testing the theoretical model in Study 2, in a language learning task Analysis of covariance (ANCOVA) to examine change in motivation, controlling for pre-test motivation scores Moderated mediation testing the mediating role of self-assessment practice between experimental conditions	Draw causal evidence on the differential effect of need-supportive online task instruction that can trigger cascading effects on intrinsic motivation, self-assessment practice, and task performance Develop a brief, cost-effective, and sustainable intervention for immediate implementation amidst online and asynchronous learning environments

Table 1. Outline of studies included in this thesis

Note: References for each chapter are integrated and consolidated at the end of the thesis

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Chapter 2: Validation of a subject-specific Self-Assessment Practices Scale among secondary school students in the Philippines

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Validation of a subject-specific Self-Assessment Practices Scale among secondary school students in the Philippines

Abstract

Self-assessment is fundamental to self-regulated learning; however, instruments to measure self-assessment practices are limited to a few developed educational systems. This study examined the psychometric properties of the Self-assessment Practice Scale (SaPS) in the English language subject using data from 778 secondary school students from the Philippines. We used confirmatory factor analysis (CFA) and Rasch analysis to test the SaPS' within-network validity, then bivariate correlations and structural equation modeling (SEM) for between-network validity. The CFA supported the scale's four-factor structure, and the Rasch analysis supported the scale's dimensionality, rating scale effectiveness, and item fit statistics. The four SaPS subscales were positively correlated to agentic, cognitive, and metacognitive engagement. SEM results show that all SaPS factors (except self-monitoring) had significant associations to the engagement outcomes. This study highlights the sound psychometric properties of SaPS in a new educational context and its applicability as a subject-specific measure of assessment-as-learning strategies.

Validation of a subject-specific Self-Assessment Practices Scale among secondary school students in the Philippines

Introduction

Self-assessment is generally conceptualized as a process through which students judge their performance based on the information and evidence collected from different sources (Boud, 1995; McMillan & Hearn, 2008; Yan & Brown, 2017). Broadly speaking, self-assessment occurs when "students reflect on the quality of their work, judge the degree to which it reflects explicitly stated goals or criteria, and revise accordingly" (Andrade & Valtcheva, 2009, p. 13). Self-assessment is a core skill for self-regulated learning (Panadero & Alonso-Tapia, 2013; Yan, 2020b) and lifelong learning (Papanthymou, 2018; Siegesmund, 2017; Yan & Brown, 2017). It is linked with key learning outcomes, such as school achievement (McDonald & Boud, 2003; Yan, Chiu, et al., 2020), student motivation (McMillan & Hearn, 2008), and self-regulated learning (Panadero et al., 2017), among others (see Andrade, 2019; Brown & Harris, 2013, for reviews). Because of the positive association between self-assessment and key learning outcomes, researchers have recognized the need to understand the self-assessment process and develop instruments to assess self-assessment (Panadero, Brown, et al., 2016; Yan & Brown, 2017). Doing so can help in programs or interventions designed to enact and maximize the impact of self-assessment.

Yan (2018a) adopted a theory-driven approach in developing the Self-assessment Practice Scale (SaPS) in the Hong Kong school context, which has been successfully applied in other contexts, such as higher education (Yan, 2020b) and professional training in western culture (Yan, Brubacher, et al., 2020). The instrument evaluates students' use of two core self-assessment processes: seeking self-directed feedback and self-reflection. However, the SaPS' validity for evaluating learner-centered formative assessment has not yet been investigated in developing countries with varied educational curricula (e.g., The Philippines).

Validating the SaPS in the Philippines is especially crucial and beneficial, given the Philippines' poor performance in its first participation in the recent Program for International Student Assessment or PISA 2018 (OECD, 2019).

This study aims to evaluate the psychometric properties of the SaPS (Yan, 2018a) in the Philippines. This research is a first attempt to investigate the validity of the SaPS in the English language subject at a secondary school level. This could then extend the use of the SaPS across cultures in light of improving the use of 21st-century skills like student self-assessment.

Self-assessment Practice Scale

Assessing self-assessment practices is different from evaluating self-assessment accuracy. Although there is a consensus that self-assessment is a complex process incorporating multiple steps (see Andrade et al., 2008; Boud, 1995), the understanding of self-assessment practices (i.e., the actions students do during the self-assessment process) is surprisingly limited. Yan and Brown (2017) proposed a cyclical process model of self-assessment that explicitly outlines three sequential actions of self-assessment including (1) determining assessment criteria, (2) self-directed feedback seeking, and (3) engaging in self-reflection. These actions were included in self-report measures following the cyclical process of self-assessment (Yan, 2016, 2018b), which evolve into the SaPS Yan (2018a). To our knowledge, the SaPS is the only available theory-driven instrument that is specifically designed for assessing self-assessment practices.

The SaPS is focused on the self-assessment processes of self-directed feedback seeking and self-reflection. The scale starts with "When I study...," followed by self-assessment items which are grouped into four subscales corresponding to the four self-assessment actions: seeking external feedback through monitoring (SEFM; 5 items), seeking external feedback through inquiry (SEFI; 4 items), seeking internal feedback (SIF; 4 items),

and engaging in self-reflection (SR; 7 items). The scale was validated with a sample of 2906 primary and secondary Hong Kong students. The results of factor analysis and Rasch analysis for SaPS supported its psychometric properties and structural validity (Yan, 2018a).

The SaPS and its short form and adapted versions have been used for graduate students (Yan, 2020b) and professional trainees in a Western cultural context (Yan, Brubacher, et al., 2020). The scale can track the development of self-assessment skills and can be used to inform teaching strategies that can promote self-assessment for optimizing learning outcomes. Evidence from recent interventions (e.g., randomized control trials and self-diaries) points to the effectiveness of self-assessment practices in increasing student achievement, self-regulation, and motivation (Meusen-Beekman et al., 2016; Yan, Chiu, et al., 2020).

The current study

This study extends the use of the SaPS as a critical tool in evaluating students' self-assessment practices in the English language as a specific subject domain. We adopted the network construct validation approach (see Martin, 2007; Martin & Marsh, 2006) which involves examining the scale's within-network construct validity (i.e., factor structure and internal reliability) and between-network construct validity (i.e., the association of SaPS' dimensions with criterion-related constructs).

We used agentic, cognitive, and metacognitive engagement outcomes as correlates for testing the SaPS' between-network validity since these outcomes are viewed as self-regulatory learning (SRL) strategies (Fredricks et al., 2004; Zimmerman & Schunk, 2004) similar to self-assessment (see Brown & Harris, 2013; Panadero et al., 2017). Agentic engagement is defined as "students' constructive contribution into the flow of the instruction they receive [in school]" (e.g., asking questions, communicating their thoughts and needs; Reeve & Tseng, 2011, p. 258) and is conceptualized as a key component of overall student

engagement (Reeve et al., 2020). Cognitive engagement is composed of internal indicators of SRL, such as students' striving and effort to understand complex ideas and master difficult skills (Fredricks et al., 2004; Fredricks & McColskey, 2012). Metacognitive engagement consists of SRL strategies such as planning, monitoring, and revising one's schoolwork (Wolters, 2004). Metacognitive engagement has been posed as integrating motivation and SRL (see Zimmerman & Moylan, 2009) and is associated with self-assessment (Siegesmund, 2017). These student engagement outcomes are therefore posited as constructs interrelated with self-assessment.

Further, we aim to extend the utility of SaPS as a subject-specific instrument since students might employ different learning strategies (e.g., self-assessment practices and engagement outcomes) in different subject domains in school (e.g., Wigfield et al., 1991; Wigfield et al., 2004). Therefore, we modified the opening SaPS prompt from "When I study" to "When I learn English..." to frame subject specificity. Such a procedure has been used previously with closely related constructs (e.g., self-concept, self-efficacy; Lent et al., 1997). Contextualizing self-assessment practices has also been recommended in a separate validation study (Yan, Brubacher, et al., 2020). The engagement outcomes measured are also framed in the context of the English language subject.

Method

Participants

Participants in the study were 778 secondary school students from the Philippines1. Participants with missing data greater than 5% and outliers for each of the measures were removed (see Data analysis section for details). Data from 673 students remained for the final analysis. The data consist of 186, 158, 157, and 172 students from Grades 7, 8, 9, and 10, respectively. Although the students' age ranged from 11 to 19 years old (M = 14.14, SD =

1.51), there was only one 11-year-old and 12 18- and 19-year-olds. More than half of the participants were females (n = 376, 55.87%). It was vital to have a balanced number of participants from each grade level since SRL strategies can be developmentally influenced (see Paris & Newman, 1990).

Procedures

Data were collected through a paper-and-pen survey method. Procedures for this study were approved by the Human Research Ethics Committee of both authors' affiliated university. A research assistant from the Philippines administered the questionnaires during the students' class hours and was present during the data collection to respond to potential student inquiries. The questionnaires were in the English language as English is the medium of instruction in the Philippines' K-12 schools. The students took about 10 minutes to complete the questionnaire.

Table 1. Bivariate correlations and descriptive statistics (n=673)

	SaPS			Engagement			
	1	2	3	4	5	6	7
1. SEFM (monitoring)	(.72)						
2. SEFI (inquiry)	.54***	(.76)					
3. SIF (internal feedback)	.53***	.44***	(.68)				
4. SR (reflection)	.66***	.56***	.59***	(.81)			
5. Agentic engagement	.55***	.57***	.42***	.59***	(.87)		
6. Cognitive engagement	.56***	.44***	.48***	.68***	.67***	(.84)	
7. Metacognitive engagement	.55***	.42***	.54***	.64***	.62***	.71***	(.73)

Note. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$. Values shown in parentheses on diagonal are internal consistency reliabilities of the scales

Measures

SaPS. The SaPS (Yan, 2018a) is a 20-item instrument based on the cyclical model of the self-assessment process (Yan & Brown, 2017). It comprises four subscales: seeking

external feedback through monitoring, seeking external feedback through inquiry, seeking internal feedback and self-reflection (see Table 2 for scale items). The internal consistency of the subscales ranged from α = .69 to .81 (see Table 1).

Engagement outcomes. We used a 5-item Agentic Engagement Scale (Reeve & Tseng, 2011) which consists of items on students' constructive contribution to the flow of the instruction and feedback they receive in school (e.g., "During English class, I ask questions to help me learn."). We used Wolters's (2004) learning strategies questionnaire, which was derived from the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich et al., 1993), to assess cognitive engagement (4 items) and metacognitive engagement strategies (4 items). Cognitive engagement items consist of elaboration-based learning strategies (e.g., "I adjust whatever we are learning so I can learn as much as possible."), while metacognitive engagement items include self-regulation strategies (e.g., "Before I begin to study, I think about what I want to get done."). These instruments' internal consistencies in the present study are α = .87, .84, and .73, respectively.

Data analysis

For the within-network validity, confirmatory factor analysis (CFA) and Rasch analysis were used. Numerous empirical studies have applied this complementary combined analytical approach (e.g., Chang & Engelhard, 2016; Testa et al., 2019; West et al., 2020; Yan, 2018a; Yan, Brubacher, et al., 2020) to examine unique psychometric information of the scale items and subscales. The structural validity of the four-factor model of SaPS was assessed using CFA, where n = 19 participants with more than 5% of item-level missing data were excluded (Tabachnick et al., 2007). Responses with item-level missing data were imputed using multiple imputation by chained equation (Azur et al., 2011). Participants with extreme scores on multiple items or variables which might bias the parameter estimates (i.e.,

multivariate outliers; Kline, 2015), were identified using the Mahalanobis distance rule (see Bedrick et al., 2000). This rule evaluates how far each person's score lies from the centroid of

Table 2. *Item Difficulties, Standard Errors, and Item Fit Statistics for the SaPS items (n=768)*

Scale/Item	Item Measure*	SE	Infit MNSQ	Outfit MNSQ
Seeking External Feedback Through Monitoring (SEFM)				
1. I check whether I have mastered the subject content by doing extra exercises.	-0.02	0.03	0.81	0.8
2. I check whether I have fully understood the subject content by doing past exam papers.	-0.10	0.03	0.86	0.84
3. I keep track of my progress by recording my performance.	0.11	0.03	0.98	1.02
4. I ask myself questions in my head to check whether I have understood the subject content.	-0.20	0.03	0.98	0.95
5. I check my performance against the answers in textbooks or on a website.	0.22	0.06	1.16	1.21
Seeking External Feedback Through Inquiry (SEFI)				
6. I ask my teachers to give me feedback about my performance.	0.25	0.03	1	1
7. I ask my family members to give me advice on my work.	-0.13	0.03	1.22	1.18
8. I ask my friends to tell me how to improve my learning.	-0.12	0.03	1.11	1.07
9. I ask my fellow group members to evaluate my contributions to group work tasks.	0.00	0.05	0.9	0.89
Seeking Internal Feedback (SIF)				
10. My gut feelings** (*hinala o pakiramdam*) tell me whether my work is good or bad.	-0.10	0.03	1.01	1.02
11. My emotions influence my evaluation on my learning performance.	0.04	0.03	0.99	0.98
12. How my body feels (e.g., feeling tired or energetic) tells me how well I am doing.	0.05	0.03	0.97	0.99
13. My intuition** (*kutob*) tells me if I am doing a good job or not.	0.01	0.05	1.06	1.1
Self-reflection (SR)				
14. I seek out the reasons for mistakes I made after getting back marked work.	-0.09	0.03	1.02	1
15. I think about how much sense the comments of other people (e.g., teachers, family members, and friends) regarding my work make to me.	0.16	0.03	0.96	0.99
16. Any areas I am unsure of after finishing my work, I go over again.	0.27	0.03	0.88	0.91
17. I think about whether the way I am studying is really helping me learn.	-0.31	0.03	0.93	0.9
18. When I do exercise, I look at what I got wrong or did poorly on to guide me as to what I should learn next.	-0.01	0.03	1.04	1.01
19. I pay attention to my assessment results in order to identify what I can do better next time.	-0.32	0.03	1.27	1.19
20. I reflect on my weaknesses when I discuss study-related issues with my classmates.	0.30	0.07	1.16	1.23

Note. *All measures and SEs are in logits. **To aid readability, this word is followed by a translation to the Philippine local language.

all the participants (i.e., the aggregated mean of all item means). Fifty-seven participants were identified as outliers and were excluded from the CFA. Next, the two SaPS structural models were tested: a one-factor model and a four-factor model (SEFM, SEFI, SIF, and SR). All items were treated as continuous data, and the following goodness-of-fit indices were used to evaluate and compare the models: Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and standardized root mean square residual (SRMR). Following the Hu and Bentler (1995) recommendation, a good model fit would include model CFI and TLI of greater than .90 and an RMSEA of less than .08. An SRMR value of less than .08 is considered a good fit (Hu & Bentler, 1999).

A multidimensional Rasch-based model (Adams et al., 1997), using ConQuest 2.0 (Wu et al., 2007) was employed in this study because self-assessment practice was conceptualized as a multidimensional construct (Yan & Brown, 2017). All subscales are calibrated simultaneously, and the measurement precision on each subscale can be enhanced by taking into account any inter-correlations between the subscales (Bond et al., 2020). The indicators used to examine the instrument quality in Rasch analysis include Rasch reliability, response category functioning, and item MNSQ (mean squared) fit statistics (i.e. infit MNSQ and outfit MNSQ).

For the between-network validity, we used bivariate correlations and structural equation modeling (SEM), respectively. Specifically, we evaluated how each of the hypothesized SaPS subscales correlate to agentic, cognitive, and metacognitive engagement followed by SEM. The use of a full SEM is essential to further examine the association between the constructs while controlling for item-level measurement errors (Yu & Hsu, 2013; Zumbo, 2014). We first tested whether the three engagement outcomes would fit a three-factor model. Then, we regressed the agentic, cognitive, and metacognitive engagement outcomes to the four SaPS factors. The same data screening procedures with the SaPS CFA

were applied to the engagement outcomes. Consequently, the engagement data (n = 706) were merged to the SaPS data (n = 702), resulting in a final analytic dataset (n = 673) for the SEM. Apart from the Rasch analysis, all other analyses were conducted through the statistics software R (R Core Team, 2016) using Rosseel's (2012) lavaan package.

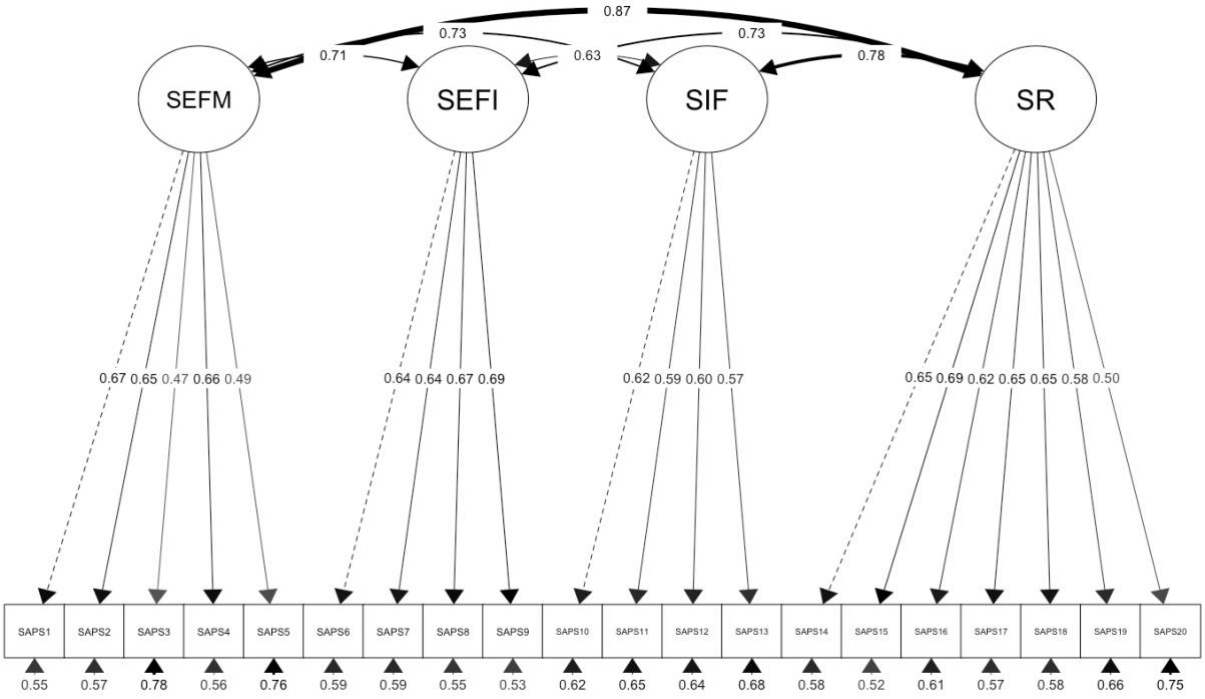

Figure 1. Four-factor structure of SaPS

Results

Within-network Construct Validity

CFA results showed that the one-factor model did not have good model fit (see Table 3), whereas the four-factor model had good model fit: $\chi 2(164) = 444.47$, CFI = .934, TLI = .923, RMSEA = .049, and SRMR = .04. The four-factor model also had significantly better fit than the one-factor model [$\chi 2\text{diff}(6) = 300.16$, $p < .001$]. Figure 1 shows the standardized factor loadings for each of the items and their corresponding factors.

The multidimensional rating scale Rasch model results support the SaPS good psychometric properties. The step calibrations, or the measures of the transition points between adjacent categories, increased monotonically from -1.31, -0.85, -0.77, 0.62, to 2.31 logits, suggesting that the six-point response scale functioned well. All items demonstrated sufficient fit to the Rasch model as the values of infit and outfit MNSQ fell within the acceptable range between 0.75 and 1.33 (M Wilson, 2005). This result indicates that all items were assessing each latent trait as hypothesized. The Rasch reliabilities for SEFM, SEFI, SIF, and SR were .84, .79, .75, and .87, respectively. Table 2 presents the item difficulties, standard errors, and item fit statistics.

Table 3. *Fit indices of the confirmatory factor analyses and structural equation model*

Model	χ^2	df	CFI	TLI	RMSEA	SRMR
CFA: SAPS 20 4-factor model[a]	444.474***	164	.934	.923	.049	.04
CFA: SAPS 20 1-factor model[a]	744.636***	170	.864	.848	.069	.051
CFA: Engagement 3-factor model[b]	468.825***	86	.927	.911	.079	.048
SEM: SaPS predicting engagement[c]	1483.013***	602	.911	.902	.047	.045

Note. * $p<.05$., ** $p<.01$., *** $p<.001$; superscripts indicate sample size: [a]=702, [b]=706, [c]=673

Between-Network Construct Validity

The correlation between the four SaPS factors ranged from .44 to .66, indicating a significant and moderate positive relationship across the factors. The SaPS factors were also positively correlated with the engagement outcomes (see Table 1). The SEM results show that each SaPS factor predicts unique association in each engagement outcome (see Table 4; Figure 2). SEFI (B = .26, p < .001) and SR (B = .63, p < .001) were both associated with agentic engagement. Self-reflection was associated with cognitive engagement (B = .88, p < .001). SIF (B = .28, p < .001) and SR (B = .60, p < .001) were both associated with metacognitive engagement. SEFM had no significant association with the engagement

outcomes. The full model had good fit indices: $\chi 2(538) = 1352.54$, CFI = .917, TLI = .908, RMSEA = .047, and SRMR = .044.

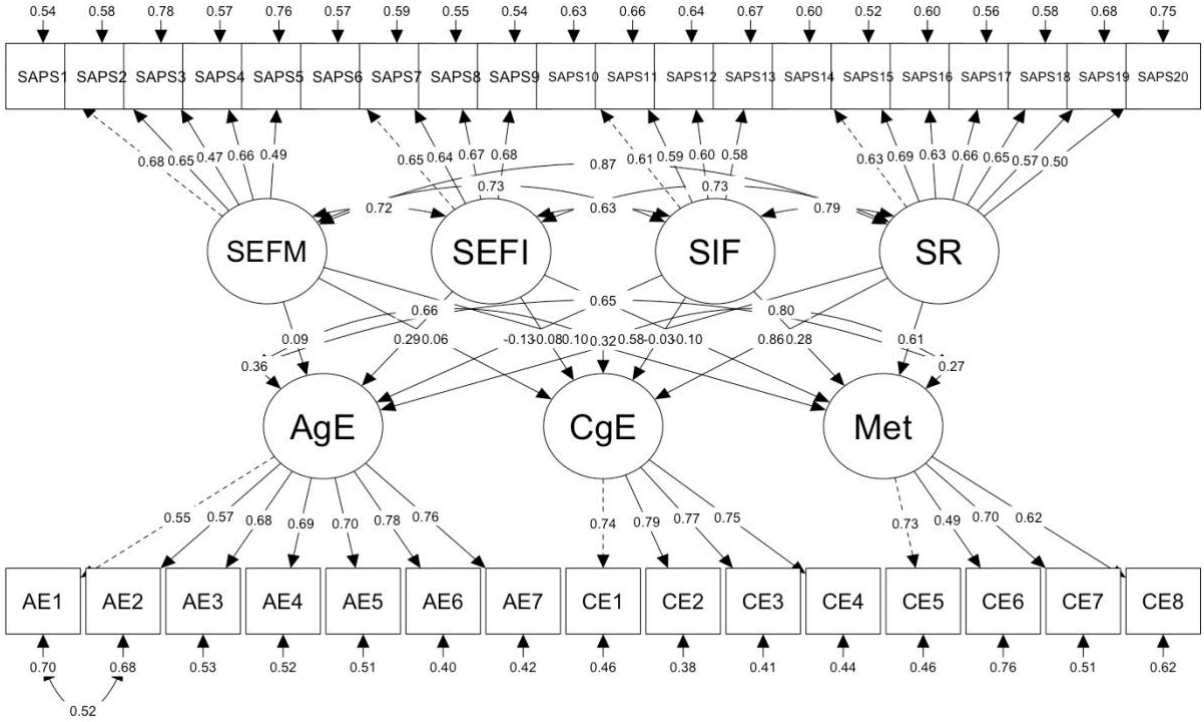

Figure 2. Structural equation model with SaPS subscales predicting agentic, cognitive, and metacognitive engagement

Table 4. Structural equation model where SaPS factors were entered as predictors of engagement outcomes

		B	SE	*p*	Std. Beta
Agentic engagement<-	SEFM	.090	.141	.523	.075
	SEFI	.294	.068	.000	.296
	SIF	-.177	.104	.089	-.141
	SR	.755	.179	.000	.603
Cognitive engagement<-	SEFM	.043	.161	.788	.033
	SEFI	-.084	.073	.251	-.077
	SIF	-.051	.116	.658	-.037
	SR	1.207	.210	.000	.880
Metacognitive engagement<-	SEFM	.105	.163	.521	.080
	SEFI	-.110	.075	.142	-.102
	SIF	.368	.120	.002	.271
	SR	.844	.200	.000	.623

Note. SEFM (monitoring), SEFI (inquiry), SIF (internal feedback), SR (self-reflection)

Discussion

This study aimed to validate the SaPS on an English language subject domain within a Philippine sample. Overall, the study highlights the SaPS' reliability and validity for use in a specific subject domain. The CFA supported the hypothesized four-factor structure, and the multidimensional Rasch analysis showed that all 20 items of the SaPS demonstrated satisfactory item/subscale fit. These findings demonstrated within-network validity. As with previous validation studies of the SaPS (Yan, 2018a, 2020a; Yan, Brubacher, et al., 2020), the four-factor structure had a better structural model fit. This supports the theoretical underpinnings of the SaPS as aligning with the cyclical process of self-assessment (Yan & Brown, 2017).

The relationships between the SaPS factors with the engagement outcomes demonstrated between-network validity. As self-assessment practices (Brown & Harris, 2013; Panadero, Jonsson, et al., 2016; Yan, Brown, et al., 2020) and student engagement (Fredricks et al., 2004; Zimmerman & Schunk, 2004) are both related with SRL, the direction of the relationship between the SaPS factors and engagement outcomes was expected to be positive. Indeed, the strength of the relationship between self-assessment and engagement was positive and moderate, indicating that the subscales are correlated but not so high as to be interpreted as tapping the same underlying construct.

Controlling for item-level measurement errors, SR predicted all engagement outcomes, especially cognitive engagement. The strong association of SR to cognitive engagement can be due to its practices similar with cognitive engagement (e.g., relating previous to new knowledge; connecting learning to personal experiences; Fredricks & McColskey, 2012; Wolters, 2004). SEFI was primarily associated with agentic engagement due to the similarity of students' intentional desire to seek feedback (see Reeve & Tseng, 2011). Both SEFI and agentic engagement involves the act of asking questions to members of

their learning environment (Reeve & Tseng, 2011; Yan, 2018a; Yan & Brown, 2017). The link between SIF and metacognitive engagement can be due to the importance of internal/psychological mechanisms relevant to self-assessment and engagement (Wolters, 2004; Yan, 2018a). How students feel emotionally in school can influence their engagement (Pekrun & Linnenbrink-Garcia, 2012) and their self-assessment practices (Yan, 2018a). SEFM was not associated with engagement outcomes. This lack of association can be due to the practical use of SEFM. Students may pay more attention to self-assessment practices while learning in school (e.g., inquiry, internal feedback, and self-reflection) and less attention to self-monitoring practices (e.g., checking content mastery by re-doing past exam papers, reviewing test results against answers in the textbook or website). SEFM involves practices which are more applicable before or after school. Hence, SEFM practices may be less salient when the latter self-assessment practices are practically more applicable. The statistically significant and theoretical association of the SaPS factors to the engagement outcomes further supports the scale's validity.

The validation of the subject-specific SaPS has two potential practical implications. First, the SaPS' scores can be used to identify student self-assessment practices that need further improvement. Interventions can then be designed to target specific self-assessment practices. Second, the effectiveness of scalable interventions like monitoring logs (Zimmerman & Kitsantas, 1997), self-assessment diaries (Yan, Chiu, et al., 2020), or self-assessment checklists (see Meusen-Beekman et al., 2016 for self-assessment strategies used in randomized controlled interventions) can be evaluated using the subject-specific SaPS. Consequently, teachers can encourage students to seek feedback and reflect on their English learning tasks.

Limitations and Directions for Future Research

Despite the notable strengths of the present study, we also note some limitations. First, the study used cross-sectional data; hence, future studies can explore test–retest reliability and predictive validity using a longitudinal approach. Second, our sample is only composed of students from Grades 7 to 10, limiting the possible generalizability of our findings. Extending the current sample to students from primary and higher education would be a meaningful future research endeavor. Finally, consistent with previous studies is the finding that shows a relatively lower reliability of SIF. Yan and Brown (2017) showed that internal feedback is more salient for subjects involving performance-related activities (e.g., sports, music, and arts) and could be less noticeable for academic or less performance-oriented subjects like English. Hence, future investigations can (a) refine the items under SIF and make them more suitable for less performance-oriented subjects, or (b) identify alternative ways, rather than self-reports, to capture students' practices in SIF for self-assessment. From a substantive and theoretical standpoint, the exploration of social and psychological predictors of self-assessment practice are meaningful future research directions.

Conclusion

Schools from countries with an educational reform that only recently incorporated formative assessment strategies in the curriculum and geared at improving their students' performance on international assessments (i.e., PISA) could benefit by using instruments that gauge how students engage in self-assessment practices. Students' use of self-assessment practices is an invaluable 21st-century skill that students can use for lifelong learning. This study supports the psychometric properties of the original SaPS and extends its applicability across cultures and in an English language subject domain.

Footnote

1. The Philippines did not fare well in its first participation in the recent PISA 2018 assessments (OECD, 2019); ranking lowest on Reading achievement. Evidence suggests that self-assessment practice through self-assessment diaries can improve academic achievement (Yan, Chiu, & Ko, 2020). Studies also highlight that self-assessment practice is key for lifelong and deep learning (e.g., Boud, 1995; Papanthymou, 2018; Yan & Brown, 2017); hence, validating this scale to study, evaluate, and improve student self-assessment is an important step in improving both short- and long-term achievement.

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Chapter 3: Domain-specific motivation and self-assessment practice as mechanisms linking perceived need-supportive teaching to student achievement

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Domain-specific motivation and self-assessment practice as mechanisms linking perceived need-supportive teaching to student achievement

Abstract

The self-system model of motivational development was used in this study to examine whether and how student motivation and self-assessment practices—as psychological and behavioural mechanisms, respectively—link need-supportive teaching to students' objective achievement scores in English language learning. We applied a multilevel mediation analysis on Rasch-calibrated data from 796 students (53% females; mean age = 14.12, *SD* = 1.51) nested within 30 classes (mean class size = 26.53) in a secondary school in the Philippines. We collected all predictor variables (i.e., need-supportive teaching, motivation, self-assessment practice) in Time 1, while achievement scores were collected eight weeks later (Time 2). Lower-level mediation results show that students' perceptions of involved teaching and structured teaching are associated with higher controlled motivation and autonomous motivation. Further, only autonomous motivation was associated with higher achievement in Time 2. Self-assessment practice significantly mediated the link between both controlled and autonomous motivation to achievement. These results held while controlling for age, gender, and socioeconomic status. Hence, involved and structured teaching practices correlate with higher motivation and increased self-assessment practice, which, in turn, leads to higher achievement in English language learning. The findings highlight that motivation and self-assessment practices are psychological and behavioural pathways that can theoretically and empirically explain how need-supportive teaching practices impact student achievement in a specific subject. Implications and directions for future research are discussed.

Domain-specific motivation and self-assessment practice as mechanisms linking perceived need-supportive teaching to student achievement

Introduction

Teachers' instructional practices that satisfy students' basic psychological needs for relatedness (e.g., sense of connection and belonging), competence (e.g., sense of mastery or efficacy), and autonomy (e.g., sense of choice and volition) are referred to as need-supportive teaching (Leenknecht et al., 2017; Reeve, 2006; Ryan & Deci, 2000, 2017; Vansteenkiste et al., 2012). Need-supportive teaching consists of involved, structured, and autonomy-supportive teaching strategies that foster a wide range of positive student outcomes in school (e.g., motivation, engagement, self-regulated learning; Kiefer et al., 2015; Mouratidis et al., 2013; Mouratidis et al., 2011; Reeve, 2012; Reeve & Jang, 2006; Tas, 2016) as well as student achievement (Baeten et al., 2013; Burns et al., 2021; Kiefer et al., 2015; Olivier et al., 2021). Because of such impact, researchers have studied *how* need-supportive teaching predicts student school outcomes (Aelterman et al., 2014; Baeten et al., 2013; Burns et al., 2021; Ntoumanis et al., 2017; Olivier et al., 2021). However, research into the underlying psychological and behavioural mechanisms that can explain the link between need-supportive teaching and achievement remains sparse, with several research gaps (cf. Connell & Wellborn, 1991; Skinner & Belmont, 1993; Skinner et al., 2008).

A crucial research gap in studies that examine the link between need-supportive teaching and achievement is the overreliance on self-reported student outcomes focused on schooling in general. For instance, studies have examined how need-supportive teaching impact self-reported outcomes like student engagement (Kiefer et al., 2015; Olivier et al., 2021; Tas, 2016), motivation (Haerens et al., 2015; Ntoumanis et al., 2017), or both (see Stroet et al., 2013 for a review); but very view have examined objective student achievement scores at outcomes. Relatedly, despite the varied impact of instructional practices on student

outcomes depending on the subject domain (see Chanal & Guay, 2015; Wigfield et al., 2004), few have studied objective achievement in a specific subject domain (e.g., science achievement; Burns et al., 2021; Haw et al., 2021). Another research gap is the focus of current studies on autonomy-supportive teaching (e.g., Baker & Goodboy, 2019; Bureau et al., 2022; Haerens et al., 2015; Occhino et al., 2014; Reeve, 2006, 2016; Wang et al., 2016). Autonomy-supportive teaching satisfies students' basic psychological need for autonomy, involved teaching satisfies relatedness needs, and structured teaching satisfies students' need for competence. Still, little attention is given to the impact of involved teaching and structured teaching practices on student achievement and other outcomes (cf. Mouratidis et al., 2013; Vansteenkiste et al., 2012). Finally, there has been little attention placed on secondary school students from non-WEIRD (i.e., White, Educated, Industrialised, Rich, and Democratic) and non-Western contexts, limiting the representativeness, generalisability, and impact of current and international research findings in Educational Psychology.

To address these gaps, the current research will examine how students' perceptions of involved, structured, and autonomy-supportive teaching are linked to English learning achievement through motivation and self-assessment practice. Under the self-system model (see Connell & Wellborn, 1991; Skinner & Belmont, 1993; Skinner et al., 2008), we integrate domain-specific student motivation (Deci & Ryan, 2000; Ryan & Deci, 2000) and self-assessment practices (Yan, 2020b; Yan & Brown, 2017), as psychological and behavioural mechanisms, respectively. Moreover, the focus of this study is on a specific subject domain, i.e., English language learning among secondary school students in the Philippines. The domain-specific nature of this study is especially relevant given the recent results of the OECD Programme for International Student Assessment (PISA) 2018, where the Philippines ranked lowest on reading achievement among the participating countries (OECD, 2019).

Specifically, we hypothesise that need-supportive teaching practices (i.e., involved, structured, and autonomy-supportive teaching) will be positively associated with student motivation. Moreover, we expect student motivation to positively affect English learning achievement directly and indirectly through self-assessment practices as a behavioural mediator. We test these hypotheses using Rasch-calibrated data and lower-level mediation analysis, accounting for students (n = 796) having the same teacher and being nested in the same classroom (n = 30), thereby accounting for the clustered nature of the data.

Needs-supportive teaching and student achievement

Need-supportive teaching pertains to a set of teaching practices that satisfies students' three basic psychological needs: the need for competence, need for relatedness, and need for autonomy (Deci & Ryan, 2000; Leenknecht et al., 2017; Reeve, 2006; Ryan & Deci, 2000, 2017; Taylor & Ntoumanis, 2007). Structured teaching satisfies students' competence needs. This practice is enacted when teachers give clear steps, actionable goals, and consistent feedback (Connell & Wellborn, 1991; Pelletier & Rocchi, 2016; Skinner & Belmont, 1993). To fulfil students' relatedness needs, teachers can apply involved teaching practices, including joyful and caring classroom interaction (see also Taylor & Ntoumanis, 2007). Lastly, autonomy-supportive teaching, which communicates the openness to provide students with a choice on how to engage with their learning materials and explain the rationale for the learning tasks, can satisfy students' need for autonomy (Belmont et al., 1988; Haerens et al., 2015). According to the SDT (Deci & Ryan, 2000; Ryan & Deci, 2000), these need-supportive teaching practices initiate students' inherent motivation leading to a wide array of positive school outcomes (Connell & Wellborn, 1991; Skinner & Belmont, 1993; Stroet et al., 2013).

Empirical and experimental studies have shown that need-supportive teaching practices create a learning environment that can influence student achievement, among other

positive student outcomes (e.g., student achievement, learning, motivation, and engagement; Baeten et al., 2013; Burns et al., 2021; Kiefer et al., 2015; Mouratidis et al., 2011; Olivier et al., 2021; Reeve, 2012; Reeve & Jang, 2006; Tas, 2016). The impact of learning environments that satisfy students' basic psychological needs on positive outcomes and achievement continues to gain significant research attention (see Hospel & Galand, 2016; Lietaert et al., 2015). For instance, a recent study by Burns et al. (2021) used the 2015 PISA data and found a positive link between students' perception of need-supportive teaching to their science participation, self-efficacy, and achievement (see also Haw et al., 2021 for a study linking need-supportive teaching to reading achievement).

However, the mechanisms that link need-supportive teaching to student achievement remain underexamined. Moreover, research exploring mechanisms that can explain how social contexts influence student achievement is frequently segmented since unpacking multiple mechanisms requires integrating multiple theoretical approaches. Few have examined the context-self-achievement link in an integrated theoretical model (cf. Feraco et al., 2022; Olivier et al., 2021).

Embedding motivation and self-assessment practice within the self-system model

The self-system model of motivational development (Skinner & Belmont, 1993; Skinner et al., 2008) highlights the cascading effect of need-supportive contexts on crucial student outcomes like engagement (Olivier et al., 2021; Skinner et al., 2008), motivation (Ahn et al., 2021; Taylor & Ntoumanis, 2007), and academic performance (Burns et al., 2021; Leenknecht et al., 2017). The model posits that social contexts in school (e.g., need-supportive contexts) allow students to experience a sense of autonomy, competence, and relatedness. When students experience such learning contexts, they report higher motivation (Liu et al., 2021; Pintrich, 2003; Ryan & Deci, 2017; Taylor & Ntoumanis, 2007) and practice more frequent self-regulated learning (e.g., Miller & Brickman, 2004; Sierens et al.,

2009; Yan, 2020b; Zimmerman & Moylan, 2009). Conversely, when students' environment is chaotic, uninvolved, or controlling, motivation can decline (Deci & Ryan, 2000; Ryan & Deci, 2017), and self-regulated learning strategies can also decrease (Soenens et al., 2012).

Student motivation and self-regulated learning are two core constructs facilitated by need-supportive contexts (Ryan & Deci, 2000; see also Vansteenkiste et al., 2012) and are known to impact student learning and achievement (Dignath & Büttner, 2008; Huang, 2012; Toste et al., 2020). Motivation is one's inherent propensity to learn and grow as facilitated by need-supportive contexts (see Niemiec & Ryan, 2009). Motivation has been conceptualised into two forms, each reflecting one's reasons for task engagement: autonomous and controlled motivation (Deci & Ryan, 2000; Howard et al., 2017). Autonomous motivation is defined as "engaging in a behaviour because it is perceived to be consistent with intrinsic goals or outcomes and emanating from the self", whereas controlled motivation is defined as "engaging in behaviours for externally referenced reasons" (Hagger et al., 2014, p. 566; see also Howard et al., 2017; Ryan & Deci, 2000).

Student motivation is associated with students' higher achievement (Lepper et al., 2005; Pintrich, 2003; Taylor et al., 2014) and increased mastery (Turner et al., 2002), among other positive student outcomes. A recent meta-analysis found that motivation is a positive predictor of reading achievement with a moderate effect size among K-12 students (Toste et al., 2020). Empirical evidence suggests that autonomous motivation is linked with increased in-class performance (e.g., reading comprehension; Law, 2011). When students are motivated, they are more engaged in behaviours and practices that would improve their learning outcomes (Reeve, 2012, 2013).

Self-assessment practice is a fundamental behavioural component of self-regulated learning (Yan, 2020b). Considered a 21st-century learning skill, self-assessment pertains to a learner's ability to "reflect on the quality of their work, judge the degree to which it reflects

explicitly stated goals or criteria, and revise accordingly" (Andrade & Valtcheva, 2009, p. 13) by seeking and using feedback information from various sources (McMillan & Hearn, 2008; Yan & Brown, 2017). Four critical practices of self-assessment have been theoretically proposed and empirically tested by Yan and Brown (2017): seeking external feedback by monitoring (SEFM), seeking external feedback by inquiry (SEFI), seeking internal feedback (SIF), and self-reflection (SR). These formative practices are behaviours that students can enact before, during, and after learning activities that enable them to seek feedback and reflect on their learning process and outcomes.

Need-supportive teaching practices can influence self-assessment practices (see Mendoza & Yan, 2021a; Miller & Brickman, 2004; Wang et al., 2016; Yan, 2020b; Zimmerman & Moylan, 2009). For example, Mouratidis et al. (2013) found evidence to show that when teachers provide clear expectations in the classroom (i.e., structured teaching), middle school and secondary school students were more likely to practice effective self-regulated learning strategies (e.g., metacognitive self-regulation; effort regulation). Similarly, Sierens et al. (2009) showed that the synergy of structured and autonomy-supportive teaching was also found in self-regulated learning among secondary school students. When self-regulated students practice self-assessment, they tend to have higher achievement scores (McDonald & Boud, 2003; Mega et al., 2014; Yan, 2020b; Yan, Chiu, et al., 2020; Zimmerman & Schunk, 2001).

Given that meta-analytic findings (see Panadero et al., 2017; Sitzmann et al., 2010) and more recent empirical work (Leenknecht et al., 2020; Panadero et al., 2012) support the association between motivation and self-assessment practices, the integration of both under the self-system model have theoretical and empirical backing. In the self-system model, the social context (e.g., need-supportive teaching) will activate psychological mechanisms (e.g., motivation) that will enable behaviours (e.g., self-assessment practices) that will, in turn,

yield learning and achievement (see Figure 1). Therefore, motivation and self-assessment practices are posited as mechanisms that can link need-supportive teaching to student achievement. Specifically, when one's learning contexts satisfy the basic psychological needs, one becomes motivated and enacts meaningful self-assessment practice, which will, in turn, enhance student achievement.

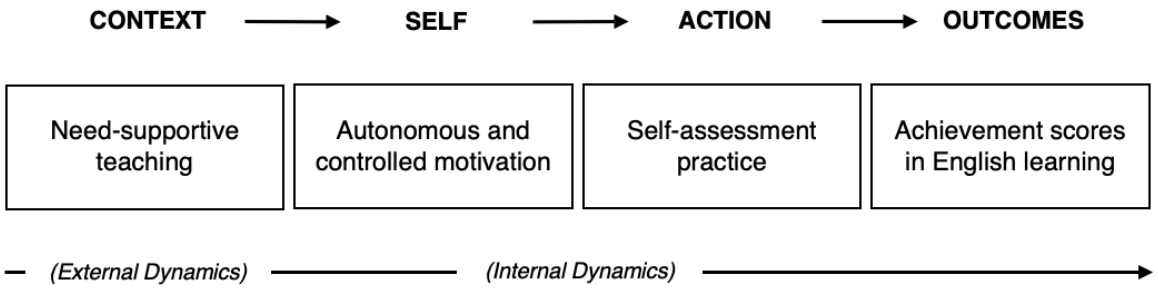

Figure 1. The self-system model of motivational development (Skinner et al., 2008), including student motivation and self-assessment practices as internal dynamics linking need-supportive teaching and learning outcomes.

Secondary school students in the Philippines and English language learning

Secondary school education marks a key transition point for student life inside and outside school. Along with the challenges of adolescent life, students also experience a decline in school motivation during secondary school (Gnambs & Hanfstingl, 2016). Relatedly, achievement in language learning has also been documented to decline from Grade 7 to Grade 9 (Fraine et al., 2007). Hence, secondary school is a crucial period necessitating interventions or initiatives to enhance student motivation and achievement.

Most of the research on need-supportive teaching and how it impacts student achievement have been conducted in Western contexts. Eastern contexts, especially in Southeast Asia, have been featured less in studies that examine the interplay of social, psychological, and behavioural mechanisms that drive student achievement and learning outcomes (cf. King & Mendoza, 2021; Mendoza & King, 2020). The lack of representation of

secondary school students from non-Western contexts in this research area limits the generalisability and potential impact of existing research. Pioneering efforts to conduct research that includes non-Western counterparts is necessary to extend research generalisability and applicability (see King & Bernardo, 2016).

The Philippines is a Southeast Asian country that can benefit from studies focused on secondary student motivation and achievement. From a practical perspective, the country fared dismally in its first participation in the recent PISA 2018 assessments (OECD, 2019), ranking lowest on reading achievement. Although efforts and initiatives are being made to improve performance in such international assessments, classroom-level and student-level interventions are equally necessary. From a theoretical perspective, Wigfield et al. (2004) detailed the importance of domain-specificity in examining motivation and achievement, given that both can vary across domains. Hence, a domain-specific approach can best explore the pathways and mechanisms that foster student motivation and achievement. Overall, exploring English language learning is practically driven, and the domain-specific approach is theoretically informed.

Study aims and hypotheses

The reviewed literature points to the gaps, opportunities, and practical implications of examining the psychological and behavioural constructs that link students' perception of need-supportive teaching and their achievement in English learning. The current study uses the self-system model of motivational development, which highlights the dynamic interplay between positive social, psychological, and behavioural outcomes, leading to achievement. Specifically, this study aims to explore how student motivation (controlled and autonomous) and self-assessment practices—as psychological and behavioural mechanisms, respectively—link need-supportive teaching (i.e., involved, structured, and autonomy-supportive teaching)

to student achievement. We control for age, gender, and socioeconomic status in addressing these aims. The study hypotheses are as follows:

H1. Involved, structured, and autonomy-supportive teaching will have a positive association with autonomous motivation (H1.1), controlled motivation (H1.2), and self-assessment practices (H1.3).

H2. Students' autonomous and controlled motivation will have a positive association with self-assessment practices (H2.1) and will have a positive link to English achievement scores (H2.2).

H3. Students' self-assessment practices will have a direct and positive association with achievement scores (H3.1) and significantly mediate the link between controlled motivation (H3.2) and autonomous motivation (H3.3) to English achievement scores.

Method

Participants and procedures

Participants in the study were 796 secondary school students clustered in 30 classrooms. The average number of students per classroom was 26.53. The data consists of 233, 197, 183, and 183 students from Grades 7, 8, 9, and 10. The students were 11 to 19 years old (M = 14.12, SD = 1.51) with nearly equal numbers of boys and girls (n = 424 girls, 53.27%).

Procedures for this study were approved by the Human Research Ethics Committee of the affiliated university of the first author and second author. The first author approached a public secondary school located two hours north of Manila through the Department of Education Divisions Office to conduct a research survey. Upon the school principal's approval, informed assent forms were sought from the students, which their guardians and their teachers also reviewed. In addition, the parents/guardians were provided with passive

consent forms. Before administering the surveys, the questions were reviewed by the principal and the English teachers at the school to evaluate whether the questions were crafted to the student's level of English language comprehension. The questionnaires were in the English language as English is the medium of instruction in the Philippines (Department of Education, 1974).

Data were collected through a paper-and-pen method at the beginning of the final quarter of the school year (Time 1; T1). A trained research assistant administered the questionnaires containing the instruments described below to 30 classrooms. Students were briefed about the questionnaires, and questions were entertained. The English teacher was also present during the data collection. The students took about 10 to 12 minutes to complete the questionnaire. After eight weeks (Time 2; T2), objective achievement scores on English learning were computed and provided by the school. The achievement scores were then paired to the respective students' respondent ID.

Measures

The instruments used were selected considering their theoretical underpinnings and recent utility in relevant studies focused on need-supportive teaching, student motivation, and self-assessment practice. Developed in the last three decades, the instruments assessing need-supportive teaching and motivation remain relevant in current research, given that both constructs are core educational and psychological constructs (e.g., Guay et al., 2015; Leenknecht et al., 2017; Olivier et al., 2021; Reeve, 2013). The instrument used for self-assessment was also selected because it is theoretically driven, anchored in self-regulated learning (Yan & Brown, 2017) and empirically validated among the target sample (Mendoza & Yan, 2021b). We describe the instruments used below and cite their psychometric properties. All instruments are adjusted to refer to English teachers and the English subject for domain specificity.

Teacher as Social Context Questionnaire (TASCQ). The TASCQ (Belmont et al., 1988) measures students' perceptions of their teachers' use of need-supportive practices. The questionnaire consists of 24 items assessing involved, structured, and autonomy-supportive teaching practices. To specify the English teacher as the referent of the instrument, we added: "English teacher" to the scale items. For instance, for involved teaching (e.g., "*My English teacher really cares about me*"), for structured teaching (e.g., "*My English teacher makes sure I understand before he or she goes on*"), and for autonomy-supportive teaching (e.g., "*My English teacher gives me a lot of choices about how I do my schoolwork*"). Items are scored on a 5-point scale, ranging from 1 (*not at all true*) to 5 (*very true*). In the present study, the internal reliabilities of the subscales are all $\alpha = .73$.

Student motivation. We used the 10-item autonomous motivation subscale and the 8-item controlled motivation subscale of the Academic Motivation Scale (AMS; Guay et al., 2015; King & Caleon, 2021; Vallerand et al., 1992). The beginning sentence was adjusted to "*I study English because…*" to assess students' motivation to study English learning. Students responded using the scale of 1 (*strongly disagree*) to 7 (*strongly agree*), with 4 being neutral. The autonomous motivation subscale consists of items like "*Because I really like studying English*". The controlled motivation subscale includes sample items such as "*Because I think studying English will help me better prepare for the job that I like*". In this study, the internal reliabilities of the autonomous motivation and controlled motivation subscales are $\alpha = .87$ and $\alpha = .82$, respectively.

Self-assessment Practices Scale (SaPS). The SaPS (Yan, 2018a) is a 20-item instrument based on the cyclical model of the self-assessment process (Yan & Brown, 2017). The subject-specific version of the scale was used in this study (Mendoza & Yan, 2021b) to measure self-assessment practices in English learning. It is composed of four subscales, all with adequate internal reliability in this study: seeking external feedback by monitoring

(SEFM; α = .70), seeking external feedback by inquiry (SEFI; α = .74), seeking internal feedback (SIF; α = .66), and self-reflection (SR; α = .79). The internal reliability of the full SaPS scale in this study is α = .89.

Achievement scores in English learning. The K to 12 Basic Education Program (Department of Education, 2013, 2016) uses a standard-based and competency-based grading system where grades are based on the weighted raw score of the learners' summative assessments. The academic year in the basic education of the Philippines consists of four quarters, each with around two months of duration (Department of Education, 2013, 2016). The 1st quarter starts around June, and the last quarter ends around March of the following year. Achievement scores are computed each quarter. The grades in English language learning for the 4th quarter were used in this study. The average grade of the students is 85.38.

Data analysis

Before the primary analyses, we evaluated item-level missing data. More than half of the participants (n = 466; 58.54%) have complete responses. Two hundred ninety-one participants (36.56%) had item-level missing data of less than five per cent, and only 39 participants had missing data ranging from 6% to 36%. All item-item level missing data were imputed using multiple imputation by chained equation (MICE; Azur et al., 2011). Consequently, Rasch calibrations and lower-level mediation analysis were implemented.

Rasch rating scale analysis in ConQuest (Wu et al., 2007) was first used to examine the measures' psychometric properties and calibrate students' respective measures on each latent construct. Rasch analysis has been used in previous studies to measure latent or unobserved constructs prior to mediation analyses (Boon, 2014; Yan, Brown, et al., 2020; Yan & Cheng, 2015). Rasch person-measure calibrations have been widely applied and advocated in education and social science research to achieve fundamental measurement (Bond et al., 2020). The Rasch model overcomes the limitations of conventional analytical

techniques (e.g., factor analysis) by converting ordinal data (typically from Likert scales) into interval measures that have a constant interval meaning and, therefore, provide objective measurement than of ordered category responses (Linacre, 2006). After the interval metric is created, person measures and item difficulties are calibrated onto a single unidimensional latent trait scale. The Rasch-calibrated person measures were imported to Mplus 8.0 ver. 1.6 (Muthén & Muthén, 1998-2019) to analyse the lower-level mediation analysis.

Given that the data used in this study were clustered into classrooms or sections, we controlled for the effects of clustering using a lower-level mediation model for the main analyses (i.e., 1-1-1-1; Bauer et al., 2006). All constructs are measured as Level 1 (L1) constructs (i.e., based on individual student responses), and the implementation of multilevel analysis accounts for sampling error (Morin et al., 2014). Specifically, the latent L2 constructs are automatically computed in MPlus' two-level analysis (Muthén & Muthén, 1998-2019; see user guide example 9.2, p. 274-275), where L2 represent the classroom-level decomposition of the observed constructs (see Lüdtke et al., 2008), allowing the mediation model at L1 to take into account student responses in the same class (e.g., Burić, 2019; Lüdtke et al., 2008; Morin et al., 2014).

The teaching practices were included in the model as distinct exogenous predictors of motivation and self-assessment practice. Self-assessment practice consisting of four factors (see Mendoza & Yan, 2021b; Yan, 2018a) was posited as a doubly-latent construct (e.g., Burić & Frenzel, 2020; Burić & Kim, 2020; Marsh et al., 2012; Morin et al., 2014) to control for measurement error. Controlled and autonomous motivation were entered as predictors of achievement, and the doubly-latent self-assessment practice was included as a mediator between motivation and achievement. All constructs were modelled in a unified structural model. Age, gender, and mother's educational attainment were included as demographic

covariates. We used mothers' highest educational attainment to proxy for the student's socioeconomic status (see Johnson et al., 2001; Li & Lerner, 2011).

To evaluate the extent to which students from the same classroom share similar English achievement due to clustering effects, we explored the endogenous outcomes' intraclass correlation coefficient (i.e., ICC_1). ICC_1 pertains to the percentage of the variance at the classroom level where values near or higher than 0.10 would suggest the need for a multilevel analysis (see Lüdtke et al., 2011; Marsh et al., 2012). The ICCs and the bivariate correlations on both levels were computed using R (R Core Team, 2016).

The goodness of model fit was examined using the maximum-likelihood and was evaluated using the following indices: Comparative Fit Index (CFI; Bentler, 1990), Tucker-Lewis Index (TLI; Tucker & Lewis, 1973), Root Mean Square Error of Approximation (RMSEA; Steiger, 1990), and standardised root mean square residual (SRMR; Bentler, 1995). Following the Hu and Bentler (1995) recommendation, a good model fit would include model CFI and TLI of greater than .90 and an RMSEA of less than .08. An SRMR value of less than .08 is considered a good fit (Hu & Bentler, 1999). As multilevel mediation does not allow for bootstrap in MPlus, we implemented a Bayesian estimator to compute for asymmetric confidence interval to evaluate significant indirect effects.

Results

The initial results of the Rasch analysis identified three misfitting items (item #4 in autonomous motivation; and items #14 and #16 in the controlled motivation). As the subscales had sufficient items with adequate coverage of contents for subsequent analysis, the three misfitting items were removed, and the Rasch analysis was re-conducted. The results (see Table 1) demonstrated good item fit statistics for all remaining items. Most items had mean-squared fit statistics (MNSQs) within the desirable range (i.e., 0.75 - 1.33; Mark

Wilson, 2005), and one item was within the acceptable range (i.e., 0.5-1.5; Linacre, 2006). In addition, the Rasch reliabilities for all subscales were higher than .70 (see Table 1), indicating the items in each subscale measured the target constructs well.

Table 1. Rasch psychometric properties of the measurement

Construct	No. of items	Rasch reliability	Item fit statistics	
			Range of Infit MNSQ	Range of Outfit MNSQ
Involved teaching	8	.71	0.83-1.06	0.82-1.06
Structured teaching	8	.73	0.85-1.03	0.86-1.03
Autonomy-supportive teaching	8	.70	0.91-1.41	0.91-1.41
Autonomous motivation	9	.89	0.89-1.33	0.87-1.18
Controlled motivation	6	.88	1.00-1.25	1.03-1.14
Seeking external feedback by monitoring	5	.83	0.81-1.11	0.79-1.14
Seeking external feedback by inquiry	4	.79	0.92-1.16	0.94-1.14
Seeking internal feedback	4	.76	0.96-1.06	0.97-1.10
Self-reflection	7	.87	0.94-1.27	0.93-1.23

Note. MNSQ = mean -squared fit statistics

The descriptive, summary statistics, bivariate correlations at the student-level and class-level, including the ICC_1 and ICC_2, are in Table 2. The strength and direction of the correlations are theoretically sound, where nearly all constructs are positively correlated. The unconditional model shows that the ICC_1 and ICC_2 of student achievement scores in English are .20 and .85, respectively, which indicates that a substantial amount of students' achievement can be accounted for by the classroom as clusters. This supports the use of multilevel analysis to account for the clustered nature of the data (see Lüdtke et al., 2011; Marsh et al., 2012). The multilevel model yielded a good fit to the data ($\chi^2[55]=165.24$, CFI=.956, TLI=.916, RMSEA=.050, $SRMR_{within}$ =.041), and the results support most of the study hypotheses with notable nuances (see Figure 2).

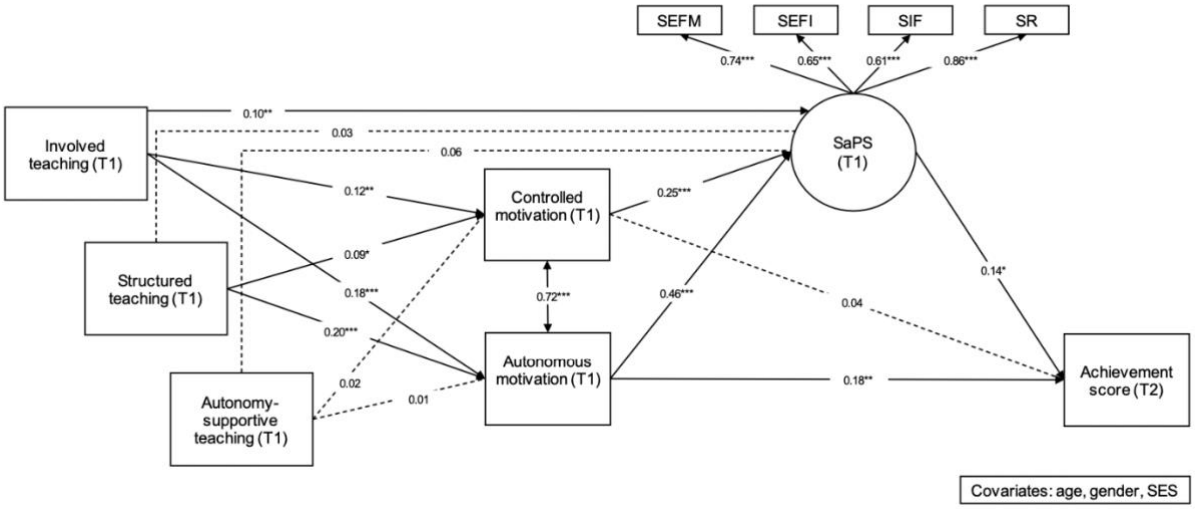

Figure 2. Lower-level mediation model where need-supportive teaching (i.e., involved, structured, and autonomy-supportive teaching) were entered as predictors of motivation and self-assessment practices. Notes. $^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$; SaPS = self-assessment practices; broken lines are non-significant paths; paths for age, gender, and socioeconomic status as covariates are not illustrated for figure parsimony

On the impact of need-supportive teaching (H1), findings suggest that involved teaching (β = .18, p < .001) and structured teaching (β = .20, p < .001) were both associated with increased autonomous motivation (H1.1). Similarly, involved (β = .12, p < .01) and structured teaching (β = .09, p < .05) were also linked with increased controlled motivation (H1.2). Only involved teaching was positively associated with self-assessment practice (β = .10, p < .01; H1.3). Autonomy-supportive teaching was not associated with motivation and self-assessment practice.

Examining how motivation relates to self-assessment practice and achievement (H2), results show that both autonomous (β = .46, p < .001) and controlled (β = .25, p < .001) motivation were positively associated with self-assessment practices (H2.1), but only autonomous motivation was positively associated with achievement in English learning (β = .18, p < .01; H2.2).

Self-assessment practice was directly associated with student achievement (β = .14, p < .05; H3.1), and it also yielded significant mediating effects between student motivation and achievement. Specifically, higher autonomous motivation is linked with higher self-assessment practice which, in turn, was associated to higher achievement (*B* = 0.32, PSD = 0.14, [95% C.I. = 0.093, 0.563]; H3.2). Self-assessment practices also had a significant positive indirect effect on the link between controlled motivation and achievement; that is, higher controlled motivation is linked with higher self-assessment practice which, in turn, was associated with higher achievement (*B* = 0.17, PSD = 0.08, [95% C.I. = 0.048, 0.308]; H3.3).

Table 2. Level 1 student-level correlations (n = 796) and Level 2 class-level correlations (n = 30)

	1	2	3	4	5	6	7	8	9	10
1. Involved teaching	--	.07	.05	.42*	.32	.42*	.44*	.45*	.56**	.37*
2. Structured teaching	.32**	--	.56**	.24	.20	.04	.02	.13	.29	.43*
3. Autonomy-supportive teaching	.25**	.31**	--	.15	.04	.25	.19	.19	.45*	.57**
4. Autonomous motivation	.24**	.27**	.11**	--	.91**	.58**	.58**	.58**	.70**	.24
5. Controlled motivation	.16**	.14**	.08	.73**	--	.53**	.51**	.67**	.60**	.19
6. SEFM	.18**	.20**	.14**	.53**	.48**	--	.81**	.75**	.78**	.43*
7. SEFI	.15**	.03	-.01	.42**	.36**	.54**	--	.63**	.72**	.42*
8. SIF	.16**	.12**	.12**	.37**	.42**	.44**	.39**	--	.68**	.44*
9. SR	.26**	.25**	.17**	.61**	.52**	.61**	.55**	.54**	--	.51**
1. English achievement	.18**	.24**	.22**	.33**	.27**	.20**	.08	.15**	.32**	--
ICC_1	.02	.04	.01	.06	.09	.06	.06	.02	.05	.20
ICC_2	.30	.51	.13	.64	.72	.61	.64	.35	.56	.87
Cronbach's alpha	.73	.73	.73	.87	.82	.70	.74	.66	.79	--

Notes. Correlations on the lower diagonal are student-level while correlations on the upper diagonal are class-level. ** $p < .001$; * $p < .05$. SEFM = Seeking external feedback by monitoring, SEFI = Seeking external feedback by inquiry; SIF = Seeking internal feedback; SR = Self-reflection

Discussion

Prior studies have demonstrated the impact of need-supportive teaching in improving student outcomes. However, limited evidence exists regarding the psychological and behavioural mechanisms that link need-supportive teaching to student achievement. Under the self-system model of motivational development, the current study integrated student motivation and self-assessment practices to examine the pathways linking involved, structured, and autonomy-supportive teaching practices to student achievement, particularly in English language learning.

The findings of the study provide evidence that involved and structured teaching practices were both associated with autonomous and controlled motivation (partially supports H1.1-2), and only involved teaching was linked with self-assessment practices (H1.3). Both autonomous and controlled motivation were associated with higher self-assessment practices (H2.1), but only autonomous motivation directly influenced student achievement (partially supports H2.2). Finally, student self-assessment practice was linked to increased achievement scores (H3.1) and mediated the link between autonomous and controlled motivation to achievement (H3.2). Overall, the findings suggest that increased controlled and autonomous motivation is linked with more frequent self-assessment practice, which, in turn, was associated with higher achievement. These results held while accounting for the nested nature of the data in classrooms and demographic characteristics. This study is among the first studies that attempted to examine the motivation and self-assessment practice as theoretical mechanisms that can link students' perception of need-supportive teaching to objective achievement in English learning.

Involved and structured teaching impacts student motivation and self-assessment practice

The results support the importance of students' perceptions of specific need-supportive teaching practices (i.e., involved teaching and structured teaching) to student motivation and self-assessment practice. Specifically, involved teaching and structured teaching were positively associated with higher student motivation and more frequent self-assessment. Several studies have provided evidence for the importance of learning environments in fostering student motivation (Baeten et al., 2013; Pintrich, 2003; Ryan & Deci, 2017; Skinner et al., 2008; Tas, 2016) and self-regulated learning strategies (e.g., self-assessment practice; Miller & Brickman, 2004; Mouratidis et al., 2013; Sierens et al., 2009; Wang et al., 2016). We discuss below how involved teaching and structured teaching is linked with motivation and self-assessment practice and why autonomy-supportive teaching was not.

Teachers who are involved and warm help toward creating a learning environment that can help satisfy students' relatedness needs (Furrer & Skinner, 2003; Furrer et al., 2014; Niemiec & Ryan, 2009) by expressing their enjoyment of being and interacting with their students (see Connell & Wellborn, 1991; Taylor & Ntoumanis, 2007). Evidence suggests that as teacher enthusiasm for teaching increases, student motivation also tends to increase (Frenzel et al., 2019). Previous studies have also shown that students' perception of involved teaching practices encourages them to practice self-assessment (Mendoza & Yan, 2021a), which can be due to the safe and caring learning climate that involved teaching creates (see Urdan & Schoenfelder, 2006). Given that a sense of psychological safety is essential for students to engage in self-assessment (Yan, Brown, et al., 2020), it is anticipated that involved teaching is linked with higher self-assessment practice. Culturally, for collective cultures like the Philippines (Hofstede, 2001), warmth is a vital aspect valued in social

contexts (e.g., classroom, family; Enriquez, 1986; Mendoza & King, 2021). Hence, although previous studies tend to lean heavily on structured teaching and autonomy-supportive teaching as significant predictors of positive student outcomes (e.g., Baker & Goodboy, 2019; Haerens et al., 2015; Sierens et al., 2009; Wang et al., 2016), our study highlights evidence suggesting the relevance of involved teaching in motivation and self-assessment practice.

Structured teaching practices can impact student motivation. It lays out clear and concrete instructions and expectations for students to achieve their target learning outcomes (see Connell & Wellborn, 1991; Reeve & Jang, 2006; Skinner & Belmont, 1993). Studies have shown that well-structured classrooms cater to student motivation by satisfying students' competence needs (Hospel & Galand, 2016; Leenknecht et al., 2017; Niemiec & Ryan, 2009). By offering appropriate step-by-step support in class, students incrementally build their sense of competence and skills (see Niemiec & Ryan, 2009). This sense of efficacy can, in turn, foster motivation. However, structured teaching was not associated with self-assessment practices, standing contrary to other studies that demonstrate how structured learning environments can lead to more frequent self-regulated learning strategies (e.g., Mouratidis et al., 2013). Due to the specific directions that structured teaching communicates, students can have, paradoxically, fewer opportunities with self-assessment practice. Thus, unless self-assessment practice is included in the subject curriculum, it is likely that students may merely follow the structure that teachers provide and would forgo self-assessment practice.

Although previous studies have emphasised the importance of autonomy-supportive teaching on student motivation (Bureau et al., 2022; Haerens et al., 2015; Reeve, 2006, 2016) and self-regulated learning (Schuitema et al., 2012; Wang et al., 2016), in this study, we found no evidence to support the link between autonomy-supportive teaching to motivation and self-assessment practice. Autonomy-supportive teaching provides students with a choice

on how to engage in a specific learning task (Baker & Goodboy, 2019; Connell & Wellborn, 1991; Skinner & Belmont, 1993) by creating an environment that enables students to take ownership of their learning (see Reeve, 2016). However, it is documented that autonomy-support can also be perceived as lacking structure or overly permissive (see Occhino et al., 2014; Reeve, 2006). This perception could attenuate the desired impact of autonomy-supportive teaching on student motivation. Given that high-structure or controlling learning environments can be preferred over autonomy-supportive teaching in Eastern contexts (e.g., Zhou et al., 2012), it is possible that autonomy-supportive teaching may translate to student motivation and self-assessment practice only in specific conditions and contexts. It could be surmised that autonomy-supportive teaching may be more impactful on student motivation and learning in individualistic contexts and cultures, where one's needs for autonomy could be more evident.

The mediating role of self-assessment practice between autonomous and controlled motivation and English achievement

One may regard controlled motivation as the opposite of autonomous motivation (e.g., Baeten et al., 2013; Haerens et al., 2015), but in Eastern contexts, both types of motivation were positively associated with each other (see Caleon et al., 2015). The same holds for motivational outcomes (e.g., mastery and performance goals), which are often negatively correlated and perceived positively among Filipinos (e.g., King & McInerney, 2019; King & Mendoza, 2020). In this study, controlled motivation and autonomous motivation are positively and highly correlated. Niemiec and Ryan (2009) argued that both types of motivation are conducive to student learning. Although we found a high correlation between controlled and autonomous motivation, their influence on achievement scores is distinct. Our results show that only autonomous motivation predicted students' objective achievement scores. Like most SDT-related studies (e.g., Baeten et al., 2013; Deci & Ryan, 2000; Law,

2011), our findings suggest that motivation rooted in intrinsic goals substantially impacts academic achievement. Because autonomous motivation is internally driven, it is less contingent on external reinforcements or rewards (see Baeten et al., 2013; Eccles & Wigfield, 2002). Such nature of autonomous motivation enables it to be a sustainable source of drive to achieve, thereby increasing student achievement; such may not be the case for controlled motivation which is contingent on explicit external demands or instructions.

Although the link between autonomous motivation and student achievement intuitively makes sense, researchers have long argued to explore the behavioural mechanisms that can explain the motivation-achievement link (see Elliot et al., 2017). We found that self-assessment practice directly predicted achievement and mediated the link between both controlled and autonomous motivation to achievement. Specifically, self-assessment practice acts as a behavioural mechanism that links motivation to achievement. Our study highlights that specific self-regulated learning strategies can act as a behavioural mechanism that can link motivation to achievement. Because of the cyclical nature of self-assessment practice (Yan, 2018a; Yan & Brown, 2017), it acts as a formative assessment to further impact student achievement. Leenknecht et al. (2020) noted that a bi-directional link exists between student motivation and self-assessment; that is, increased student motivation could foster self-assessment practice, and increased self-assessment practice can also increase student motivation. Overall, our finding suggests that student motivation would require the enactment of behavioural practices that can further improve student achievement, especially if student motivation is more controlled than it is autonomous.

Practical implications

Given the importance of need-supportive teaching for students, school heads, principals, or administrators can encourage professional development that can train and enhance such practices. In-service training for teachers on implementing need-supportive

teaching exists (e.g., Aelterman et al., 2014; Aelterman et al., 2013), and schools can and should make full use of them. It is vital that the implementation of need-supportive teaching is culturally informed, given that our findings suggest that only involved teaching and structured teaching contributed to increased student motivation.

This study found that self-assessment practice mediated the link between motivation to achievement; hence, encouraging self-assessment practices can help promote higher achievement (see Leenknecht et al., 2020). The role of teachers in promoting self-assessment is crucial (e.g., Panadero, Jonsson, et al., 2016). Teachers can endorse the use of specific self-assessment practices (e.g., self-assessment diaries; Yan, Chiu, et al., 2020) that can improve students' academic performance. Recent findings from a meta-analysis showed that explicit instruction to self-assess has a larger impact on academic performance (Yan et al., 2021). Hence, teachers can be trained not only to encourage students to integrate self-assessment practices into their learning but also to provide explicit ways how to do so.

Study limitations and directions for future research

While this research holds theoretical and methodological advantages, we note our study's limitations below to inform future research work. First, while we used multilevel mediation from students nested in 30 classrooms, our analysis relied on individual students' perceived teaching practices of their respective English teachers. Ideally, a true level 2 predictor (i.e., teacher-reported need-supportive teaching) may provide a more ecologically appropriate predictor of student motivation. Future work can consider including multiple schools with more classrooms and with teacher-reported level 2 data. Second, one of the core strengths of our study is that all constructs refer to students' outcomes in a specific subject domain (i.e., English language learning). This is noteworthy since all evaluated constructs are referenced to English language learning. While this is a novel and practical research approach, in aid of generalising the findings, we encourage future studies to examine similar

constructs in a different subject domain or among different student populations (e.g., students in primary school or higher education). Finally, the data was collected in the typical classroom setting before the school disruptions brought about by the COVID-19 pandemic. Given the shift in learning modalities due to the pandemic, exploratory research can use qualitative approaches to examine how the predictors of student achievement used in this study operate or apply in online learning. Longitudinal and experimental research designs can also be implemented to support the rigour of the study methods further.

Conclusion

Exploring pathways and mechanisms that can foster and maximise students' opportunities for learning hold theoretical and practical import. Our research shows that student motivation and self-assessment practices are relevant psychological and behavioural mechanisms, respectively, that can explain how teaching as social context can influence achievement. Both mechanisms can be initiated by involved and structured teaching practices and can consequently influence higher student achievement in a specific subject domain. It is crucial that teachers consider using need-supportive teaching practices to foster student motivation among secondary school students. For students, encouraging them to use self-assessment practices (e.g., seeking external and internal feedback and self-reflection) can help them translate their motivation into concrete practices that can improve their learning outcomes in school.

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Chapter 4: Supporting students' basic psychological needs in online learning: The effect of *need-supportive* task instructions on motivation, self-assessment, and task performance

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Supporting students' basic psychological needs in online learning: The effect of *need-supportive* task instructions on motivation, self-assessment, and task performance

Abstract

The satisfaction of students' basic psychological needs for autonomy, competence, and relatedness fosters students' intrinsic motivation in school. However, the absence of face-to-face teaching and learning due to the COVID-19 pandemic impinged on teachers' provision of need-supportive teaching. Through a brief online intervention informed by the self-determination theory, this experiment (1) tested the effect of a need-supportive task instruction in a language task on students' intrinsic motivation and (2) examined whether the ensuing intrinsic motivation positively predicts task performance directly, or indirectly, through self-assessment practice as a learning strategy. Secondary school students randomly assigned to the need-supportive task instruction group (n = 56) showed significantly higher intrinsic motivation than those in the control group (n = 51) while controlling for their pre-test intrinsic motivation. Intrinsic motivation had no direct effect on task performance but had significant indirect effects via self-assessment practice. Post-hoc moderated mediation analysis demonstrates that the indirect effect of intrinsic motivation on task performance was specific to students from the need-supportive task instruction group. Need-supportive statements in task instructions can generate higher intrinsic motivation for online tasks. As we transition to the new normal of education, the results highlight a unique opportunity for educators to implement brief, cost-effective, and sustainable interventions to overcome the motivational challenges that students face in their learning tasks online.

Supporting students' basic psychological needs in online learning: The effect of *need-supportive* task instructions on motivation, self-assessment, and task performance

Introduction

Schools in over 138 countries have closed and have been compelled to conduct all teaching and learning activities online due to the COVID-19 pandemic (UNESCO, 2021; Van Lancker & Parolin, 2020). Such school closures led to students' learning loss (e.g., Engzell et al., 2021), and the abrupt shift to online learning presented a myriad of challenges in teaching and learning (see Chiu et al., 2021; Dhawan, 2020). Student motivation, among other adaptive outcomes, was heavily impacted during the pandemic (Daniels et al., 2021), exacerbating the pre-existing concerns about students' low school motivation, particularly in secondary school (see Cai et al., 2022; Gnambs & Hanfstingl, 2016; Gottfried et al., 2007). Given how crucial intrinsic motivation is in developing and maintaining learning and achievement online (see Hartnett, 2016), effective and sustainable interventions are urgently needed to ameliorate low motivation and recover students' learning losses.

To increase student motivation in traditional classrooms, teachers can rely on need-supportive teaching (NST), which creates a learning environment that supports students' basic psychological needs for relatedness, competence, and autonomy (Leenknecht et al., 2017; Reeve, 2006; Ryan & Deci, 2000, 2017; Vansteenkiste et al., 2012). Teachers practice NST by being more involved and caring, setting actionable and clear goals, communicating openness in students' learning strategies, and explaining the rationale for learning tasks (Haerens et al., 2015; Pelletier & Rocchi, 2016; see also Taylor & Ntoumanis, 2007). Evidence suggests that students' perception of a need-supportive learning context optimises a wide array of students' learning outcomes (e.g., achievement, motivation, engagement, well-being; Baeten et al., 2013; Mouratidis et al., 2011; Olivier et al., 2021; Reeve, 2012; Reeve & Jang, 2006; Wang et al., 2021; see Stroet et al., 2013 for a review). However, much of the

research on NST has been conducted in face-to-face contexts. Hence, there is a need to explore how teachers can support students' basic psychological needs in online contexts and what implications this might have for their intrinsic motivation, self-regulated learning, and achievement.

This study aims to explore how need-supportive task instructions can foster student motivation, and the mechanisms that could account for their beneficial effects on learning. More specifically, it aims to examine whether need-supportive task instructions can increase the intrinsic motivation of secondary school students on an online language learning task. Subsequently, we aim to test how the intrinsic motivation derived from the task instructions can directly improve task performance by examining self-assessment practice as a mediator. Self-assessment practice is posed as a mediator due to the crucial role of self-directed learning in online contexts (Kim & Frick, 2011). Previous findings have also demonstrated it as a behavioural mechanism linking motivation to achievement scores (Mendoza et al., 2022). This study also aims to yield several implications for teaching and learning in online contexts. First, the current study intends to generate evidence highlighting potential actionable pathways to foster intrinsic motivation in students' learning tasks by hypothesizing that need-supportive statements in language learning tasks can foster increased intrinsic motivation (cf. Chiu et al., 2021; McEown & Oga-Baldwin, 2019). Second, by directly or indirectly testing the influence of intrinsic motivation on task performance, we can test behavioural mechanisms that can explain how motivation impacts performance. Finally, it is hoped that the findings from this study can inform innovative ways to improve student experiences in online learning. Such innovation is necessary to foster and maintain intrinsic motivation and overcome the pervasive challenges driven by online learning during the pandemic and even beyond.

Satisfying students' basic psychological needs through need-supportive instructions

Self-determination theory (SDT) rests on the fundamental assumption that individuals have an inherent tendency for intrinsic motivation (Deci, 1985; Ryan & Deci, 2000). That is, people, by nature, are driven by curiosity and desire for learning (Deci & Ryan, 2000; Ryan & Deci, 2000, 2017; Vansteenkiste et al., 2010). In essence, people are inherently intrinsically motivated. However, there are circumstances when students do not present an intrinsic desire for learning and instead display a lack of motivation. According to the Basic Psychological Needs mini-theory of SDT (see Vansteenkiste et al., 2010; Vansteenkiste et al., 2020 for reviews), individuals' basic psychological needs for *autonomy*, *competence*, and *relatedness* must be satisfied to sustain their intrinsic motivation (Ryan & Deci, 2017; Vansteenkiste et al., 2010; Vansteenkiste et al., 2020). *Autonomy* refers to the need to have self-endorsed behaviours or having a clear task rationale, *competence* is the need for a sense of ability to engage effectively with desired tasks, and *relatedness* covers the need to have a caring and close connection with others (Vansteenkiste et al., 2020). In school, these needs are satisfied by teachers' need-supportive teaching practices (Reeve, 2006; Ryan & Deci, 2000, 2017; Vansteenkiste et al., 2012).

Teachers use several instructional practices to satisfy students' basic psychological needs inside the classroom. For instance, a teacher can explain the rationale behind school tasks to satisfy autonomy needs, promote the importance of effort over results to satisfy competence needs, or encourage and cheer on students to evoke a sense of confidence and trust that satisfies students' relatedness needs (see Ahmadi et al., 2022; Reeve, 2006, 2016; Ryan & Deci, 2017). These teaching practices can target specific needs (e.g., autonomy-supportive teaching to satisfy autonomy needs; Reeve, 2016; Reeve et al., 1999), although one need-supportive teaching (NST) practice can also satisfy multiple needs (see Leenknecht et al., 2017; Olivier et al., 2021; Reeve, 2012; Vansteenkiste et al., 2020 for the non-

orthogonal effects of need-supportive teaching). As such, NST practices are actionable pathways toward fostering intrinsic motivation among students. However, many of these findings are based on cross-sectional or longitudinal data limiting causal interpretations. Moreover, these practices are naturally impeded by the shift to online learning due to the COVID-19 pandemic. Aside from teaching presence online (see Turk et al., 2022), little to no research exists on how teachers can satisfy students' basic psychological needs in online contexts (cf. Oga-Baldwin, 2015).

In online learning, NST practices remain perceivable to students and can influence adaptive student outcomes (e.g., engagement, achievement; Chen & Jang, 2010). Recent longitudinal research also highlights the importance of basic psychological needs satisfaction in online learning during the COVID-19 pandemic (see Chiu, 2022). However, apart from the virtual nature of teaching, the asynchronous nature of online learning poses an inherent barrier to supporting basic psychological needs as it offers limited real-time interaction between teachers and students. How can teachers effectively and sustainably support students' basic psychological needs online?

The effectiveness of brief online interventions to support basic psychological needs

Brief interventions can have potent and lasting effects if they tap into how people see themselves in a specific context or task (e.g., wise interventions; Walton & Wilson, 2018; Walton & Yeager, 2020). For example, brief randomized experiments show that tweaking a question from "*How important is it to you to vote* [verb] *in tomorrow's election?*" to "*How important is it to you to be a voter* [noun] *in tomorrow's election?*" significantly increased voter turnouts in the US (see Bryan et al., 2011; Walton, 2014 for a list of wise interventions across domains). Walton (2014) argued that noun wording (i.e., "*to be a voter*") places value on taking an identity of value as a voter, whereas verb wording (i.e., "*to vote*") may present

voting as a mere errand. This suggests that how statements are communicated can have psychological and behavioural effects.

Relatedly, meta-analytic evidence highlights the effectiveness of online interventions designed to enhance student motivation (see Lazowski & Hulleman, 2016). Specifically, brief task-based interventions informed by the self-determination theory (Deci, 1985; Ryan & Deci, 2000, 2017) have been shown to impact positive student outcomes significantly (e.g., intrinsic motivation, prosocial behaviors; Jeno et al., 2020; Kanat-Maymon et al., 2015; Pavey et al., 2011; Sheldon & Filak, 2008; Vaughn, 2017). When students' basic psychological needs are supported in digital learning environments, this helps learners persist and stay motivated in their learning tasks (Chiu, 2022; see also Oga-Baldwin, 2015). The interventions are implemented by framing statements to be worded in a way that supports students' basic psychological needs for relatedness, competence, and autonomy (Kanat-Maymon et al., 2015; Pavey et al., 2011). Among other need-supportive statements, statements such as "*One thing to keep in mind is that these tasks are quite challenging, and beginners find that they do not meet the time pressures. Just do the best you can, and you will improve quickly.*" to support competence needs have been shown to increase autonomous motivation (see Kanat-Maymon et al., 2015). These interventions can impact outcomes such as prosocial motivation (Pavey et al., 2011), self-regulatory focus (Vaughn, 2017), mood (Sheldon & Filak, 2008), and even decrease cheating behaviour (Kanat-Maymon et al., 2015).

In such studies, experimenters use brief priming interventions by reading instructions phrased to manipulate basic psychological needs (see Sheldon & Filak, 2008). For example, an experimenter verbalizing autonomy-supportive statements such as "*In this experiment, you will be given two tasks. In the first task, I just want you to play around with the puzzles, learning to do them your own way. You can choose which puzzle to start with. Just try to get*

into it and see where it goes" can satisfy autonomy needs (Kanat-Maymon et al., 2015). However, very little research has incorporated these experiments on specific learning tasks, that is, phrasing the instructions of school tasks to be need-supportive. Furthermore, while efforts have been made to integrate such statements online (e.g., learning apps; Jeno et al., 2020), brief interventions focused on satisfying basic psychological needs on online school tasks remain in their early stages. The research on theoretically informed online interventions holds the foundation of the conditions of this experimental study.

Self-assessment practice as a behavioural mechanism linking intrinsic motivation to task performance

Intrinsic motivation provides a self-directed drive behind a behaviour. It correlates with increased mastery (Turner et al., 2002), higher achievement (Lepper et al., 2005; Taylor et al., 2014), greater persistence (Abuhamdeh & Csikszentmihalyi, 2009), and better psychological health (see Froiland et al., 2012). However, research continues to call for studies that examine the mechanisms that can explain how intrinsic motivation improves school performance. Not because intrinsic motivation alone cannot lead to improved performance but because there could be behaviours that can explain such effect. Identifying such behaviours holds practical implications for interventions. Research has shown that self-regulated learning (SRL) strategies can act as mediators linking motivation to achievement (see Feraco et al., 2022; Leenknecht et al., 2020; see also Mendoza et al., 2022); a fundamental strategy in the SRL process is self-assessment practice (Yan & Brown, 2017).

Self-assessment practice is considered as a 21st-century learning skill (see Dweck, 2009) and a vital behavioural component of SRL (Yan, 2020b; Yan & Brown, 2017). It refers to a process through which learners "reflect on the quality of their work, judge the degree to which it reflects explicitly stated goals or criteria, and revise accordingly" (Andrade & Valtcheva, 2009, p. 13). This self-directed behaviour is enacted by determining the

assessment criteria, seeking feedback information from various sources, and self-reflecting on ways to improve (McMillan & Hearn, 2008; Yan & Brown, 2017; Yan & Carless, 2021). Meta-analytic (see Panadero et al., 2017; Sitzmann et al., 2010; Yan et al., 2021) and empirical findings (Leenknecht et al., 2020; Panadero et al., 2012; Yan, 2018b, 2020b) have shown that students' self-assessment practice can act as a key lever that can improve achievement in English language learning (see Mendoza et al., 2022 for reference on how self-assessment practice is embedded within the self-system model of motivational development). Given the importance of self-directed learning in online contexts (Kim & Frick, 2011), it is theoretically and practically relevant to examine self-assessment practice as a mediator linking motivation to performance. Examining the causal link between intrinsic motivation on task performance via behavioural mechanisms such as self-assessment practice within an experimental design has been deemed necessary (see Mendoza et al., 2022).

The present study

This study was a randomized experiment that recruited secondary school students. We compared the effect of an online need-supportive task instruction and a default task instruction on intrinsic motivation, task-specific self-assessment practice, and task performance in an online language learning task. We hypothesized that need-supportive task instructions would help generate increased intrinsic motivation resulting in higher self-assessment practice which, in turn, improves task performance. The specific hypotheses of this study are as follows:

H1. Participants in the need-supportive task instructions group would have higher intrinsic motivation than the control group while controlling for their pre-test motivation

H2. Intrinsic motivation will directly influence task performance (H2.1) or indirectly via self-assessment practice (H2.2)

Methods

Participants

We used G* Power (Faul et al., 2009) to compute the required sample size a priori. Specifically, we used F tests ANCOVA, where the entered effect size, alpha error probability, and power as .40, .05, and .95, respectively. The number of groups was two, the numerator degree of freedom was two, and the number of covariates was one. The output parameters indicate that the total sample size required is 100, with a critical F of 3.09. For the experiment, we recruited 123 secondary school students attending a public science high school in a highly urbanized city in Central Luzon, Philippines. This school is specifically chosen as it is among the few schools that implemented online learning during the COVID-19 pandemic. Seven students opted out of the study halfway through the experiment. Four observations were excluded due to spurious responses. Five students failed to answer the items for attention check. The final sample size was 107 (n = 56 for intervention group; n = 51 for the control group). This sample size is within the required sample size calculation and is considered adequate similar to previous related experiments (e.g., Chung et al., 2020; Kanat-Maymon et al., 2015; Radel et al., 2015).

The participants were randomly assigned to either the control or the intervention group. The randomization was automated through the online task in Qualtrics to have an equal number of samples for each condition, but due to the exclusion of random responders and those who opted out, the intervention group (n = 56; 36 girls) ended up having five more participants than the control group (n = 51; 33 girls). The average age of the participants was 15.77 years old (SD = 0.58). As a proxy for socioeconomic status, 73 (68.22%) of the participants reported that their mother's highest educational attainment was graduating college. This suggests that the students are from the lower middle class regarding socioeconomic status.

Procedures

The experimental procedures are based on previous studies that manipulated task instructions (see Chung et al., 2020). Before implementing the procedures detailed below, a pilot test with ten secondary school students was conducted. The students in the pilot went through both the experimental condition and the control condition. We sought comments on the procedures from the students. We found parts of the online task that can be improved to make the task less tedious (e.g., reducing the page breaks on the online survey), and the readability of the font type and size was optimized for laptop use. Notably, the pilot test also helped refine the experiment's logistics.

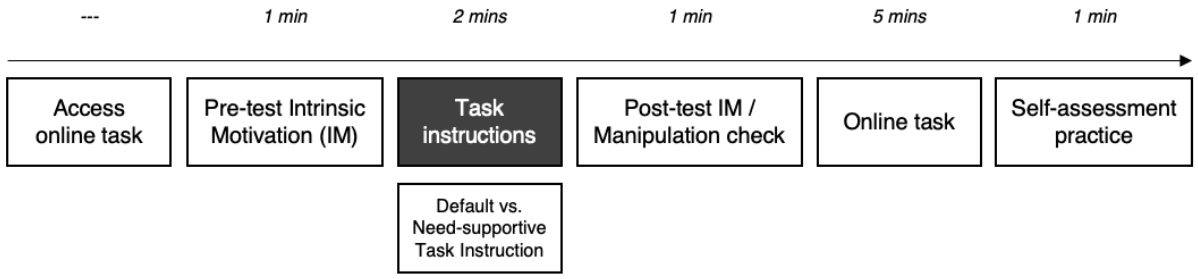


Figure 1. Experimental procedures

For the experiment (see Figure 1), students joined an online call via Zoom using their laptops. The first author discussed the Informed Consent and provided the students with the Qualtrics link that contains all parts of the experiment. All participants are aware that they are participating in a language learning task that will take approximately 10 minutes. The task was a C-test (Eckes & Grotjahn, 2006; Norris, 2018), a language learning task requiring participants to complete the mutilated words to make a sentence meaningful. C-tests are brief assessment instruments that measure global foreign language proficiency in written form (see Klein-Braley, 1997; Norris, 2018). This task was chosen because it is straightforward to answer with sufficient novelty.

Before the task instruction manipulation, demographic details were sought, and the 4-item situational intrinsic motivation scale was administered as a pre-test. Next, the students

were presented with the task instructions. The following is task instruction for the control condition:

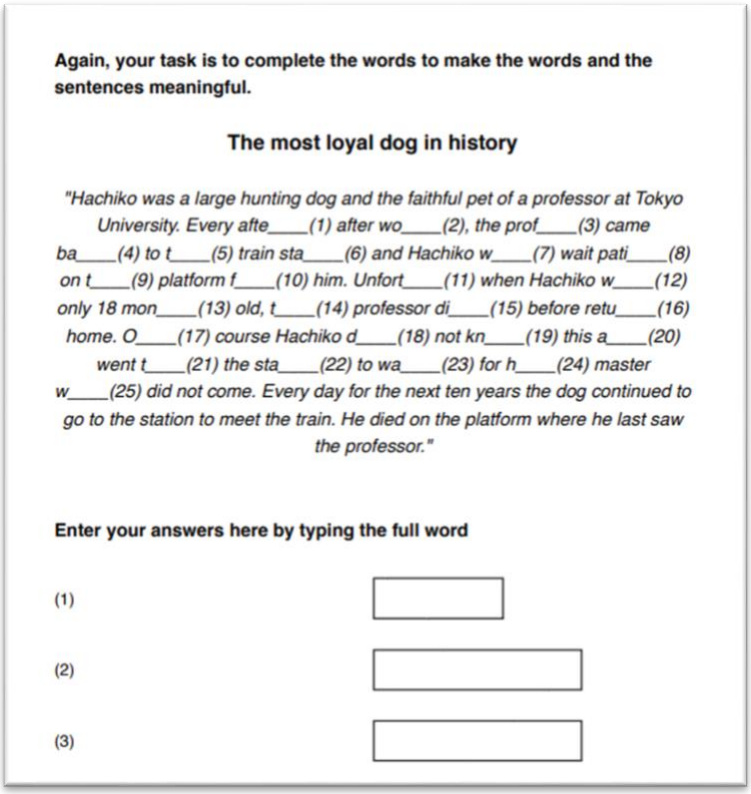
> "This task is called a C-test. A C-test is a task where you fill in the blanks to make a meaningful sentence. In a given text, parts of some words have missing letters. [A blank C-test is shown here as an example] Your task is to complete the words to make the words and the sentences meaningful, as below: [a completed C-test example]."

On the other hand, the task instruction for the need-supportive intervention condition includes the following before the default instructions:

> About this task: (1) This task can assess and can also help improve your language proficiency in English. (2) You are more likely to do well by reading carefully and putting effort in the task. (3) You may find some parts of the task to be more challenging than others and that is normal. What's important is that you do your best."
>
> After the default task instructions, the following is also added: "You can consider re-reading the words, taking down notes, or using other strategies that you find suitable for you. I trust you can do this task well. If you find some parts of the tasks confusing or if you want to clarify something, please do not hesitate to message me in Zoom.

The need-supportive statements are anchored on the existing literature for need-supportive teaching (Connell & Wellborn, 1991; Reeve, 2012; Ryan & Deci, 2000) and from a study that classified and consolidated teachers' motivational behaviours for self-determination theory interventions (Ahmadi et al., 2022), based on the recommendations of an international panel of experts in the field of motivation. Specifically, the statements in the need-supportive task instructions were designed to support *autonomy* (via providing rationale and using invitational language), *competence* (via praising effort and giving encouragement and optimism), and *relatedness* (via understanding the students' perspective, showing unconditional positive regard, and asking students about their progress and/or feeling).

The need-supportive task instructions were pilot-tested to five secondary school students and five English language teachers through a think-aloud protocol. We asked the students and teachers about their general thoughts on the instructions, their perception of the objective of the instruction, if any, and what school activities or tasks can instructions be applied to. Finally, we asked them how the instructions could be improved to communicate a sense of autonomy, competence, and relatedness to the task taker. This procedure was critical to increasing the instruction's applicability, fidelity, and effectivity to the task (see Sekhon et al., 2017). Along with semantic suggestions, the teachers suggested that the need-supportive instructions be bulleted, and the students recommended the addition of emojis for the statements designed to communicate relatedness.



Again, your task is to complete the words to make the words and the sentences meaningful.

The most loyal dog in history

"Hachiko was a large hunting dog and the faithful pet of a professor at Tokyo University. Every afte____(1) after wo____(2), the prof____(3) came ba____(4) to t____(5) train sta____(6) and Hachiko w____(7) wait pati____(8) on t____(9) platform f____(10) him. Unfort____(11) when Hachiko w____(12) only 18 mon____(13) old, t____(14) professor di____(15) before retu____(16) home. O____(17) course Hachiko d____(18) not kn____(19) this a____(20) went t____(21) the sta____(22) to wa____(23) for h____(24) master w____(25) did not come. Every day for the next ten years the dog continued to go to the station to meet the train. He died on the platform where he last saw the professor."

Enter your answers here by typing the full word

(1)

(2)

(3)

Figure 2. The C-Test language task

Immediately after the manipulated task instructions were presented, a manipulation check was conducted with two questions: (1) "*Were you able to read and understand the instructions?*" which is answerable with "*yes*" or "*no*", and (2) "*This is a question to check if*

you are reading attentively, please click "No" as your answer below." Additionally, to further evaluate whether the manipulation was detected, we administered an instrument assessing the students' satisfaction of basic psychological needs for the specific task. Afterwards, the students responded to the situational intrinsic motivation scale again as post-test measures. This was done before the C-test to isolate the effect of the manipulated task instruction from the task itself. The C-test task was then presented (see Figure 2). This specific C-test was chosen after consulting with five teachers at the secondary school. It was chosen out of five other C-tests to adjust to the students' language proficiency. After completing the C-test, the 5-item task-specific self-assessment practice was administered. After the survey, all the participants were debriefed, thanked, and paid 250 Philippine Pesos (equivalent to US$5) for their participation.

Measures

Intrinsic motivation

The 4-item intrinsic motivation subscale of the situational motivation scale (Guay et al., 2000; see also Standage et al., 2005) was used to assess intrinsic motivation for a specific task. A stem of "Why are you currently doing this task" is followed by statements on intrinsic motivation, such as "Because I think that this task is interesting". The response options ranged from 1 (*not at all*) to 7 (*exactly*). The Cronbach's alpha of this scale was .94 for both the pre-test and post-test, and the scale's construct validity had excellent fit to the data, $SB\chi^2(6) = 230.496$, CFI = 1.000, TLI = 1.000, RMSEA = 1.000 (95% C.I. = 0.101- 0.875), SRMR = .005.

Self-assessment practice (SaP)

A 5-item task-specific self-assessment practice was devised based on the Self-assessment Practice Scale (Mendoza & Yan, 2021b; Yan, 2018a) by targeting the five key practices of self-assessment practice on a specific task. The five core processes and their

respective task-specific adaptations are as follows: determining criteria ("I know what I needed to do in order to do the task correctly"), seeking feedback via monitoring (I reviewed the instructions and double-checked my answers to check if I'm doing the task correctly), seeking feedback via inquiry ("I asked a question or sought feedback in the Zoom chat regarding the task"), seeking internal feedback ("I evaluated how well or poorly I did on the tasks based on how I generally felt"), and self-reflection ("I reflected on what I can do to perform better for the next time I do the task"). The items are responded to on a 5-point scale from 1 (*not at all*) to 5 (*always*). The third item, focused on inquiry, was not included in the analyses since most students did not ask a question due to the nature of the task being administered online. The Cronbach's alpha of this scale was .75, and the scale's construct validity had adequate fit to the data, SB$\chi^2(6) = 67.984$, CFI = .969, TLI = .906, RMSEA = .128 (95% C.I. = 0.000- 0.239), SRMR = .040.

Basic psychological needs (BPN)

We devised a 4-item scale tapping on students' satisfaction of basic psychological needs on a specific task. The items were based on the basic tenets of self-determination theory (Ryan & Deci, 2017) and the adolescent basic psychological needs scale (Tian et al., 2014). Two items evaluated the satisfaction of the need for autonomy ("*I understand the reason behind doing this task*", "*I feel free to engage on this task in a way that suits me*"), and one item each for the satisfaction of needs for relatedness ("*I feel comfortable and supported in doing this task*") and competence ("*I feel confident in my ability to do this task well*"). Students responded to these statements with a 1 (strongly disagree) to 5 (strongly agree). The Cronbach's alpha of this scale was .85, and the scale's construct validity had adequate fit to the data, SB$\chi^2(6) = 77.321$, CFI = .978, TLI = .935, RMSEA = .138 (95% C.I. = 0.000- 0.319), SRMR = .032.

Task performance

The number of correctly filled words on the C-test had 25 mutilated words. The mean score was 23.73.

Table 1. Descriptive statistics and bivariate correlations

	1	2	3	4	5
1. Pre-test motivation	(.94)				
2. Post-test motivation	.84**	(.94)			
3. Basic psychological needs	.48**	.55**	(.85)		
4. Self-assessment practice	.45**	.39**	.44**	(.75)	
5. Task performance	.04	.10	.13	.25*	---
Mean	19.80	21.29	16.46	17.39	23.73
SD	5.16	4.73	2.51	2.48	1.34

Notes. ** $p < .001$, * $p < .01$, parentheses in diagonal are the internal consistency ratings of the instruments

Data analysis

No missing items were observed from the data. Descriptive statistics and bivariate correlations are presented in Table 1. ANCOVA was conducted for constructs with pre-test and post-test measures (i.e., intrinsic motivation and preference for challenging tasks) to examine the difference between the intervention and control groups while controlling for pre-test scores. Assumptions of linearity, homogeneity, and normality were tested before the ANCOVA. We used the *check_model* command within the *performance* package (Lüdecke et al., 2020) to visually evaluate these assumptions. We also used the Shapiro-Wilk test and Levene's test to evaluate the normality of residuals and the equivalence of residuals for both the control and intervention groups, respectively. ANCOVA was conducted with a posthoc analysis with a Bonferroni adjustment. For basic psychological needs satisfaction (manipulation check) and self-assessment practices (post-task outcome), an independent samples t-test was conducted to compare the mean scores between the control and

intervention groups. The same analyses in evaluating the assumptions for ANCOVA were implemented for the t-test. Using the *ggplot2* package (Wickham, 2016), the estimated marginal means from the ANCOVA were plotted in line plots, while the means from the independent t-tests were plotted in boxplots.

Structural equation modelling was used to test the direct effect of intrinsic motivation on task performance and its indirect effect via self-assessment practice. We used the *lavaan* package (Rosseel, 2012). The following goodness-of-fit indices were used to evaluate and compare the models: Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). Following the Hu and Bentler (1995) recommendation, a good model fit would include model CFI and TLI of greater than .90 and an RMSEA of less than .08. An SRMR value of less than .08 is considered a good fit (Hu & Bentler, 1999). Standardized estimates falling within the lower and upper 95% confidence interval for the indirect effects should indicate significant effects. All statistical and plotting procedures were conducted in R (R Core Team, 2016).

Results

Manipulation check

Aside from responding "yes" to reading and understanding the manipulated and controlled task instructions and correctly responding to the attention checker question, we further evaluated whether the respective groups detected the manipulated task instructions by evaluating the satisfaction of their basic psychological needs. We compared the means on the task-specific basic psychological needs (BPN) scale using a t-test. The Shapiro-Wilk test was significant for both the control ($W = 0.896$, $p < .001$) and intervention group ($W = 0.932$, $p < .001$); thus, there is evidence for the non-normality of residuals between the two groups.

Levene's test was computed and was not significant, $F(1,105) = 0.01$, $p = .92$, suggesting the equivalence of the residual variances for both groups. The t-test result, $t(96.23) = -4.04$, $p < .001$, shows that the mean scores for BPN of the intervention group ($n = 56$, mean = 17.3, $SD = 2.09$) were significantly higher than that of the control group ($n = 51$, mean = 15.5, $SD = 2.59$; see Figure 3). The effect size, Cohen's $d = .79$, is considered medium effect size (Cohen, 1988; Lenhard & Lenhard, 2016). This result suggests that, at the group level, the manipulated task instructions were differentiated.

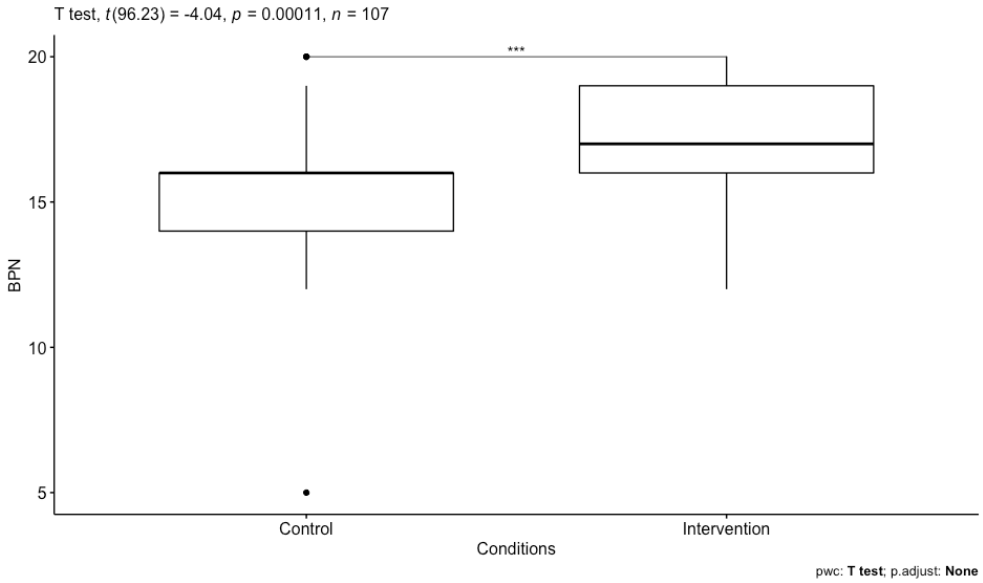


Figure 3. Line plots for basic psychological needs as a manipulation check

Effects of need-supportive task instructions on intrinsic motivation

Preliminary analysis

Prior to computing ANCOVA, we tested whether the necessary statistical assumptions for ANCOVA were not violated. The visual scatter plot demonstrates the direct linear relationship between pre-test and post-test intrinsic motivation scores for the control and intervention groups (see Figure 4). Testing for the homogeneity of regression slopes, the interaction term between the two conditions and the pre-test intrinsic motivation was not statistically significant, $F(1, 103) = 3.57$, $p > .05$. The Shapiro-Wilk test was not significant ($W = 0.986$, $p = .30$); thus, no evidence for the non-normality of residuals was detected.

Levene's test was computed and was not significant, $F(1,105) = 1.24$, $p = .27$, so we can assume that the residual variances are equal for both the control and the intervention group. No observations in both groups had standardized residuals greater than 3 in absolute value; hence the absence of outliers can be assumed.

$$\text{PostTestMotivation} = \alpha + \beta_1 \text{PreTestMotivation} + \beta_2 \text{Condition} + \epsilon \quad (1)$$

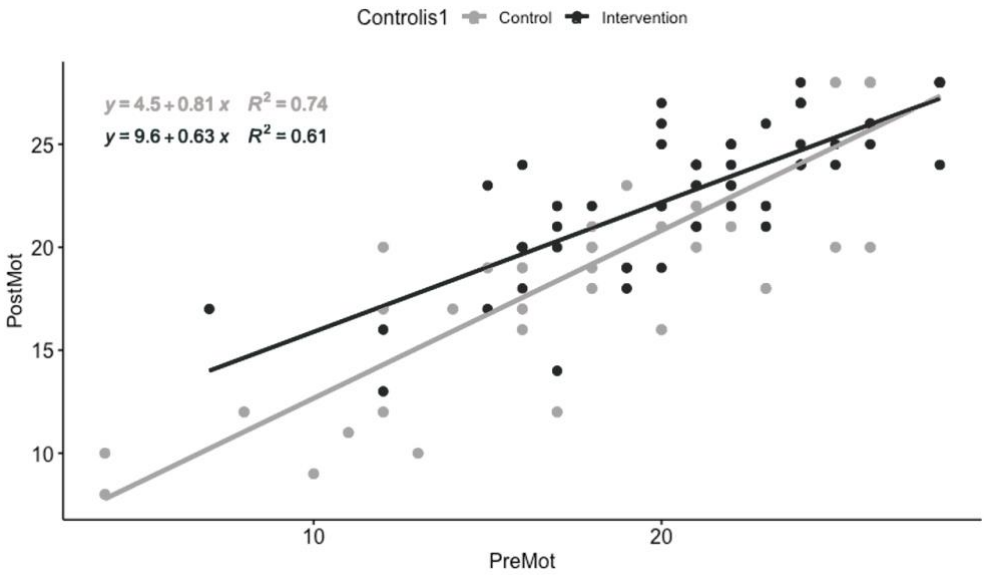


Figure 4. Scatterplot for intrinsic motivation. PreMot = Pre-test intrinsic motivation, PostMot = Post=test intrinsic motivation.

Differential effect of need-supportive task instruction on intrinsic motivation

An ANCOVA with the model Equation (1) was conducted to determine the effect of the intervention on the task-specific intrinsic motivation of the participants after controlling for their intrinsic motivation pre-test scores. After adjustment of pre-test intrinsic motivation, there was a statistically significant difference in post-test intrinsic motivation between the intervention group and the control group, $F(1,104) = 7.66$, $p < .01$ ($\eta^2 = .07$). The effect of the intervention on intrinsic motivation, $\eta^2 = .07$ (or Cohen's $d = .55$), is considered a medium effect size (Cohen, 1988) and within the desired effect size in the educational contexts (Hattie, 2011; see also Lenhard & Lenhard, 2016). With a Cohen's d of .55, 70.9%

of the intervention group will be above the mean of the control group (Cohen's U_3), 78.3% of the two groups will overlap, and there is a 65.1% chance that a person picked at random from the intervention group will have a higher score than a person picked at random from the control group. Post-hoc analysis was performed with a Bonferroni adjustment. The estimated marginal means (emmeans) of post-test intrinsic motivation was significantly higher for the intervention group (emmeans = 21.9, *SD* = 0.36) than that of the control group (emmeans = 20.6, *SD* = 0.34). The emmeans are illustrated in a line plot in Figure 5.

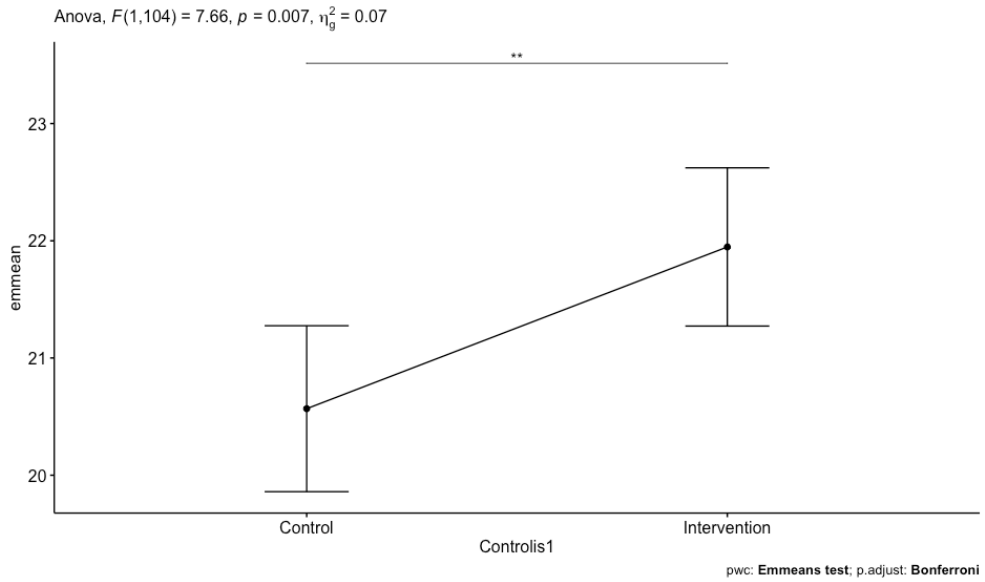


Figure 5. Line plot for intrinsic motivation

Indirect effects of intrinsic motivation on task performance via self-assessment practice

A structural equation model (SEM; see Figure 6) was conducted where the dependent variable task performance was regressed to the independent variable intrinsic motivation (path *c*) and to the mediator self-assessment practice (path *b*). The mediator self-assessment practice was also regressed to intrinsic motivation (path *a*). The mediation model ran normally after 39 iterations. The model was estimated using the Satorra-Bentler correction and had good model fit to the data, SB$\chi^2(36) = 383.176$, CFI = .979, TLI = .970, RMSEA = .063 (95% C.I. = 0.000- 0.107), SRMR = .054. Results show that intrinsic motivation did not significantly predict task performance (β = -.01, p = .92) while self-assessment practice did (β

= .28 [95% C.I. = 0.021-0.25], $p < .05$). Results also show that intrinsic motivation had a significant direct effect on self-assessment practice (β = .45 [95% C.I. = 0.199-2.11], $p < .05$). A bootstrap of 5000 was implemented to test for indirect effects. We found that intrinsic motivation had significant indirect effects to task performance via self-assessment practice (β = .12, [95% C.I. = 0.015, 0.510]). The total effect in the link between intrinsic motivation to task performance mediated by self-assessment practice was not significant (β = .11, [95% C.I. = -0.134, 0.380]), thus a full mediation is demonstrated. The model accounts for 20% of the variance of self-assessment practice and 7% of the variance of task performance.

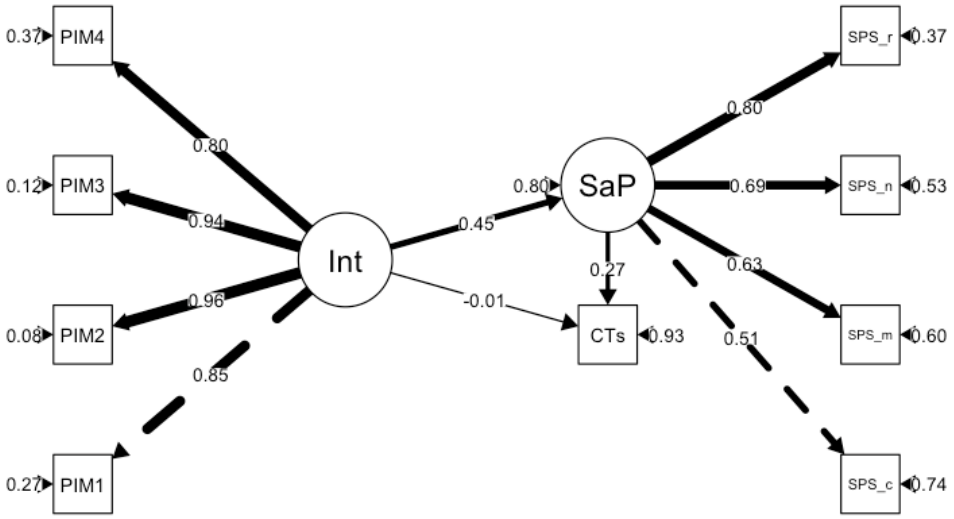


Figure 6. Mediation model testing the indirect effect of intrinsic motivation to task performance via self-assessment practice (INT = intrinsic motivation; SaP = self-assessment practice; CTs = c-test scores/task performance scores)

Post-hoc analysis of indirect effects within the context of the intervention

As with previous experimental methods (Leander & Shah, 2013; Thrash et al., 2017), we ran a moderated mediation to examine whether the mediation model linking intrinsic motivation to task performance via self-assessment practice was specific to either the need-supportive task instruction group and the control group. Since moderated mediation analyses require observed variables and to account for item-level errors, we created factor scores for

the latent intrinsic motivation (independent variable) and self-assessment practice (mediator). Consequently, we mean-centred these factor scores. Then, we included the dichotomous condition variable as a moderator in the link between intrinsic motivation and self-assessment practice (see Figure 7). We used the *gemm* command in the *rosetta* package (Garbulowski et al., 2021).

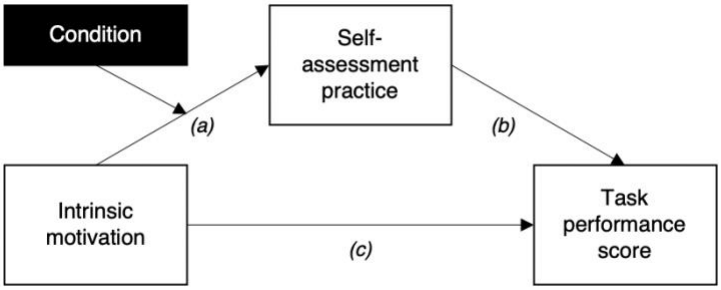
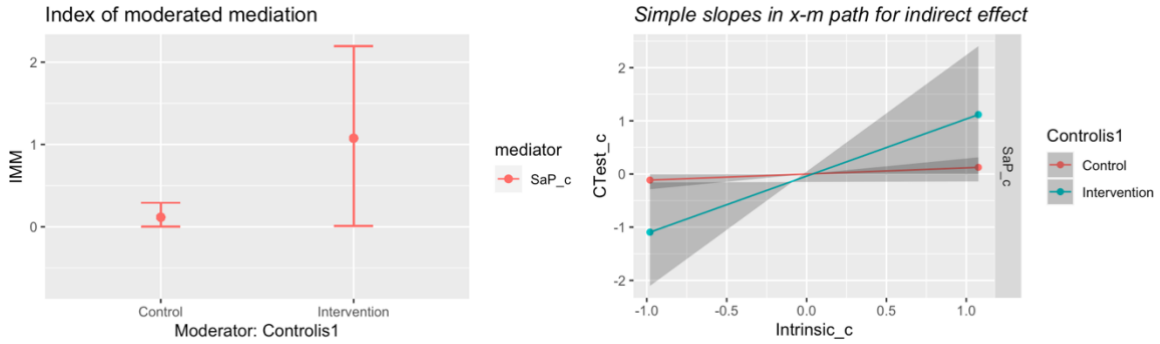


Figure 7. Moderated mediation model to test the indirect effect of intrinsic motivation on task performance via self-assessment practice depending on the study condition

The moderated mediation model had good fit to the data, $\chi^2(2) = 2.863$, CFI = .989, TLI = .961, RMSEA = .064. Self-assessment practice had a significant direct effect on task performance (B = 1.14, SE = 0.55, $p < .05$) but, like the mediation model, the intrinsic motivation did not (B = -0.01, SE = 0.14, p = .93). The direct effect of intrinsic motivation to self-assessment practice was significant (B = 0.10, SE = 0.03, $p < .01$) and this effect is significantly moderated by the condition variable (B = 0.85, SE = 0.07, $p < .01$). To illustrate the moderated mediation effects, we mean-centred task performance scores and plotted mediated simple slopes. Figure 8a shows the indirect effect of intrinsic motivation on task performance through self-assessment practice (i.e., index of moderated mediation) for the intervention and the control group. Since the line plot of the intervention group is greater than and does not overlap with that of the control group, this suggests that the effect of intrinsic motivation on task performance via self-assessment practice is specific to the intervention group. Moreover, the simple slopes with 95% C.I. (see Figure 8b) show a positive association between intrinsic motivation, self-assessment practice, and task performance for the

intervention group. However, a non-linear direction was observed for the control group. The simple slopes further highlight the mediating effect of intrinsic motivation on task performance via self-assessment practice for the intervention group and the absence of the same for the control group.



(a) (b)

Figure 8. Mediated simple slopes plots testing the moderated mediation model

Discussion

This study tested whether embedding need-supportive statements within the instructions of an online task could help generate intrinsic motivation and result in increased task performance through self-assessment practice as a learning strategy. We found that students with need-supportive task instructions had significantly greater intrinsic motivation than those presented with a default task instruction (supports H1). This difference held while accounting for their intrinsic motivation before the manipulated instruction and before the task was presented. The ensuing intrinsic motivation did not directly affect task performance (rejects H2.1), but we observed indirect effects via self-assessment practice (supports H2.2). Thus, greater intrinsic motivation is associated with increased self-assessment practice which, in turn, yielded higher task performance. Further, results from the moderated mediation analysis highlight that the indirect effect of intrinsic motivation on task performance through self-assessment practice was significant only for those in the intervention group. Overall, our

findings suggest that need-supportive statements within online task instructions can foster students' intrinsic motivation for the task. The ensuing intrinsic motivation for the task does not necessarily lead to increased task performance, but through self-assessment practice, intrinsic motivation can indirectly boost performance in online tasks.

A key finding of this study highlights the feasibility and efficacy of embedding need-supportive statements on online school tasks to foster intrinsic motivation. This demonstrates students' reception of such statements that lead to higher intrinsic motivation for the task. As evidenced by the manipulation check, participants who were presented with need-supportive statements in task instructions had significantly higher basic psychological needs satisfaction compared to those in the control group. Clearly, a variety of need-supportive statements can be incorporated by teachers depending on the nature of the task (e.g., Reeve, 2016; Ryan & Deci, 2017; Vansteenkiste et al., 2020). But by incorporating statements that offer task rationale, using invitational language, praising effort, giving encouragement, and expressing positive regard for task instructions (see Ahmadi et al., 2022 for an exhaustive list of need-supportive practices), students' basic psychological needs can be satisfied, and intrinsic motivation increases.

The finding that intrinsic motivation increased due to need-supportive statements supports the general tenets of SDT and the basic psychological needs theory (see Ryan & Deci, 2017; Vansteenkiste et al., 2020) and aligns with SDT-based interventions (Kanat-Maymon et al., 2015; Pavey et al., 2011; Sheldon & Filak, 2008). Brief interventions are potentially potent (e.g., wise interventions; Walton, 2014; Walton & Wilson, 2018; Walton & Yeager, 2020), especially when they are designed to modify a perceiver's view of a task. Extending previous research, the current results suggest that even if need-supportive statements are in written form, they remain perceivable to students. Research has shown that, even with the absence of physically observable cues (e.g., face-to-face learning), individuals

are able to perceive psychological constructs from their environment (e.g., knowing that one aims to meet a certain deadline evokes you to strive for the same goal; Leander & Shah, 2013; see also Radel et al., 2015 for how one perceives other's intrinsic motivation). Experiments also demonstrated that readers perceive psychologically rich written contents (e.g., readers can perceive inspiration from texts written by inspired writers and, in effect, be inspired writers themselves; Thrash et al., 2017; see also Walton, 2014). This means that the basic psychological needs can be satisfied not only through spoken or visible practice by teachers in the classroom but also through written texts. Hence, students' basic psychological needs can still be fulfilled through need-support expressed in text format.

The other key finding of this study demonstrates the indirect impact of intrinsic motivation on task performance, showing that intrinsic motivation requires a means to improve performance. Such a role is taken by self-assessment practice. Research has contended the need to examine behavioural mechanisms that can explain how motivation impacts achievement (see Elliot et al., 2017). The current result demonstrating that self-assessment practice mediates intrinsic motivation to task performance supports previous findings that underscore how self-regulated learning strategies can mediate the motivation-achievement link (Feraco et al., 2022; Leenknecht et al., 2020). This is also aligned with recent empirical investigations on the role of self-assessment practice as a crucial behavioural learning strategy (see Leenknecht et al., 2020; Panadero et al., 2012; Yan, 2018b, 2020b), impacting even higher-order skills like creativity (Yan et al., 2022).

The cross-sectional study of Mendoza et al. (2022) has shown that autonomous motivation correlates with increased self-assessment practice, which, in turn, predicts achievement scores in English language learning among secondary school students. Intrinsic motivation could be the driver of self-assessment practice which involves the behavioural disposition to use available information as feedback to perform optimally or better (Yan,

2020b; Yan & Brown, 2017). Because self-assessment practice is conceptualised as task-specific in this study, it is plausible that students who are motivated tend to practice self-assessment by paying close attention to the task instructions, reading the task material more deeply, or double-checking their task responses. These task-specific practices cohere with the determining assessment criteria, seeking feedback via monitoring and self-reflection as components of self-assessment practice (Yan & Brown, 2017; Yan & Carless, 2021).

The moderated mediation results demonstrate that the mediating role of self-assessment practice between intrinsic motivation and task performance was conditional on need-supportive task instructions. Specifically, the observed relationship between motivation, self-assessment, and task performance for those in the intervention group was dissimilar or lacking from that of the control group. It is possible that the intervention group's increased intrinsic motivation could potentially explain the mediating role of self-assessment practice. Understandably, with significantly higher intrinsic motivation, it can act as fuel for self-assessment practice that can improve task performance. Such may not be the case for participants in the control group[1]. It can also be inferred that the need-supportive task instructions could have prompted genuine self-assessment practice. Studies have highlighted the importance of perceived learning environments in developing self-regulated learning processes (e.g., self-assessment practice; Mendoza & Yan, 2021a; Miller & Brickman, 2004; Mouratidis et al., 2013; Sierens et al., 2009; Wang et al., 2016). Although self-assessment practices are more effective when cued explicitly (Yan & Carless, 2021; Yan et al., 2021), students' perception of their learning environment, which, in this case, the instructions of their learning tasks, can also impact their self-assessment practice (see Mendoza & Yan, 2021a). Overall, the intervention not only increased intrinsic motivation but also created a context where self-assessment practice can function to improve task performance.

Practical implications, study limitations, and future research directions

The adjustment of online task instructions to be need-supportive is an immediate implication that can be inferred from this study. Reading plain instructions might affect student motivation toward a task, especially outside of the traditional classroom environment, without teachers reiterating task instructions and students asking for clarifications. There are various ways how to modify instructions to be need-supportive (e.g., Ahmadi et al., 2022; Reeve, 2016; Ryan & Deci, 2017; Vansteenkiste et al., 2020), but the goal is the same, that is, to foster a sense of autonomy, competence, and relatedness in online learning and online tasks (Oga-Baldwin, 2015). In the absence of a classroom environment that is rich in opportunities to satisfy learners' basic psychological needs, it is contingent upon schools to develop ways to support students' need for autonomy, competence, and relatedness.

Another practical implication also involves the importance of developing self-assessment practices for students. As the study findings demonstrate, motivation alone does not significantly predict higher task performance; it should be coupled with behavioural learning strategies such as self-assessment practice. Hence, encouraging self-assessment practice and, more importantly, teaching explicit strategies on how to effectively practice self-assessment are both crucial. For instance, students can be taught to (1) focus on understanding the assessment criteria or how their work is being evaluated, (2) observe the overall task and find opportunities to seek feedback from external sources, (3) not hesitate to ask questions or seek clarifications, or (4) revisit their tasks, either current or completed, to find ways to do well, if not better.

Despite the study's notable strengths, we report our study limitations. First, the ecological validity of the findings remains untested due to the limitations of experimental designs. Future research can include longitudinal or cross-sectional studies that can scale the intervention developed in this study to examine whether need-supportive statements embedded within task instructions are generalizable. Second, the task-specific instrument to

measure self-assessment practice was carefully devised and pilot-tested; measuring self-assessment practice after the task completion may be prone to recall bias. One way to amend this limitation is by implementing think-aloud protocols to ask learners about their learning strategies during the task. Future research can use such a method to determine how students use self-assessment practices on specific tasks beyond what self-report measures can capture. Third, although self-assessment practices mediated the link between intrinsic motivation and task performance, the experiment was not designed to improve it. Subsequent studies can consider interventions designed to foster or train self-assessment practice. Finally, this study is tested only among secondary school students in the Philippines. Future work can improve the study's representativeness by including students from higher education as a sample.

Conclusion

School closures linked to the COVID-19 pandemic, combined with students' declining intrinsic motivation, posed a threat to students' learning as schooling is shifted online. As we move to the new normal of education and the endemic phase of the COVID-19 pandemic, hybrid and online forms of learning will be more common. Hence, scalable and effective interventions that can foster motivation online are necessary to recover the learning losses caused by the COVID-19 pandemic and to sustain motivation forward. This study highlights the impact of a brief SDT intervention that uses need-supportive statements for online task instructions to generate intrinsic motivation. Such intervention can increase students' basic psychological needs and intrinsic motivation, and the ensuing intrinsic motivation can lead to higher task performance through self-assessment practices.

Footnote:

[1]Of note, although the intervention was designed to foster higher intrinsic motivation and not self-assessment practice, we ran a t-test to compare the self-assessment practice between the experimental groups. The self-assessment practice across groups was not significantly different. Research has shown that specific and explicit self-assessment interventions are necessary to foster self-assessment practice (see Yan & Carless, 2021; Yan et al., 2021).

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Chapter 5: Integrated Discussion

Summary of findings

This thesis aimed to theoretically investigate student self-assessment practice, its social and psychological predictors, and its implication on learning among secondary school students. Hence, the three studies included in this thesis focus on understanding self-assessment practice within the classroom ecology. Specifically, the studies demonstrate how social and psychological factors influence self-assessment practice by embedding self-assessment and self-determination theory within the self-system model of motivational development. Furthermore, evidence has been established on interventions to foster and maximise adaptive learning outcomes. In this final chapter, I draw the findings and arguments of each empirical chapter together. By doing so, I highlight how this thesis contributes to a broader understanding of self-assessment practice, particularly in contexts where academic achievement could be suboptimal and formative assessment is still in its early stages.

Before synthesising the findings in line with the theoretical framing of this thesis, I begin this chapter by summarising the general study findings:

1. Study 1 demonstrate evidence for the reliability and validity of the Self-assessment Practice Scale (SaPS; Yan, 2018) specific to English language learning among Filipino secondary school students. In this adapted version of SaPS, the four-factor structure of the SaPS was confirmed, and the criterion-related validity of its four dimensions. Complementary Rasch analysis and confirmatory factor analysis were used to examine the within-network validity of the scale, and structural equation modelling controlling for item-level measurement errors was used to examine its between-network validity. Specifically, seeking external feedback by monitoring (SEFM), seeking external feedback by inquiry (SEFI), seeking internal feedback

(SIF), and self-reflection (SR) to higher-order engagement outcomes such as agentic, cognitive, and metacognitive engagement. This study supported the validity and applicability of the scale in the secondary school context in the Philippines.

2. The evidence on how need-supportive teaching impacts student achievement was highlighted in Study 2, which also identified student motivation and self-assessment practice as psychological and behavioural mechanisms. Using lower-level mediation analysis, which accounts for the nested nature of the data by classrooms (n = 30), this study found the direct positive influence of involved teaching practices and structured teaching practices on students' autonomous and controlled motivation. Autonomy support did not correlate with either form of motivation. Of the two forms of motivation, only autonomous motivation positively predicted grades in English language learning directly. But with self-assessment practice as a mediator, both autonomous and controlled motivation indirectly predicted achievement scores. These findings demonstrate (a) how need-supportive teaching impacts student motivation, (b) the positive influence of motivation on achievement, and (c) how self-assessment practice can act as a behavioural mechanism that can explain the link between motivation and achievement.
3. Finally, Study 3 devised a brief online intervention based on the theoretical findings of the second study and found the differential effect of need-supportive task instructions on students' intrinsic motivation and self-assessment practice in an online language learning task. Specifically, in a randomised online experiment, students presented with task instructions that were phrased to be need-supportive had significantly higher intrinsic motivation than those assigned in the default instructions group. This effect held while controlling for pre-test motivation scores. Mechanistically, we found that intrinsic motivation did not directly predict task

performance scores; instead, it predicted higher self-assessment practice, which, in turn, predicted higher task performance. Such supplements causal evidence to the cross-sectional findings of the second study. These findings are especially relevant in the context of teaching and learning amid the COVID-19 pandemic and beyond.

Synthesis: Towards an ecological and mechanistic view of self-assessment practice

Earlier in this thesis, I introduced the self-system model of motivational development that has the theoretical flexibility and specification to examine learning outcomes ecologically. Extending Bronfenbrenner's Ecological Structure of Educational Environment (1976), the self-system model (see Skinner et al., 2022) allows a more precise integration of multiple theories, mechanisms, and outcomes operating both internal and external to the learner. Below, I integrate the findings of the three studies in terms of whether or how each finding supports the context → self → action → outcome link of the self-system model.

Context. The focal context in this study is need-supportive teaching. Studies 2 and 3 partially support previous studies that argue for the importance of need-supportive teaching to motivation (Connell & Wellborn, 1991; Reeve, 2012; Ryan & Deci, 2000). Specifically, Study 2 highlighted that, controlling for students being nested in the same classroom, involved teaching practice and structured teaching practice had a meaningful impact on their motivation, but autonomy-supportive teaching did not. As previous studies emphasised, teachers play a crucial role in creating a learning context that can satisfy students' psychological needs and, in turn, increase their motivation (Connell & Wellborn, 1991; Reeve, 2012; Ryan & Deci, 2000). Particularly, when teachers show care for their students (involvement) and when they design lessons that support and develop competence (structure), students' motivation to learn increases (Reeve, 2012; Ryan & Deci, 2000, 2017; Vansteenkiste et al., 2020).

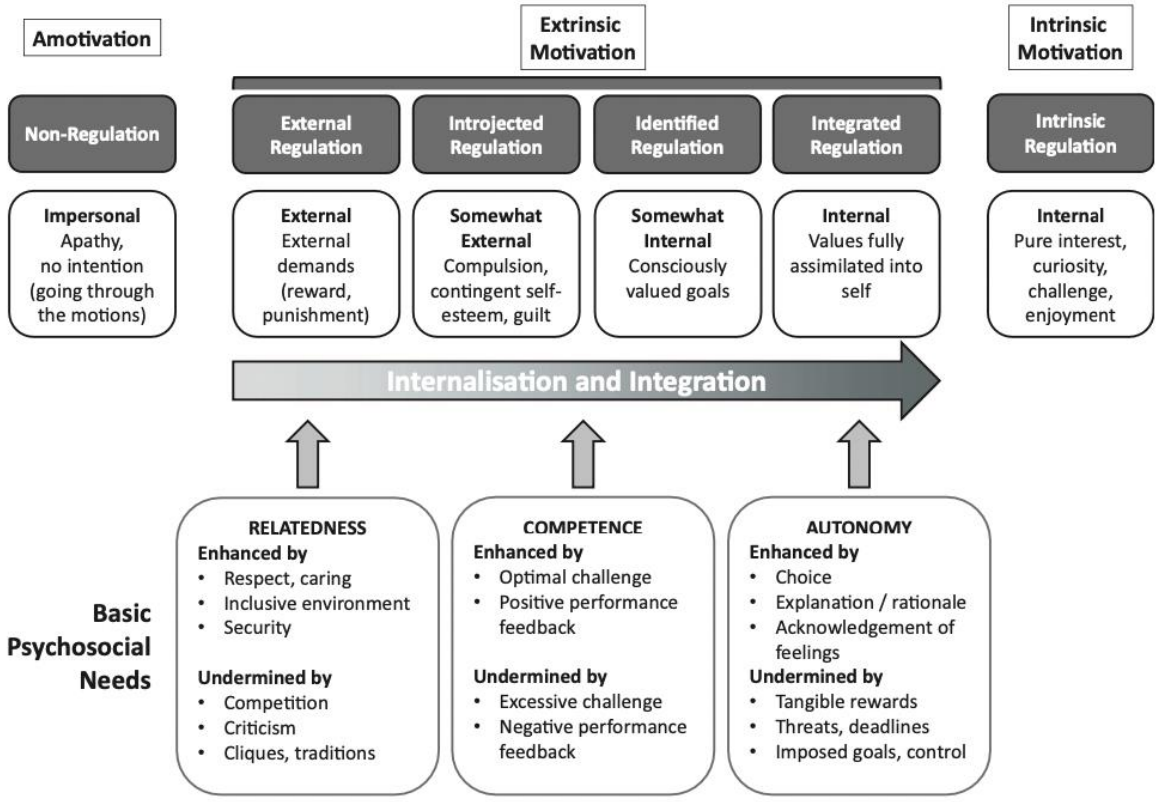

Figure 3. The conceptual framework of Self-determination Theory.

Despite numerous studies highlighting the impact of autonomy-supportive teaching (e.g., Aelterman et al., 2019; Baker & Goodboy, 2019; Bureau et al., 2022; Haerens et al., 2015; Occhino et al., 2014; Reeve, 2006, 2016; Wang et al., 2016), this did not hold when the three teaching practices were analysed as separate predictors. Autonomy-supportive teaching is manifested by giving students a choice in their learning outcomes and explaining the relevance or rationale of the task (Baker & Goodboy, 2019; Connell & Wellborn, 1991; Reeve, 2006, 2016; Reeve et al., 1999; Skinner & Belmont, 1993). I initially discussed in Study 2 that the autonomy support could be misperceived as lacking structure or too permissive (see Occhino et al., 2014; Reeve, 2006), especially in Eastern contexts where structured teaching may hold more weight (e.g., Zhou et al., 2012). Such can explain why autonomy-supportive teaching may have a meaningful influence on motivation.

Upon further reflection and review of SDT studies, I was led back to the overview of motivational theories for learning by Cook and Artino (2016). The review summarised all

contemporary motivation theories, including SDT. In the figure used (see Figure 3), it highlights that one's motivation can begin from being externally regulated until it is internalised and integrated into the self to be intrinsic. Corresponding to such a motivational continuum, the basic psychological needs appear to be sequenced: relatedness, competence, then autonomy. Hence, on the one hand, if one's motivation is externally regulated, then the more salient or applicable basic psychological need to be satisfied would be relatedness needs—a need that is satisfied by involved teaching practice.

On the other hand, as motivation leans towards being internalised, autonomy needs are more appropriate. Therefore, when motivation is somewhat external or internal, competence needs—satisfied by structured teaching—appear to be more relevant. In such theorising, the findings of Study 2 that suggest the impact of involved teaching practice and structured teaching practice do not only show which need-supportive teaching is impactful but also reveals the current motivation of students. If involved teaching and structured teaching are more impactful, it could be surmised that students' motivation is still externally regulated or somewhat internal at best. This appears to be logical. When one engages in a learning task, it might not be ideal to immediately focus on increasing competence or providing autonomy. Prioritising a sense of community and relatedness may be necessary to build trust, respect, and psychological safety. Consequently, as one becomes socially acclimated, the satisfaction of competence needs could follow, and as competence compounds and a sense of mastery grows, then autonomy can be afforded. Overall, students' perception of need-supportive practice as context does not only provide directions for teachers but could also signal the current level of motivation students have.

The experimental findings in Study 3 support the contention of the impact need-supportive has on intrinsic motivation. Controlling for pre-test motivation, the online task instruction phrased to be need-supportive led to an increase in students' intrinsic motivation

for the task. This increase in motivation was significantly higher than those randomly assigned to the control group. This suggests that need-supportive statements (e.g., Reeve, 2016; Ryan & Deci, 2017; Vansteenkiste et al., 2020) remain perceivable and potent, in text or written form, in generating intrinsic motivation. The experimental condition of Study 3 that provides an avenue to support students' basic psychological needs in online environments holds crucial evidence for devising theoretically informed interventions at scale (e.g., Kanat-Maymon et al., 2015; Pavey et al., 2011; Sheldon & Filak, 2008).

Self. For Study 2, the constructs housed under *self* were autonomous and controlled motivation, and for Study 3, the constructs were basic psychological needs and intrinsic motivation. We found that motivation can be influenced by need-supportive contexts and can impact self-assessment practice for both studies. Specific to Study 2, we found that both autonomous and controlled motivation was influenced by need-supportive teaching, and both were positively associated with self-assessment practice. Study 3 also supports the finding that intrinsic motivation is positively linked to self-assessment practice. Moreover, for Study 3, another construct that could function as a variable under *self* is the satisfaction of basic psychological needs. The findings from the manipulation check established that those who were presented with need-supportive task instructions had significantly higher basic needs satisfaction than those who read default instructions. Altogether, within the individual, Study 2 and Study 3 point to the importance of motivation and basic psychological needs satisfaction for optimal and adaptive learning outcomes.

Action. *Action* components of the self-system model are behavioural. For all three studies, self-assessment practice was the key action component. Study 1 has shown that the components of self-assessment practices were linked to higher-order engagement constructs (e.g., agentic, cognitive, and metacognitive engagement). This support previous findings that self-assessment practices and engagement in school are correlated (Brown & Harris, 2013;

Fredricks et al., 2004; Panadero, Jonsson, et al., 2016; Yan, Brown, et al., 2020; Zimmerman & Schunk, 2004). Study 2 and Study 3 both highlighted the role of self-assessment practice as a behavioural mechanism that can link motivation to achievement scores or task performance. Specifically, Study 2 showed that self-assessment partially mediates the link between autonomous motivation and English language learning scores. Further, self-assessment fully mediated the link between controlled motivation to achievement; that is, even if students' motivation is externally regulated, if this leads to self-assessment practice, their grades can improve. Whereas without self-assessment, the link between controlled motivation to achievement is not meaningful. More nuance to the role of self-assessment practice was found in Study 3. We found that intrinsic motivation alone did not predict task performance. More specifically, the direct effect of intrinsic motivation on task performance was not statistically significant. Intrinsic motivation, however, positively predicted self-assessment practice, which, in turn, predicted task performance. This means that behavioural mechanisms such as self-assessment practice support the link between motivation and achievement. The three studies highlight the adaptive role of self-assessment practice as predicted by psychological outcomes and as a predictor of achievement outcomes.

Outcome. The outcomes examined in Study 2 and Study 3 are both objective learning outcomes. In Study 2, cumulative English language learning grades were used, whereas task-specific performance scores were used in Study 3. Achievement data, although summative, are important indicators of learning. Our findings show that formative assessment strategies such as self-assessment can improve summative outcomes like grades. For instance, both studies have shown that relying on student motivation alone may not be adequate in improving achievement scores. This might be due to the contingency of motivation to need-supportive contexts. With self-assessment practice as actionable behaviours, learners can still improve their cumulative achievement scores and even their task-specific performance.

The self-system model of motivational development afforded a coherent theoretical framework that can house multiple adaptive outcomes. Specifically, self-assessment practice was integrated with self-determination theory, including need-supportive teaching and motivation. In doing so, we formed an understanding of self-assessment as it would exist in the classroom ecology. The self-system model effectively housed the integrated outcomes together, with need-supportive instruction as a *context* variable, motivation as a *self* variable, self-assessment as an *action* variable, and achievement as an *outcome* variable. Next, I tackle specific limitations that can inform future research work.

Limitations and future research directions

Before going through the specific limitations of each study, we first go over limitations of the entire thesis that requires further research in the future. The self-system model proffers a theoretical framework that can examine psychological and behavioural outcomes as internal dynamics embedded within larger socio-cultural systems (Skinner & Pitzer, 2012; Skinner et al., 2022). A unique characteristic of the self-system model, however, is its reciprocal nature (e.g., Skinner & Belmont, 1993). Specifically, the model does not only posit the downstream effects of sociocultural systems onto internal dynamics and student outcomes, but also the upstream effects of student outcomes back to the larger social systems (Fryer, 2017; Fryer & Oga-Baldwin, 2019; Skinner & Belmont, 1993). Although the quality of the current data may not be able to test the reciprocal direction of the variables, for this study to fully demonstrate the integration of motivation and self-assessment within the self-systems model, how student outcomes impact internal states and external systems needs to be put forth in future research work.

The motivational variables that are focused on this thesis are autonomous and controlled motivation, this is due to their theoretical alignment to SDT. Still, future research can integrate alternative motivational theories and constructs within the self-systems model.

For instance, situated expectancy-value theory (S/EVT; Eccles & Wigfield, 2020; Wigfield & Eccles, 2000) which focuses on task value (e.g., interest, importance, utility) and expectancy for success as motivational constructs (see Cook & Artino, 2016). Relatedly, the social-cognitive theory (SCT) which posits that the belief in one's own capacity or self-efficacy as a primary driver of motivation (Bandura, 1997). SCT also includes self-regulation (Zimmerman & Schunk, 2012) as a cyclical process that propels learners to generate self-feedback to foster motivation (see Cook & Artino, 2016). These motivational constructs, among others, can be further fleshed out and examined as internal antecedents of self-assessment practice. Future research can also examine maladaptive outcomes that may operate as risk factors for self-assessment practice (e.g., disengagement, procrastination, self-criticism, and rumination).

Given that the thesis is focused on the embedding self-assessment practice within the classroom ecology, little research attention has been given on basic psychological needs (BPN) as an internal mechanism. Aside from focusing on autonomous and controlled motivation, future studies can further explore whether or how basic psychological needs—as internal mechanisms—influence self-assessment practice, both directly and indirectly through motivation.

Study specific limitations and future research directions

For the first study, despite its notable strengths in validating the SaPS to be adopted as a subject-specific instrument, we also note some limitations. First, we cannot conclude the instrument's test-retest reliability and predictive, given the cross-sectional data. Future longitudinal work is necessary to validate the temporal reliability and validity of SaPS. Second, given that our sample were students from Grades 7 to 10, the generalizability of the subject-specific SaPS may be limited. As students from primary school may have different learning materials, their self-assessment strategies might also vary. Extending the current

sample to students in primary schools would be a worthwhile research direction. Given the breadth of learning materials in higher education and graduate studies, I argue that self-assessment for such educational contexts needs to be broader; hence the current domain-general format of the SaPS may already be applicable. As younger students learning content gets more structured and specific, self-assessment practices must also become more targeted and specific. Relatedly, more specific self-assessment practices for English language learning can be further explored (e.g., recording and listening to their speaking accents, asking peers to read their written work, or using software to correct their written outputs). These types of external feedback-seeking practices of students can better capture monitoring practices, which were found to not significantly predict engagement outcomes, unlike the other self-assessment components. Seeking external feedback by monitoring (SEFM) is a core self-assessment practice, and it is possible that more specific monitoring practices are relevant to English language learning. Finally, the reliability of the seeking internal feedback (SIF) subscale remains lower than the other self-assessment dimensions. Understandably, there could be distinctive differences in how students seek intrapersonal feedback. While others may be able to effectively check in with themselves on how they feel about their work, some may not. Considering the numerous mental processes that can operate under seeking internal feedback, future studies can further refine the items under SIF.

Despite the theoretical and methodological strengths of the second study, there are several limitations that can inform future work. First, although multilevel mediation from students nested in 30 classrooms was noteworthy, our analysis of need-supportive teaching was based on students' perception of their English teachers and not on teacher-reported need-supportive teaching. Future studies can benefit from including teacher-reported predictors and outcomes to purposefully understand not only students' perceptions of their learning environment but also the teachers' actual practices. Studies can also supplement survey data

from multiple data sources with classroom observation data. Second, a core strength of this study is that all constructs refer to students' English language learning. Still, in aid of generalising the findings, the examination of similar constructs in a different subject domain (e.g., Maths or STEM) is relevant. Third, despite the data being collected prospectively, it would have been a stronger analysis if a proper longitudinal design (i.e., all objective and self-report data are collected in at least three time points) was conducted. Such design will yield longitudinal data that can be analysed through cross-lagged panel models to observe the directionality and temporal causality of need-supportive teaching, motivation, self-assessment practice and achievement. Lastly, given the shift in learning modalities due to the pandemic, exploratory research is needed to examine how need-supportive teaching, student motivation, and self-assessment practice operate online. Much of this research is developing and integrating longitudinal and experimental research designs that may offer new evidence and insights to further support this second study's findings.

For the third study, as an inherent limitation to experimental research, external validity, i.e., whether the findings would generalise outside the experiment, is weak. Future studies can include longitudinal or quasi-experimental studies that can scale the intervention to examine if the effect of need-supportive statements embedded within task instructions is generalisable outside the experimental conditions. Second, while the task-specific instrument for self-assessment practice was carefully developed and pilot-tested, it may be prone to recall bias since it measures self-assessment practice upon task completion. Future studies can implement think-aloud protocols to probe learners' on-task self-assessment practices. Third, although self-assessment practices mediated the link between intrinsic motivation and task performance, the experiment was not designed to improve it. Subsequent studies can consider interventions designed to train students on how to engage in self-assessment practice. Fourth, in lieu of the research design and research questions, the satisfaction of basic

psychological needs was operationalised as a manipulation test and was not included as an internal or psychological mechanism in the model. Future research work can focus on designing an SDT-informed theoretical framework that will include the satisfaction of basic psychological needs as a mediator between perceptions of need-supportive online task instructions and intrinsic motivation. Finally, this experimental study is tested only among secondary school students. Future work can improve the study's generalizability by including students from higher education.

These limitations of this thesis notwithstanding, there are notable theoretical and methodological strengths in each of the studies that can be used as a guide to researchers who would like to use a three-pronged approach in answering research questions: an instrument validation, a cross-sectional study testing a theoretical framework, and an intervention or experimental study.

Practical implications

The practical implications for the validation of the subject-specific SaPS are two-fold: (1) the SaPS scores can be used to identify areas where student self-assessment practices is suboptimal which can inform potential interventions targeting such self-assessment practices, and (2) the effectiveness of self-assessment interventions (e.g., monitoring logs, self-assessment diaries, or self-assessment checklists; Meusen-Beekman et al., 2016; Yan, Chiu, et al., 2020; Zimmerman & Kitsantas, 1997) can be evaluated using the subject-specific SaPS.

Because of the importance of need-supportive teaching on student outcomes as established in Study 2, teacher professional development to train such instructional practices can be informed (e.g., Aelterman et al., 2014; Aelterman et al., 2013). Given that our data suggest that only involved teaching and structured teaching contributed to enhanced student motivation, the implementation of need-supportive teaching must be culturally informed.

Relatedly, Study 3 supports this implication of Study 2, specifically in the context of online or asynchronous learning. Given the challenges of teaching and learning amid the COVID-19 pandemic, schools and teachers need ingenious ways to recover from learning losses due to school closures. First, adjusting online task instructions to be need-supportive is a crucial study implication. Reading task instructions which are phrased to satisfy students' basic psychological needs for relatedness, competence, and autonomy can lead them to be more intrinsically motivated to the online or asynchronous learning task. Instructions can be modified in various ways depending on the task (e.g., Ahmadi et al., 2022; Reeve, 2016; Ryan & Deci, 2017; Vansteenkiste et al., 2020) to satisfy students' basic psychological needs (Oga-Baldwin, 2015). This intervention is cost-effective, sustainable, and effective and can be implemented at scale. The potential for such intervention is substantial as long as teachers are mindful of how they phrase task instructions.

Finally, as self-assessment practice has been identified as a behavioural mechanism that mediates the link between motivation and achievement, based on Study 2 and Study 3, encouraging self-assessment practices can help promote higher achievement (see Leenknecht et al., 2020). Teachers play a crucial role in encouraging self-assessment practice (e.g., Panadero, Jonsson, et al., 2016). Self-assessment strategies are more useful when explicitly taught or instructed, especially when they are specifically taught or instructed (Yan & Carless, 2021; Yan et al., 2021). Hence, teachers can recommend using specific self-assessment practices (e.g., self-assessment diaries; Yan, Chiu, et al., 2020) as a way to improve achievement scores. It's critical to teach students specific strategies for effectively practising self-assessment. Some of the many ways students can be trained to practice self-assessment include: (1) having a strong understanding of how their work is being evaluated, (2) using exemplars to improve their work, (3) finding opportunities to seek feedback from

external sources, (4) be comfortable in asking questions or seek clarifications, or (5) revisit their tasks, either current or completed, to find ways to improve.

Conclusion

Self-assessment practice among secondary school students, as contextualised in a specific learning domain, has been highlighted in the three studies in this thesis by publication. Extending previous research, the studies theoretically examined self-assessment within the ecology of the classroom. Overall, the studies provided an original contribution to the literature on self-assessment practice and self-determination theory by contextualising both in a specific domain (i.e., English language learning) in a non-Western context. Rigorous methods were also implemented by using complementary cross-sectional and experimental designs. The significance of this study is also underscored by current educational challenges, such as the low reading achievement of the Philippines in the PISA 2018, the known decline of student motivation in secondary school, and the proliferation of asynchronous learning modalities amid the COVID-19 pandemic.

Aside from the theoretical and methodological strengths with which the studies were conducted and the practical implications that each study drew, the studies have demonstrated the possibilities for and usefulness of educational research in underrepresented and disadvantaged contexts. Much is left to theorise on the extensive role that teachers play in student motivation and self-assessment practice. Moreover, the ecological factors surrounding students' practice of self-assessment are multivariate and deserve further research attention. I hope that these studies could serve as useful guides for researchers interested in exploring formative assessment strategies, especially in understudied contexts. Finally, I contend that through integrating theoretical approaches, we can make significant progress in integrating motivational theorizing with the literature on self-assessment.

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Appendix A: Response to reviewer comments for Study 1

12 December 2020

Dr Daniel B. Hajovsky
Associate Editor, Journal of Psychoeducational Assessment

Dear Dr Hajovsky,

We thank you and the anonymous reviewers for the helpful and thorough review of our manuscript. Please find attached our revised manuscript (JPA-20-0247) entitled, "**Validation of a Subject-Specific Self-Assessment Practices Scale among Secondary School Students in the Philippines**".

We have addressed each comment from both reviewers, and below we summarized how we addressed those comments raised. We added line and page numbers in the manuscript to also aid in locating the revisions. Please refer to the highlighted text for the revisions.

We believe the comments and feedback have resulted to important revisions and an improved submission of our manuscript. We are grateful for the opportunity to revise our manuscript for continued consideration for publication in *Journal of Psychoeducational Assessment.*

In gratitude,
The authors

Response to reviewer comments

Reviewer 1: General comment

"Thank you for the opportunity to review 'Validation of a subject-specific student Self-assessment Practices Scale among secondary school students in the Philippines.' I thoroughly enjoyed reading about this project. Because the authors highlighted a recent PISA administration, noting concern about the performance of students in the Philippines, the article reads as part of a broader 'self-assessment' that individuals or groups there may be performing. If that is the case, then I hope my comments are helpful as the authors continue their work."

> **Authors' response:** Thank you very much for your appreciative feedback. Please find below our response to your comments—they have been instrumental in the improvement of our manuscript.

Reviewer 1: Comment 2 (Introduction)

"The authors lay out two specific purposes to a) evaluate the SaPS in a sample from the Phillippines, and b) to investigate the SaPS within a specific subject domain, English class. I thought the introduction made the case well."

> **Authors' response**: Thank you for this feedback on our introduction section.

Reviewer 1: Comment 3 (Methods)

"The authors used a large sample in grades 7 to 10 with students ranging from 11 to 19 years old. I think it will help evaluate this study to know how many students were in each grade or age level. I speculate that there are developmental differences in self-regulated learning between 11 year-olds and 19 year-olds. Paris, S. G., & Newman, R. S. (1990). Development aspects of self-regulated learning. Educational psychologist, 25(1), 87-102.

Is this sample equally representative of these grade/ages, or is it predominately younger or older students? I think a short discussion of potential developmental differences, or expectations for this age-group could be useful, perhaps in the introduction. In their limitation section, the authors suggest this grade range is too narrow, but I also wonder if it is too broad."

> **Authors' response**: These are very important points. Indeed, our respondents from Grades 7, 8, 9, and 10 are evenly distributed: 186, 158, 157, and 172, respectively. We did not include these in our manuscript due to word count limitations, but we have added them now and reduced other sections. Also, we noted that while the age range appears broad, there was only one 11-year-old student and only twelve students who were 18 and 19 years old. We also find the reviewer's comment on the developmental differences profoundly mindful. Thank you also for leading us to the seminal paper of Paris and Newman (1990). This revision can be found on **page 6, lines 6 to 15**, which also includes this citation, as below:
>
> > "Participants in the study were 778 secondary school students from the Philippines[1]. After listwise deletion of participants with missing data greater than 5% and outliers for each of the measures (see Data analysis section for details), data from 673 students remained for the final analysis. The data

consists of 186, 158, 157, and 172 students from Grades 7 to 10, respectively. While the students' age ranged from 11 to 19 years old (*M*=14.14, *SD*=1.51), there was only one 11-year-old and twelve 18- and 19-year-olds. More than half were females (n=376, 55.87%). It was particularly important to have a balanced number of participants from each of the year level since self-regulated learning strategies can be developmentally influenced (see Paris & Newman, 1990). The data for this study are part of a larger study of student assessment-as-learning strategies and other learning outcomes."

Updated reference:

Paris, S. G., & Newman, R. S. (1990). Developmental aspects of self-regulated learning. *Educational Psychologist, 25*(1), 87-102. doi:10.1207/s15326985ep2501_7

Reviewer 1: Comment 4 (Discussion)

"The authors appropriately summarized their findings for each aspect of their analyses. Earlier in the paper, the authors highlighted self-regulated learning as a student-level construct that might be intervenable in the context of the 2018 PISA assessments. I think a section in the discussion that discusses intervention based on the constructs that the authors validated here would add additional use to the paper. What interventions could educators considered based on student SaPS scores that would positively influence their English performance?"

Authors' response: Thank you for emphasizing the importance of practical implications (e.g., interventions) that the validated instrument can help direct and evaluate. We included potential self-assessment interventions at the end of our discussion section. This revision can be found on **page 13, lines 3 through 8**, as below:

> "The validation of the subject-specific self-assessment practices scale has two potential practical implications. First, the scores from the scale can be used to identify student self-assessment practices that need further improvement. Interventions can then be designed to target specific self-assessment practices. Second, the effectiveness of interventions like monitoring logs (Zimmerman & Kitsantas, 1997), self-assessment diaries (Yan et al., 2020), or self-assessment checklists (see Meusen-Beekman et al., 2016 for self-assessment strategies used in randomized controlled interventions) can be evaluated using the subject-specific SaPS. Consequently, teachers can encourage students to seek feedback and reflect on their English learning tasks."

Updated references:

Meusen-Beekman, K. D., Joosten-ten Brinke, D., & Boshuizen, H. P. A. (2016). Effects of formative assessments to develop self-regulation among sixth grade students: Results from a randomized controlled intervention. *Studies in Educational Evaluation, 51*, 126-136. doi:https://doi.org/10.1016/j.stueduc.2016.10.008

Yan, Z., Chiu, M. M., & Ko, P. Y. (2020). Effects of self-assessment diaries on academic achievement, self-regulation, and motivation. *Assessment*

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Zimmerman, B. J., & Kitsantas, A. (1997). Developmental phases in self-regulation: Shifting from process goals to outcome goals. *Journal of Educational Psychology, 89*(1), 29-36. doi:10.1037/0022-0663.89.1.29

Reviewer 2: General comment

"Thank you for the opportunity to review this manuscript. This article describes an attempt to test and summarize the validity of the Self-assessment Practices Scale (SaPS). By using specific wording (i.e., changing the opening SaPS prompt from "When I study" to "When I learn English"), the authors provide insight into the specific English language subject. Using 673 subjects for the final analysis, all of whom were secondary school students. The manuscript fits appropriately within the journal's aims and scope. The authors used confirmatory factor analysis (CFA) to test for structural validity, Rasch analysis to detect unidimensional latent traits, and structural equation modeling (SEM) to test for concurrent and convergent validity. The CFA results showed that a 4-factor model fit significantly better than the 1-factor model for standardized factor loadings and corresponding factors. The Rasch analysis demonstrated good psychometric properties, while results from the SEM model demonstrated significant to moderate relationships across factors.

Overall. This article provides substantial supporting literature throughout, strengthening the authors' arguments and overall readability. While this is helpful, it contributes to the manuscript's length, which, including tables, exceeds 40 pages. While much of the manuscript is appropriate and warrants inclusion, I would recommend reviewing the methods section as there appears to be some sections that could be trimmed. For example, on page 10, lines 10-35 seem tangential. I feel that the paragraph could start with the phrase "Evidence suggests that self -assessment…" without losing any information relevant to understanding this study."

> **Authors' response**: We thank the reviewer for these positive comments on our submission. We also acknowledge the importance of brevity in our work. We have opted to delete the mentioned lines on page 10. We have also moved the context of the sample as Footnote 1.

Reviewer 2: Comment 1 (Introduction)

The authors effectively outline key terms, specifically the variables used to test validity (i.e., agentic, cognitive, and metacognitive engagement).

> **Authors' response**: We thank the reviewer for this commendation.

Reviewer 2: Comment 2 (Methods)

Lines 22-38 on page 9 are empty and can be deleted to reduce the manuscript's length. The description of the methods is largely clear; however, I do have questions regarding the scale's administration to the participants. Given that the manuscript identifies that the population of interest scored dismally on reading achievement, it seems relevant to review some of the technical properties of the scale's readability scores.

> **Authors' response**: Thank you for this comment. We have trimmed our data analysis section following this comment. With regard to the question on the scale's readability

given the population of interest, the school principal and six English school teachers who are familiar with the sample were provided with a copy of the SaPS in English. They vetted the readability of the scale items for the secondary school students. The principal, however, encouraged that items 10 and 13 of the scales which include the words "gut feelings" and "intuition", respectively, to be followed by the local language translations in parenthesis to aid in readability. This has led to these two items (10 and 13) to contain "(*hinala* o *pakiramdam*)" and "(*kutob*)", respectively. We added this as a note to Table 3, which contains the SaPS items.

We also noted in our Procedures that the research assistant stayed during the whole duration of the data collection to respond to potential student inquires. This is on **page 6, lines 17 to 23**, as below:

> "Data were collected through paper-and-pen survey method. Procedures for this study were approved by the Human Research Ethics Committee of the affiliated university of both authors (Ref. no.: 2019-2020-0152). A research assistant from the Philippines administered the questionnaires during the students' class hours and was present during the duration of data collection to respond to potential student inquiries. The questionnaires were in the English language as English is the medium of instruction in the K-12 schools in the Philippines. The students took about 10 minutes to complete the questionnaire."

Reviewer 2: Comment 2 (Results)

The authors provided a detailed summary of the obtained results in a manner that leads neatly into the discussion.

Authors' response: We appreciate this feedback. We have made an effort to ensure that our results flow smoothly into our discussion. We are glad you found this worth noting.

Reviewer 2: Comment 3 (Discussion)

It appears the obtained data supports the claims made by the authors. This is stated properly at the beginning of the discussion. Near the end of the discussion section, the authors similarly state, "Overall, the findings support…" This sentence may be more effective at the beginning of the discussion section. Lastly, at the end of the discussion section on page 22, the authors state "more work is needed…" which can be expanded upon. It may be helpful for future researchers to list specific future directions here.

Authors' response: We thank the reviewer for this comment. As suggested, we have moved the last sentence of our discussion to our lead discussion paragraph. We also created a subsection that covers our "Limitations and directions for future research" on **page 13, lines 9 to 22,** as below:

> "*Limitations and directions for future research*
>
> Despite the notable strengths of the present study, we also note our study limitations. First, the study is cross-sectional in nature; hence the convergent validity of SaPS does not account for predicting outcomes in a future time-point. Future studies can explore test-retest reliability and predictive validity using a longitudinal approach. Second, our sample is only

composed of students from only Grades 7 to 10, which limits the possible generalizability of our findings. Extending the current sample to include students from primary and higher education would also be a meaningful future research endeavour. Finally, consistent with previous studies is the lower reliability of seeking internal feedback (SIF). Yan and Brown (2017) showed that internal feedback is more salient for subjects with higher performance-related activities (e.g., sports, music, and arts), and could be less noticeable for academic or less performance-oriented subjects like English. Hence, future directions can also (1) include the refinement of the items under SIF and make them more suitable for less performance-oriented subjects, and (2) identify alternative ways, rather than self-reports, to capture students' practices in seeking internal feedback for the purpose of self-assessment."

Reviewer 2: Comment 4 (References)

There appears to information (e.g., DOI, reference link, journal info, publisher info) missing in the references. Please review and update the following references:

a. McMillan, J. H., & Hearn, J. (2008).
b. Panadero, E., & Alonso-Tapia, J. (2013).
c. Yan, Z., Brubacher, S., Boud, D., & Powell, M. (2020).

Authors' response: We have reviewed our reference lists for missing information and details. Thank you very much. We also completed the reference listed above as below:

McMillan, J. H., & Hearn, J. (2008). Student self-assessment: The key to stronger student motivation and higher achievement. *Educational Horizons, 87*(1), 40-49. Retrieved from http://www.jstor.org/stable/42923742

Panadero, E., & Alonso-Tapia, J. (2013). Self-assessment: Theoretical and practical connotations, when it happens, how is it acquired and what to do to develop it in our students. *Electronic Journal of Research in Educational Psychology, 11*(2), 551-576. doi:http://dx.doi.org/10.14204/ejrep.30.12200

Yan, Z., Brubacher, S., Boud, D., & Powell, M. (2020). Psychometric properties of the self-assessment practice scale (saps) for professional training contexts: Evidence from confirmatory factor analysis and rasch analysis. *International Journal of Training and Development, 24*(4). doi:10.1111/ijtd.12201

Reviewer 2: Comment 5 (Minor comments)

1. Introduction. Some minor changes can be made to improve succinctness and punctuation. These are only suggestions and are not critical to the revisions of the manuscript.
    a. On page 4, line 18, the words "and the scale" can be shortened to "which."
    b. On page 4, line 59, the words "in a specific subject domain, that is," can be deleted.
    c. On page 5, line 28, paratheses are needed around the phrase, "i.e., the actions students engage in during the self-assessment process."

Authors' response: We are grateful to the reviewer for pointing these out. We agree with all these minor comments and we have addressed them and highlighted these in the manuscript.

2. Methods.
    a. Page 10, line 14, while I think this section can be removed, if the authors disagree and feel it is important to retain this section, then I would recommend reviewing the word "dismally," as it may be unnecessarily harsh. The authors might consider changing this phrase to "The Philippines did not fare well" as an alternative way to describe the Philippines' performance.

Authors' response: We thank the reviewer for noting these. We have rephrased our statements followed the reviewer suggestion. We have also moved the educational context into Footnote 1 which now reads as below:

> "Footnote 1
>
> The Philippines did not fare well in its first participation in the recent PISA 2018 assessments (OECD, 2019); ranking lowest on Reading achievement. Evidence suggests that self-assessment practice thru self-assessment diaries can improve academic achievement (Yan, Chiu, et al., 2020). Studies also highlight that self-assessment practice is key for lifelong and deep learning (e.g., Boud, 1995; Papanthymou, 2018; Yan & Brown, 2017); hence, validating this scale to study, evaluate, and improve student self-assessment is an important step in improving both short- and long-term achievement."

    b. On page 14, lines 14-18, it may be more efficient to cite a reference that describes Rasch analysis rather than describe it here. Doing so can save space.
    c. Similarly, defining concurrent validity and convergent validity on page 15, lines 4-11, can be shortened to just the citations as such descriptions are peripheral to the goal of the article.
    d. Lastly, on page 15, line 18, the phrase, "In the testing the SEM model," can be shortened to "In testing the SEM model."

Authors' response: Many thanks to the reviewer for these comments. We have rectified our grammar errors and also followed the suggestions on the use of brief methods descriptions. These comments have improved the brevity of our writing.

3. Discussion. On page 21, lines 49-52, the sentence "The present study is the first attempt…" may be redundant and unrelated to the following discussion of limitations. The authors may consider an alternative transition sentence.

Authors' response: We agree to this reviewer comment and have revised our transition sentence to fit our limitations and future research directions subsection. This revision can be found on **page 13, lines 12 to 16, as below**:

> "*Limitations and directions for future research*
>
> Despite the notable strengths of the present study, we also note our study limitations. First, the study is cross-sectional in nature; hence the convergent validity of SaPS does not account for predicting outcomes in a future time-point. Future studies can explore test-retest reliability and predictive validity using a longitudinal approach. Second…"

13 January 2021

Dr Daniel B. Hajovsky
Associate Editor, *Journal of Psychoeducational Assessment*

Dear Dr Hajovsky:

We are grateful for the review and comments received relevant to our manuscript entitled, "Validation of a Subject-Specific student Self-Assessment Practices Scale among secondary school students in the Philippines" (JPA-20-0247.R2).

We appreciate your time and effort to improve our manuscript, especially the in-text revisions and comments. Aside from accepting the changes you have recommended, kindly view in the attached letter how we addressed your comments. We also highlighted the main changes in our manuscript for ease of reference.

Again, we are thankful for the opportunity to revise and resubmit our manuscript for continued consideration for publication in *Journal of Psychoeducational Assessment.*

Sincerely,
The authors

AE comment 1: Removing Figure 2 (Wright map) and its corresponding in-text description, among other grammar errors

Authors' response: We thank the AE for this comment. We have removed Figure 2 and its in-text description, and we also adjusted figure notations. This suggestion led to a more concise and streamlined write-up of our manuscript. We have proofread our resubmission as well.

AE comment 2: The consistent use of the psychometric validity examined in the study

Authors' response: Upon consideration of the comment on our use of construct/convergent validity and our statistical analyses, we have opted to use the construct network validation approach (see Martin, 2007; Martin & Marsh, 2006). This approach involves examining the scales' factor structure and internal reliability (*within-network construct validity*) and the scale's association with criterion-related constructs (*between-network construct validity*). It has been recently used in a paper published in the Journal of Psychoeducational Assessment (Datu & Zhang, 2020). It has also been applied among samples from the Philippines (Ganotice et al., 2012).

In our study, we used CFA and Rasch analysis to evaluate within-network construct validity, whereas bivariate correlation and SEM (against engagement outcomes) were used for between-network construct validity. We've added this in our *Data analysis* section (p. 7 to 8) and our *Results* section is now divided into two subsections: one for each validity testing (p. 9). Our revised *The current study* section on page 4 (lines 13 through 17), introduces this approach, as below:

"*The current study*

This study extends the use of the SaPS as a critical tool in evaluating students' self-assessment in the English language as a specific subject domain. We adopted the network construct validation approach (see Martin, 2007; Martin & Marsh, 2006) which involves examining the scale's within-network construct validity (i.e., factor structure and internal reliability) and between-network construct validity (i.e., the association of SaPS' dimensions with criterion-related constructs)."

Updated references:

Datu, J. A. D., & Zhang, J. (2020). Validating the Chinese version of triarchic model of grit scale in technical–vocational college students. Journal of Psychoeducational Assessment, 0(0), 0734282920974813. https://doi.org/10.1177/0734282920974813

Ganotice, F. A., Bernardo, A. B. I., & King, R. B. (2012). Testing the factorial invariance of the English and Filipino versions of the inventory of school motivation with bilingual students in the Philippines. Journal of Psychoeducational Assessment, 30(3), 298-303. https://doi.org/10.1177/0734282911435459

Martin, A. J. (2007). Examining a multidimensional model of student motivation and engagement using a construct validation approach.

British Journal of Educational Psychology, 77(2), 413-440. https://doi.org/https://doi.org/10.1348/000709906X118036

Martin, A. J., & Marsh, H. W. (2006). Academic resilience and its psychological and educational correlates: A construct validity approach. Psychology in the Schools, 43(3), 267-281. https://doi.org/10.1002/pits.20149

Related to AE comment 2: The need to incorporate SEM, aside from the traditional bivariate correlation of subscales

Authors' response: Previous studies using the within-network approach rely only on the correlation of the (sub)scale scores to their criterion-related construct. The limitation of this approach is that it doesn't account for item-level measurement errors. This limitation is resolved by using the full SEM where the subscales are used as latent variables, and the items are used as observed measures. The use of SEM, to supplement the traditional bivariate analyses, yields dis-attenuated association (i.e., correlations controlling for item-level measurement errors) of the theorized subscales (see Yu & Hsu, 2013). The use of SEM is considered as an advancement in test validation research (Zumbo, 2014).

Relevant to our findings, our correlational results support between-network construct validity, and the SEM results further highlighted the unique and theoretical association between the SaPS factors and the engagement constructs. This revision could be found is on our *Data analysis* section on page 8 (lines 8 through 12), as below:

> "For the between-network validity, we used bivariate correlations and structural equation modeling (SEM), respectively. Specifically, we evaluated how each of the hypothesized SaPS subscales correlate to agentic, cognitive, and metacognitive engagement, followed by SEM. The use of a full SEM is essential to further examine these association between the constructs while controlling for item-level measurement errors (Yu & Hsu, 2013; Zumbo, 2014)."

Updated references:

Yu, S.-C., & Hsu, W.-H. (2013). Applying structural equation modeling methodology to test validation: An example of cyberspace positive psychology scale. *Quality & Quantity*, *47*(6), 3423-3434. https://doi.org/10.1007/s11135-012-9730-3

Zumbo, B. D. (2014). Structural equation modeling and test validation. In N. N. Balakrishnan, T. Colton, B. Everitt, W. Piegorsch, F. Ruggeri, & J. L. Teugels (Eds.), *Wiley statsref: Statistics reference online*. https://doi.org/10.1002/9781118445112.stat06521

Considering the changes above, we have also adjusted our abstract, as below:

Updated abstract:

> "Self-assessment is fundamental to self-regulated learning; however, instruments to measure self-assessment practices are limited to a few developed educational systems. This study examined the psychometric properties of the Self-assessment Practices Scale (SaPS) in the English language subject using data from 778 secondary school students from the Philippines. We used confirmatory factor analysis (CFA) and Rasch analysis to test the SaPS' within-network validity, then bivariate correlations and structural equation modelling (SEM) for between-network validity. The CFA supported the scale's four-factor structure, and the Rasch analysis supported the scale's dimensionality, rating scale effectiveness, and item fit statistics. The four SaPS subscales were positively correlated to agentic, cognitive, and metacognitive engagement. SEM results show that all SaPS factors (except self-monitoring) had significant associations to the engagement outcomes. This study highlights the sound psychometric properties of SaPS in a new educational context and its applicability as a subject-specific measure of assessment-as-learning strategies."

Finally, we have removed the term "student" in our manuscript title: "Validation of a subject-specific ~~student~~ Self-Assessment Practices Scale among secondary school students in the Philippines", hence our updated title is: **Validation of a subject-specific Self-Assessment Practices Scale among secondary school students in the Philippines**.

Appendix B: Response to reviewer comments for Study 2

10 February 2022

Valerie Tartas, PhD
Editor-in-Chief
European Journal of Psychology of Education

Dear Prof. Tartas:

First, we would like to thank you and the reviewers for the constructive and encouraging feedback given to our manuscript entitled, "**Domain-specific motivation and self-assessment practice as mechanisms linking perceived need-supportive teaching to student achievement**" (EUPE-D-21-00305). We believe the comments to our manuscript has pointed us to several areas for improvement, resulting in significant enhancement of our paper.

Hence, on behalf of my co-authors, I am pleased to resubmit our following the reviewers' comments. Below, in our "*Response to Editor and Reviewers' comments*", we detail how we endeavoured to address each of the comments raised. We also included the page and line numbers where the revisions can be located. Please find a summary of our substantial revisions below:

- We reanalyzed the data and included the initially deleted responses (n=40) due to the percentage of item-level missing data and implemented item-level missing data imputation using multiple imputation by chained equations. Relatedly, we also conceded to Reviewer 3's suggestion to include SES as a covariate. The reanalysis yielded the same substantive findings after using the entire dataset and after adding SES as a covariate. We updated all results, including the tables and figures.
- We also emphasized the importance of expanding educational and psychological research in non-Western contexts, specifically among secondary school students in the Philippines, where interventions to mitigate declining student motivation and achievement are needed.
- We revised all reviewer comments relevant to formatting, grammar, and overall coherence of the manuscript.

Despite the revisions, we were able to keep the length of the manuscript to 6,308 words (excluding references, tables, and figures). It remains to include two tables and one figure.

We hope that our resubmitted manuscript merits the quality necessary for publication. Thank you very much for your kind consideration.

Respectfully,
The authors

Response to Editor's comments

Editor's comment #1:

"We would like in particular to draw your attention on three main aspects to three aspects which seem important to us and which add to the reviewers' recommendations: the first concerns the fact that the study was carried out in the Philippines - we lack details on the reasons and specificities that would make it possible to understand this choice (even if you mention the low results in the PISA assessments, you would have to argue further)"

Authors' response: Thank you for enumerating these helpful concerns. We agree with this point in aiding readers on the reason behind focusing the study on secondary schools in the Philippines. We are aware of the importance of introducing the need to extend educational, psychological research in non-Western contexts. We revised our Introduction to expand the gaps in current research on **page 3, lines 7 to 11**, as below:

> "Finally, there has been little attention placed among secondary school students from non-WEIRD (i.e., White, Educated, Industrialized, Rich, and Democratic) and non-Western contexts in educational psychology; this continues to limit the representativeness, generalizability, and impact of current research findings."

We also respond to this comment by writing a subsection entitled "***Secondary school students in the Philippines and English language learning***" detailing the reasons for implementing the study in the Philippines. In the subsection, we emphasized the importance of extending research on motivation, self-assessment, and achievement in non-Western contexts, specifically to secondary school students in the Philippines. We also emphasized why it's crucial to conduct this study during secondary school, and we highlighted the results of the recent OECD PISA participation of the Philippines. This revision can be found starting on **page 8 (line 5) to page 9 (line 3),** as below:

> "***Secondary school students in the Philippines and English language learning***
>
> Secondary school education marks a key transition point for student life inside and outside school. Along with the challenges of adolescent life, students also experience a decline in school motivation during secondary school (Gnambs & Hanfstingl, 2016). Relatedly, achievement in language learning has also been documented to decline from Grade 7 to Grade 9 (Fraine et al., 2007). As such, the crucial period when interventions or programmes to enhance student motivation and achievement occur during secondary school education.
>
> Most of the research on need-supportive teaching and how it impacts student achievement have been conducted in Western contexts. Eastern contexts, especially in Southeast Asia, have been featured less in studies that examine the interplay of social, psychological, and behavioural mechanisms that drive student achievement. The lack of representation of secondary school students from non-Western contexts in this research area limits the generalizability and potential impact of existing research. Pioneering efforts in conducting research that includes non-Western counterparts is necessary to

extend research generalizability and applicability (see King & Bernardo, 2016).

The Philippines is a Southeast Asian country that can benefit from studies focused on secondary student motivation and achievement. From a practical perspective, the country fared dismally in its first participation in the recent PISA 2018 assessments (OECD, 2019), ranking lowest on reading achievement. Trinidad (2020) analyzed the PISA data from the Philippines sample and found that demographic characteristics and being enrolled in public schools were associated with low PISA scores. Although efforts and initiatives are being made to improve performance in such international assessments, classroom-level and student-level interventions are equally necessary."

Editor's comment #2:

"…the second concerns the relations of the achievement scores to English learning and your argumentation for domain specificity, it will be important to clarify these relations in your revised version."

Authors' response: Thank you very much for seeing this important point. We have mentioned the importance of domain specificity in our paper, but we now emphasized it further in our revision. Among others sections, this revision can be found on **page 9, lines 3 through to 8**, as below:

"From a theoretical perspective, Wigfield et al. (2004) detailed the importance of domain-specificity in examining motivation and achievement, given that both can vary across domains. Hence, unpacking pathways and mechanisms that foster student motivation and achievement should be domain-specific. Overall, the choice of exploring English language learning is practically driven, and the domain-specific approach as theoretically informed."

Editor's comment #3:

"…the third one is from the statistical analysis: why do you choose to remove 40 participants from the database on the account of having more than 5% missing at item level. Mplus allows through FIML to account for that, and also, you speak of imputation. you could have done it on these data as well and performed multilevel multiple imputation in Mplus, as again the software allows it. There is a need to be more explicit here with the data. We would like you to consider these three aspects and incorporate them in your revised manuscript."

Authors' response: Thank you very much. In our first submission, we opted to exclude participants with item-level missing data beyond the acceptable threshold of 5%. However, we do agree with your comment on imputing the item-level missing data to make full use of the entire sample. Hence, aligned with this comment, we applied multiple imputation by chained equations to item-level missing data for all responses. We then recomputed the Rasch-calibrated person measures for all constructs prior to re-analyzing the multilevel mediation model in MPlus. The same substantive findings held after the reanalysis. We updated our Results section, tables, and figures. We also revised the *Data analysis* section on **page 13, lines 5 to 10**, as below:

"***Data analysis***

Before the primary analyses, we evaluated item-level missing data. More than half of the participants (n = 466; 58.54%) have complete responses. Two hundred ninety-one participants (36.56%) have item-level missing data less than five per cent, and only 39 participants had missing data ranging from 6% to 36%. All item-item level missing data were imputed using multiple imputation by chained equation (MICE; Azur et al., 2011). Consequently, Rasch and lower-level mediation analyses were implemented."

Response to Reviewers' comments

Reviewer 1, comment #1:

"Several references are hyper-cited (Baeten et al. (2013): 9; Burns et al. (2021): 7; Connell & Wellborn (1991): 9; Skinner & Belmont (1993): 7). It could be interesting to reduce these and mention other research."

Authors' response: We thank the reviewer for this mindful comment. We agree that we have cited the mentioned studies rather generously, given that these papers anchor much of our work. Following this comment, we have reduced the citation to these papers and cited them only in the study's core arguments. Following the comment, we also mentioned more recent and relevant studies that our work aligns to. The few new references are as follows:

Updated references:

Ahn, I., Chiu, M. M., & Patrick, H. (2021). Connecting teacher and student motivation: Student-perceived teacher need-supportive practices and student need satisfaction. *Contemporary Educational Psychology*, *64*, 101950. https://doi.org/https://doi.org/10.1016/j.cedpsych.2021.101950

Feraco, T., Resnati, D., Fregonese, D., Spoto, A., & Meneghetti, C. (2022). An integrated model of school students' academic achievement and life satisfaction. Linking soft skills, extracurricular activities, self-regulated learning, motivation, and emotions. *European Journal of Psychology of Education*. https://doi.org/10.1007/s10212-022-00601-4

Fraine, B. D., Damme, J. V., & Onghena, P. (2007). A longitudinal analysis of gender differences in academic self-concept and language achievement: A multivariate multilevel latent growth approach. *Contemporary Educational Psychology*, *32*(1), 132-150. https://doi.org/https://doi.org/10.1016/j.cedpsych.2006.10.005

King, R. B., & Bernardo, A. B. I. (2016). Advancing psychological studies on asian learners: Honoring the legacy of David A. Watkins. In R. B. King & A. B. I. Bernardo (Eds.), *The psychology of asian learners: A festschrift in honor of David Watkins* (pp. 3-14). Springer Singapore. https://doi.org/10.1007/978-981-287-576-1_1

Reviewer 1, comment #2:

"hese references do not follow APA 7th ed. norms: Aelterman et al. (2014); Anderman & Leake (2005); Belmont et al. (1988); Bernardo & Ismail (2010); Bond et al. (2020); Boon (2014); Connell & Wellborn (1991); Department of Education (2013, 2016); Enriquez (1986); Haw et al. (2021); Hu & Bentler (1995); Law (2011); Linacre (2006); Liu et al. (2021); Muthén & Muthén (1998-2019); Okabe (2013); Reeve (2012); Trinidad (2020); Washburn et al. (2019); Zhou (2012); Zimmerman & Schunk (2001); Zimmerman & Schunk (2004)."

> **Authors' response**: We thank the reviewer for emphasizing the importance of consistent formatting styles. We've revised these references to follow the APA 7th Ed., as suggested.

Reviewer 2, comment #1:

"The paper presents an interesting topic that has a real value to education and is present properly. To be published, the article has a few essential aspects that must review as follow: Specialty in the discussion section, the paragraphs are too long. Please break paragraphs into two or three, each one with only one main idea."

> **Authors' response**: We thank the reviewer for this essential and relevant feedback. To improve the flow and coherence of the paper, we've revisited our paragraphs and made efforts to keep one central idea for each. We've made these changes across our manuscript, especially in the Discussion section.

Reviewer 2, comment #2:

"In the method section, please be specific about the source of the alpha results for each scale. It is not clear if these indicators are from the present study or a prior one."

> **Authors' response**: We appreciate the mindful comment from the reviewer. We agree that we must specify whether the reported alpha coefficients of the measures used are from the present study and not otherwise. We revised the description of the internal reliability ratings of the measures on **pages 11 to 12**, as below:

> "*Teacher as Social Context Questionnaire.* The TASCQ (Belmont et al., 1988) measures students' perceptions of their teachers' use of need-supportive practices. The questionnaire consists of 24 items assessing involved, structured, and autonomy-supportive teaching practices. To specify the English teacher as the referent of the instrument, we added: "English teacher" to the scale items. For instance, for involved teaching (e.g., "*My English teacher really cares about me*"), for structured teaching (e.g., "*My English teacher makes sure I understand before he or she goes on*"), and for autonomy-supportive teaching (e.g., "*My English teacher gives me a lot of choices about how I do my schoolwork*"). Items are scored on a 5-point scale, ranging from 1 (*not at all true*) to 5 (*very true*). In the present study, the internal reliabilities of the subscales are all $\alpha = 0.73$.
>
> *Student motivation.* We used the 10-item autonomous motivation subscale and the 8-item controlled motivation subscale of the Academic

Motivation Scale (AMS; Guay et al., 2015; Vallerand et al., 1992). The beginning sentence was adjusted to "*I study English because…*" to assess students' motivation to study English learning. Students responded using the scale of 1 (*strongly disagree*) to 7 (*strongly agree*), with 4 being neutral. The autonomous motivation subscale consists of items like "*Because I really like studying English*". The controlled motivation subscale includes sample items such as "*Because I think studying English will help me better prepare for the job that I like*". In this study, the internal reliabilities of the autonomous motivation and controlled motivation subscales are $\alpha = 0.87$ and $\alpha = 0.82$, respectively.

Self-assessment Practices Scale. The SaPS (Yan, 2018) is a 20-item instrument based on the cyclical model of the self-assessment process (Yan & Brown, 2017). The subject-specific version of the scale was used in this study (Mendoza & Yan, 2021b) to measure self-assessment practices in English learning. It is composed of four subscales, all with adequate internal reliability in this study: seeking external feedback by monitoring (SEFM; $\alpha = 0.70$), seeking external feedback by inquiry (SEFI; $\alpha = 0.74$), seeking internal feedback (SIF; $\alpha = 0.66$), and self-reflection (SR; $\alpha = 0.79$). The internal reliability of the full SaPS scale in this study is $\alpha = 0.89$."

Reviewer 3, general comment:

"This interesting paper links two important learning domains, motivation and metacognition/regulation, to teaching practices and school outcomes. Particularly interesting is the attention paid to secondary school students covering a significant school transition period; the assumption of a complex perspective to explaining learning process and outcomes. The manuscript is well-written and provides an important contribution for psychology of education research."

Authors' response: Thank you very much for this positive comment and the overall balanced feedback. We are happy to receive your constructive feedback, and please find our response and revisions as enumerated below.

Reviewer 3, comments on Introduction (1 and 2):

"Throughout your literature review, I'd suggest the authors clearly state and detail the reasons underlying the choice to focus on secondary school students (low achievement, school transition) and on the specific learning domain of English learning. The reader may infer which and why are important, but this aspect deserves more space in the theoretical review."

and

"At page 9, the rationale should show your attempts to shed light on the relevance of your study linking to why specifically there is a need for such studies, specifically in the Philippines context."

Authors' response: We agree with this point to aid readers on the reason behind focusing the study in secondary school and within the English learning domain. We are also aware that it's crucial to introduce the need to extend educational, psychological research in non-Western contexts. We concede to this comment and

have created a subsection entitled "***Secondary school students in the Philippines and English language learning***", where we made the points you have raised more explicit. In the subsection, we emphasized the importance of extending research on motivation, self-assessment, and achievement in non-Western contexts, specifically to secondary school students in the Philippines. We also emphasized why it's crucial to conduct this study during secondary school, and we highlighted the results of the recent OECD PISA participation of the Philippines to underscore the need for interventions that teachers and students can initiate. This revision can be found on **page 8 (line 5) to page 9 (line 8),** as below:

> "***Secondary school students in the Philippines and English language learning***
>
> Secondary school education marks a key transition point for student life inside and outside school. Along with the challenges of adolescent life, students also experience a decline in school motivation during secondary school (Gnambs & Hanfstingl, 2016). Relatedly, achievement in language learning has also been documented to decline from Grade 7 to Grade 9 (Fraine et al., 2007). As such, the crucial period when interventions or programmes to enhance student motivation and achievement occur during secondary school education.
>
> Most of the research on need-supportive teaching and how it impacts student achievement have been conducted in Western contexts. Eastern contexts, especially in Southeast Asia, have been featured less in studies that examine the interplay of social, psychological, and behavioural mechanisms that drive student achievement. The lack of representation of secondary school students from non-Western contexts in this research area limits the generalizability and potential impact of existing research. Pioneering efforts in conducting research that includes non-Western counterparts is necessary to extend research generalizability and applicability (see King & Bernardo, 2016).
>
> The Philippines is a Southeast Asian country that can benefit from studies focused on secondary student motivation and achievement. From a practical perspective, the country fared dismally in its first participation in the recent PISA 2018 assessments (OECD, 2019), ranking lowest on reading achievement. Trinidad (2020) analyzed the PISA data from the Philippines sample and found that demographic characteristics and being enrolled in public schools were associated with low PISA scores. Although efforts and initiatives are being made to improve performance in such international assessments, classroom-level and student-level interventions are equally necessary. From a theoretical perspective, Wigfield et al. (2004) detailed the importance of domain-specificity in examining motivation and achievement, given that both can vary across domains. Hence, unpacking pathways and mechanisms that foster student motivation and achievement should be domain-specific. Overall, the choice of exploring English language learning is practically driven, and the domain-specific approach as theoretically informed."

Reviewer 3, comments on Introduction (3):

"Please, provide a better linkage of your hypothesis to the reviewed theoretical background."

Authors' response: We agree that our transition from our reviewed literature to our study aims and hypotheses aren't linked smoothly. We've revised our subsection "***The study aims and hypotheses***" to link the literature and our hypotheses. This revision is on **page 9, lines 14 to 24**, as below:

"***The study aims and hypotheses***

The reviewed literature points to the gaps, opportunities, and practical implications of examining the psychological and behavioural constructs that link students' perception of need-supportive teaching and their achievement in English learning. To reiterate, the current study uses the self-systems model of motivational development, which highlights the dynamic interplay between positive social, psychological, and behavioural outcomes, leading to achievement. Specifically, this study aims to explore how student motivation (controlled and autonomous) and self-assessment practices—as psychological and behavioural mechanisms, respectively—link need-supportive teaching (i.e., involved, structured, and autonomy-supportive teaching) to student achievement. We control for age, gender, and socioeconomic status in addressing these aims. The study hypotheses are as follows:"

Reviewer 3, comments on Method (1):

"I'd suggest providing details about the recruitment and research process."

Authors' response: We appreciate the reviewers attention to the details on how the research was conducted. Please find this comment addressed on **pages 10 and 11** of our revision, as below:

"Procedures for this study were approved by the Human Research Ethics Committee of the affiliated university of the first author (Ref. no.: 2019-2020-0152). The first author approached a public secondary school located two hours north of Manila through the Department of Education Divisions Office to conduct a research survey. Upon the approval of the school principal, informed assent forms to participate in the research were sought from the students, which their guardians and their teachers also reviewed. In addition, the parents/guardians were provided with passive consent forms. Before administering the surveys, the questions were reviewed by the principal and the English teachers at the school to evaluate whether the questions were crafted to the students' level of English language comprehension. The questionnaires were in the English language as English is the medium of instruction in the Philippines (Department of Education, 1974).

Data were collected through a paper-and-pen method at the beginning of the final quarter of the school year (Time 1; T1). A trained research assistant administered the questionnaires containing the instruments described below to 30 classrooms. Students were briefed about the questionnaires, and questions were entertained. The English teacher was also present during the data collection. The students took about 10 to 12 minutes to complete the questionnaire. After eight weeks (Time 2; T2), objective achievement scores

> on English learning were computed and provided by the school. The achievement scores were then paired to the respective students' respondent ID."

Reviewer 3, comments on Method (2):

"Further specification would be necessary on the inclusion of control variables, such as SES, bilingualism/multilingualism."

> **Authors' response**: We thank the reviewer for this important point. Although we did not collect data for bilingualism, we did collect data on the highest educational attainment of their mothers as a proxy for their socioeconomic status. Mother's educational attainment has been used as an effective representation for secondary school students' SES in previous research (e.g., Johnson et al., 2001; Li & Lerner, 2011). We reanalyzed our data and included SES as a control variable, along with students' age and gender. Our reanalysis yielded the same substantive results, and we revised the statistics in our results section. We included this in our revision on **page 14, lines 17 to 19**, as below:
>
> > "Age, gender, and mother's educational attainment were included as demographic covariates. We used mothers' highest educational attainment to proxy for the student's socioeconomic status (see Johnson et al., 2001; Li & Lerner, 2011)."
> >
> > Updated references in our paper:
> >
> > Johnson, M. K., Crosnoe, R., & Elder, G. H. (2001). Students' attachment and academic engagement: The role of race and ethnicity. *Sociology of Education*, *74*(4), 318–340. https://doi.org/10.2307/2673138
> >
> > Li, Y., & Lerner, R. M. (2011). Trajectories of School Engagement During Adolescence: Implications for Grades, Depression, Delinquency, and Substance Use. *Developmental Psychology*, *47*(1), 233–247. https://doi.org/10.1037/a0021307

Reviewer 3, comments on Method (3):

"For a better understanding of the research, a greater description of instruments and the theoretical/empirical reasons for their choice would be useful: the authors could integrate the list of the sub-scales chosen with an ample illustration, which would clarify, on the one hand, the content and the modalities of response."

> **Authors' response**: We agree that it is important to clearly describe the empirical and theoretical reasons considered in selecting the instruments used in the study. Our first submission also did not communicate the internal reliability coefficients of our instruments consistently. Hence, guided by this comment, we wrote a brief paragraph to introduce the instruments used, and we also clarified the psychometric properties of the same in our revised *Measures* subsection. We did not, however, create tables or illustrations for this revision to save space and maintain the current length of our manuscript. Our revision is on **pages 11 to 12**, as below:

"***Measures***

The instruments used were selected considering their theoretical underpinnings and recent utility in relevant studies focused on need-supportive teaching, student motivation, and self-assessment practice. Developed in the last three decades, the instruments assessing need-supportive teaching and motivation remain relevant in current research given that both constructs are core educational and psychological constructs (e.g., Guay et al., 2015; Leenknecht et al., 2017; Olivier et al., 2021; Reeve, 2013). The instrument used for self-assessment was also selected because it is theoretically driven, anchored in self-regulated learning (Yan & Brown, 2017) and empirically validated among the target sample (Mendoza & Yan, 2021b). We describe the instruments used below and cite their psychometric properties. All instruments are adjusted to refer to English teachers and the English subject for domain specificity.

"*Teacher as Social Context Questionnaire.* The TASCQ (Belmont et al., 1988) measures students' perceptions of their teachers' use of need-supportive practices. The questionnaire consists of 24 items assessing involved, structured, and autonomy-supportive teaching practices. To specify the English teacher as the referent of the instrument, we added: "English teacher" to the scale items. For instance, for involved teaching (e.g., "*My English teacher really cares about me*"), for structured teaching (e.g., "*My English teacher makes sure I understand before he or she goes on*"), and for autonomy-supportive teaching (e.g., "*My English teacher gives me a lot of choices about how I do my schoolwork*"). Items are scored on a 5-point scale, ranging from 1 (*not at all true*) to 5 (*very true*). In the present study, the internal reliabilities of the subscales are all $\alpha = 0.73$.

Student motivation. We used the 10-item autonomous motivation subscale and the 8-item controlled motivation subscale of the Academic Motivation Scale (AMS; Guay et al., 2015; Vallerand et al., 1992). The beginning sentence was adjusted to "*I study English because…*" to assess students' motivation to study English learning. Students responded using the scale of 1 (*strongly disagree*) to 7 (*strongly agree*), with 4 being neutral. The autonomous motivation subscale consists of items like "*Because I really like studying English*". The controlled motivation subscale includes sample items such as "*Because I think studying English will help me better prepare for the job that I like*". In this study, the internal reliabilities of the autonomous motivation and controlled motivation subscales are $\alpha = 0.87$ and $\alpha = 0.82$, respectively.

Self-assessment Practices Scale. The SaPS (Yan, 2018) is a 20-item instrument based on the cyclical model of the self-assessment process (Yan & Brown, 2017). The subject-specific version of the scale was used in this study (Mendoza & Yan, 2021b) to measure self-assessment practices in English learning. It is composed of four subscales, all with adequate internal reliability in this study: seeking external feedback by monitoring (SEFM; $\alpha = 0.70$), seeking external feedback by inquiry (SEFI; $\alpha = 0.74$), seeking internal

feedback (SIF; α = 0.66), and self-reflection (SR; α = 0.79). The internal reliability of the full SaPS scale in this study is α = 0.89."

Reviewer 3, comments on Method (4):

"The cross-sectional nature of this research limits the data interpretation. Although the mediation can be estimated, the results should be interpreted very cautiously with respect to an experimental or longitudinal design"

Authors' response: We thank the kind attention of the reviewer for pointing at the cross-sectional nature of our data. Although the achievement scores were collected eight weeks after the survey data, we conceded to this comment and veered from the use of terms that might communicate causality (e.g., predict). We focused the writing of the Results section on associations.

Reviewer 3, comments on Method (5):

"Given the concurrent nature of your data, I'd suggest avoiding all causal language throughout."

Authors' response: Related to the preceding reviewer comment, we have avoided causal description and explanation of our findings both on the Results and Discussion sections, respectively. We, again, express our sincere thanks.

Reviewer 3, comments on Discussion (1):

"I suggest focusing on the specific hypotheses of the study. Authors link their results with some past studies, but it should be put forward. Also, it would be interesting to discuss more in depth the theoretical and practical implications of findings."

Authors' response: We agree with this recommendation. We have revised our subsection on **Practical implications** and **Study limitations and directions for future research**, on **pages 21 to 22,** as below:

"***Practical implications***

Given the importance of need-supportive teaching for students, school heads, principals, or administrators can encourage professional development that can enhance such practices. In-service training for teachers on implementing need-supportive teaching exists (e.g., Aelterman et al., 2014; Aelterman et al., 2013), and schools can and should make full use of them. It is vital that the implementation of need-supportive teaching is culturally informed, given that our findings suggest that only involved teaching and structured teaching contributed to increased student motivation. Given the critical role of teachers in promoting self-assessment (e.g., Panadero et al., 2016), they can also endorse the use of specific self-assessment practices (e.g., self-assessment diaries; Yan et al., 2020b) that can improve students' academic performance. As self-assessment is found to mediate motivation to achievement, encouraging self-assessment practices can help promote higher achievement (see Leenknecht et al., 2020).

Study limitations and directions for future research

While this research holds theoretical and methodological advantages, we note our study's limitations below to inform future research work. First, while we used multilevel mediation from students nested in 30 classrooms, our analysis relied on individual students' perceived teaching practices of their respective English teachers. Ideally, a true level 2 predictor (i.e., teacher-reported need-supportive teaching) may provide a more ecologically appropriate predictor of student motivation. Future work can consider including multiple schools with more classrooms and with teacher-reported level 2 data. Second, one of the core strengths of our study is that all constructs were referring to students' outcomes in a specific subject domain (i.e., English language learning). This is noteworthy since all evaluated constructs are referenced to English language learning. While this is a novel and practical research approach, in aid of generalizing the findings, we encourage future studies to examine similar constructs in a different subject domain or among different student populations (e.g., students in primary school or higher education). Finally, the data was collected in the typical classroom setting before the school disruptions brought about by the COVID-19 pandemic. Given the shift in learning modalities due to the pandemic, exploratory research can use mixed-methods approaches to examine how the predictors of student achievement used in this study operate or apply in the context of online learning. Longitudinal designs can also be implemented to further support the rigour of the methods.

07 April 2022

Valerie Tartas, PhD
Editor-in-Chief
European Journal of Psychology of Education

Dear Prof. Tartas:

I, on behalf of my co-authors, would like to express my sincerest thanks for the decision to accept our manuscript entitled, “Domain-specific motivation and self-assessment practice as mechanisms linking perceived need-supportive teaching to student achievement” (EUPE-D-21-00305), following the corrections given by the reviewers.

We have reviewed the entire reference list and corrected the DOI errors, and fixed the references with missing information. We have also gone through the entire document and revised grammar errors. Our revision now has 6576 words (excluding the references), two tables, and two figures.

We hope that our resubmitted manuscript merits the quality necessary for publication. Thank you very much for your kind consideration.

Respectfully,
The authors

Response to Reviewers' comments

We express our sincerest gratitude to the reviewers who have diligently reviewed our reference section and pointed out corrections that needed to be addressed. We have reviewed the entire reference list and corrected the DOI errors, and fixed the references with missing information. We have also gone through the entire document and revised grammar errors.

The specific revisions are as follows:

Comment: Page 24, lines 6 - 7. DOI still wrong referred.

Revision:

Aelterman, N., Vansteenkiste, M., Van Keer, H., De Meyer, J., Van den Berghe, L., & Haerens, L. (2013). Development and evaluation of a training on need-supportive teaching in physical education: Qualitative and quantitative findings. *Teaching and Teacher Education*, *29*, 64-75. https://doi.org/10.1016/j.tate.2012.09.001

Comment: Page 24, line 47. DOI still wrong referred.

Revision:

Bond, T. G., Yan, Z., & Heene, M. (2020). *Applying the Rasch Model: Fundamental Measurement in the Human Sciences* (4th ed.). Routledge. https://doi.org/10.4324/9780429030499

Comment: Page 24, line 48. Still wrong: "australian" must be capitalized.

Revision:

Boon, H. J. (2014). Disaster resilience in a flood-impacted rural Australian town. *Natural Hazards*, *71*(1), 683-701. https://doi.org/10.1007/s11069-013-0935-0

Comment: Page 25, line 25. Still wrong: who are the publishers of the book?

Revision:

Connell, J. P., & Wellborn, J. G. (1991). Competence, autonomy, and relatedness: A motivational analysis of self-system processes. In *Self processes and development.* (pp. 43-77). Lawrence Erlbaum Associates, Inc.

Comment: Page 25, lines 33 and 35. Still wrong: it is not necessary "retrieved from".

Revision:

Department of Education. (1974). *Implementing Guidelines for the Policy on Bilingual Education (Department Order No. 25, s. 1974)*. Manila: Author

Department of Education. (2013). *Implementing Rules and Regulations (IRR) of Republic Act No. 10533 otherwise known as The Enhanced Basic Education Act of 2013 (DepEd Order No. 43, s. 2013)*. Pasig City, Manila: Author

Comment: Page 25, line 48. Still wrong: "filipino" must be capitalized.

Revision:

Enriquez, V. G. (1986). Kapwa: A core concept in Filipino social psychology. In V. G. Enriquez (Ed.), *Philippine world view* (pp. 6-19). Institute of Southeast Asian Studies.

Comment: Page 26, line 38. Still wrong: "philippines" must be capitalized; "pisa" must be written in capital letters.

Revision:

Haw, J. Y., King, R. B., & Trinidad, J. E. R. (2021). Need supportive teaching is associated with greater reading achievement: What the Philippines can learn from PISA 2018. *International Journal of Educational Research, 110*, 101864. https://doi.org/10.1016/j.ijer.2021.101864

Comment: Page 27, line 1. Still wrong: who are the publishers of the book?

Revision:

Hu, L. T., & Bentler, P. M. (1995). Evaluating model fit. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications.* (pp. 76-99). Sage Publications, Inc.

Comment: Page 27, lines 29 - 30. DOI still wrong referred.

Revision:

Law, Y.-K. (2011). The effects of cooperative learning on enhancing Hong Kong fifth graders' achievement goals, autonomous motivation and reading proficiency. *Journal of Research in Reading*, *34*(4), 402-425. https://doi.org/10.1111/j.1467-9817.2010.01445.x

Comment: Page 27, line 49. Still wrong: title must be written in cursive, not the

Revision:

Linacre, J. (2006). *A users guide to WINSTEPS Ministep: Rasch-model computer programs*. Chicago. https://www.winsteps.com/winman/copyright.htm

Comment: Page 29, line 3. Still wrong: what is the book's publisher?

Revision:

Muthén, L. K., & Muthén, B. Q. (1998-2019). *Mplus 8.3*. In Muthén & Muthén.

Comment: Page 29, line 47. Still wrong: who are the publishers of the book?

Revision:

Reeve, J. (2012). A self-determination theory perspective on student engagement. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of Research on Student Engagement* (pp. 149-172). Springer. https://doi.org/10.1007/978-1-4614-2018-7

Comment: Page 32, line 10. Still wrong: "chinese" must be capitalized.

Revision:

Zhou, N., Lam, S.-F., & Chan, K. C. (2012). The Chinese classroom paradox: A cross-cultural comparison of teacher controlling behaviors. *Journal of Educational Psychology*, *104*(4), 1162-1174. https://doi.org/10.1037/a0027609

Comment: Page 32, line 17. Still wrong: who are the publishers of the book?

Revision:

Zimmerman, B. J., & Schunk, D. H. (2001). Reflections on theories of self-regulated learning and academic achievement. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement:*

Theoretical perspectives (2nd ed., pp. 289-307). Lawrence Erlbaum Associates Publishers.

Comment: In update references Ahn, Chiu & Patrick (2021) and Fraine, Damme & Onghena (2007), dois are wrong referred. Feraco, Resnati, Fregonese, Spoto & Meneghetti (2022) updated reference has not been included in the text nor in references.

Revision:

Aelterman, N., Vansteenkiste, M., Van Keer, H., De Meyer, J., Van den Berghe, L., & Haerens, L. (2013). Development and evaluation of a training on need-supportive teaching in physical education: Qualitative and quantitative findings. *Teaching and Teacher Education*, *29*, 64-75. https://doi.org/10.1016/j.tate.2012.09.001

Fraine, B. D., Damme, J. V., & Onghena, P. (2007). A longitudinal analysis of gender differences in academic self-concept and language achievement: A multivariate multilevel latent growth approach. *Contemporary Educational Psychology*, *32*(1), 132-150. https://doi.org/10.1016/j.cedpsych.2006.10.005

Response:

Thank you for your generous attention. We have included the Feraco et al., (2022) in our revision, on page 5, line 14. With the following citation on the Reference list:

Feraco, T., Resnati, D., Fregonese, D., Spoto, A., & Meneghetti, C. (2022). An integrated model of school students' academic achievement and life satisfaction. Linking soft skills, extracurricular activities, self-regulated learning, motivation, and emotions. *European Journal of Psychology of Education*. https://doi.org/10.1007/s10212-022-00601-4

Again, we express our most sincere thanks to our reviewers for providing feedback that improves our manuscript.

Appendix C: Response to comments/ questions raised by External Examiner(s) and Internal Examiner point by point

Examiner 1 Comments

Examiner 1 Comment #1: Provide more information for the Integrated Thesis Abstract (i.e., add lines for each study to include methods and sampling used.

> **Author's response**: Thank you for this feedback. The Integrated Thesis Abstract is now revised to include further details on each of the study's methods (sampling and analytical procedures). This revision provides key details of the empirical chapters. Further, we have placed also graphical abstract to illustrate the connection between the empirical chapters.

Examiner 1 Comment #2: Place the tables and figures within chapters to avoid flipping through pages.

> **Author's response**: These tables and figures are now integrated within the relevant pages where they are referred to or discussed. Thank you for such feedback.

Examiner 1 Comment #3: Though not a fatal flaw, it would have been more complete to see a proper longitudinal analysis involving students' academic performance; while Study 2 does include some element of prediction over time, it would be nice to see a truly longitudinal design of cross-lagged panel models to test the relationships between variables over time in relation to achievement. This would have truly tested the reciprocal role of SaPS as it functions in context and in theory.

> **Author's response**: This is a crucial detail of the study that can indeed be further answered to by longitudinal methods and cross-lagged panel models. The data being cross-sectional or prospective at best, may not be able to capture the temporal aspects of the variables (e.g., how NST, motivation, or SaP predict achievement over time). More importantly, in examining the reciprocal role of SaP as integrated within the self-system model of motivational development, data collected at multiple time point and at multiple levels are needed. I include this is our limitation and directions for future research. Please see the revision on page 106, as below:
>
> > "Third, despite the data being collected prospectively, it would have been a stronger analysis if a proper longitudinal design (i.e., all objective and self-report data are collected in at least three time points) was conducted. Such design will yield longitudinal data that can be analysed through cross-lagged panel models to observe the directionality and temporal causality of need-supportive teaching, motivation, self-assessment practice and achievement."

Examiner 1 Comment #4: The theoretical and practical contributions are couched in the prior discussions, though the exact way that SaPS informs the SSMMD is somewhat unclear from the final; though some of the variables used integrate with the SSMMD, the practice of self-assessment has not been demonstrated as a reciprocal phenomenon. The SSMMD is a fully reciprocal and complex dynamic framework (students influencing teachers, teachers influencing students), and there requires a similar level of evidence. Mr. Mendoza mentions this, but for the work to fully demonstrate the theoretical effects, SaPS will have to feed

back into itself to calibrate future effort and expectations. There is indeed room for this work, and I hope that the author will undertake this in his future studies on the topic.

> **Author's response**: Thank you for this comment. I concur that SSMMD is conceptualized as a complex and dynamic framework that demonstrates not only how social contexts through internal and external dynamics impact student outcomes and vice-versa (i.e., students influencing teachers, schools, or contexts). Although the current data may not be able to test and demonstrate the reciprocal influence of self-assessment in the context of SSMMD, future studies can consider exploring such through the expansion of the current research designs and data collection procedures. I enumerated these on the revised limitation and directions for future research. Please see the revision on page 103, as below:
>
> > "Before going through the specific limitations of each study, we first go over limitations of the entire thesis that requires further research in the future. The self-system model proffers a theoretical framework that can examine psychological and behavioural outcomes as internal dynamics embedded within larger socio-cultural systems (Skinner & Pitzer, 2012; Skinner et al., 2022). A unique characteristic of the self-system model, however, is its reciprocal nature (e.g., Skinner & Belmont, 1993). Specifically, the model does not only posit the downstream effects of sociocultural systems onto internal dynamics and student outcomes, but also the upstream effects of student outcomes back to the larger social systems (Fryer, 2017; Fryer & Oga-Baldwin, 2019; Skinner & Belmont, 1993). Although the quality of the current data may not be able to test the reciprocal direction of the variables, for this study to fully demonstrate the integration of motivation and self-assessment within the self-systems model, how student outcomes impact internal states and external systems needs to be put forth in future research work."

Examiner 2 Comments

Examiner 2 Comment #1: SEFM was not associated with engagement outcomes. I hope he will draw more references from the literature to beef up the discussion. Some non-significant correlations in the SEM results may deserve more attention as well.

> **Author's response**: I agree that the lack of association between SEFM and the engagement outcomes is worth elaborating further, especially given the importance of seeking external feedback by monitoring. This revision is on page 105, as below:
>
> > "Relatedly, more specific self-assessment practices for English language learning can be further explored (e.g., recording and listening to their speaking accents, asking peers to read their written work, or using software to correct their written outputs). These types of external feedback-seeking practices of students can better capture monitoring practices, which were found to not significantly predict engagement outcomes, unlike the other self-assessment components. Seeking external feedback by monitoring (SEFM) is a core self-assessment practice, and it is possible that more specific monitoring practices are relevant to English language learning."

Examiner 2 Comment #2: One suggestion for this study is that Mendoza consider expanding students' motivation to include (more) different motivational variables (e.g., self-efficacy, task importance and utility) that reflect better the literature on students' learning motivation in his future research. I think there should be a great potential for more research regarding how students' different types of motivation may mediate the relationships between teachers' instructional practices, self-assessment practices and learning results.

Author's response: Indeed, a much welcome future direction is the inclusion of interrelated motivational outcomes (e.g., self-efficacy, task importance and utility, interest) in examining the breadth of psychological predictors of self-assessment practices. In fact, I also agree that less adaptive motivational outcomes (e.g., disengagement, procrastination, self-criticism, and rumination) are also worth exploring in terms of risk factors that may impinge on students' self-assessment practice. I wrote and integrated these on the future research directions, on pages 103 to 104, as below:

> "The motivational variables that are focused on this thesis are autonomous and controlled motivation, this is due to their theoretical alignment to SDT. Still, future research can integrate alternative motivational theories and constructs within the self-systems model. For instance, situated expectancy-value theory (S/EVT; Eccles & Wigfield, 2020; Wigfield & Eccles, 2000) which focuses on task value (e.g., interest, importance, utility) and expectancy for success as motivational constructs (see Cook & Artino, 2016). Relatedly, the social-cognitive theory (SCT) which posits that the belief in one's own capacity or self-efficacy as a primary driver of motivation (Bandura, 1997). SCT also includes self-regulation (Zimmerman & Schunk, 2012) as a cyclical process that propels learners to generate self-feedback to foster motivation (see Cook & Artino, 2016). These motivational constructs, among others, can be further fleshed out and examined as internal antecedents of self-assessment practice. Future research can also examine maladaptive outcomes that may operate as risk factors for self-assessment practice (e.g., disengagement, procrastination, self-criticism, and rumination)."

Examiner 2 Comment #3: One question that I have for Mendoza is that why intrinsic motivation failed to influence students' task performance directly, given that motivation is supposed to be the driving force for all sorts of learning.

Author's response: This is a simple question but not an easy one to answer. Certainly, the literature on intrinsic motivation asserts its strong and adaptive influence on student learning and achievement. I surmise that there are three potential reasons behind the lack of direct link between intrinsic motivation on task performance specifically for Study 3. First, it is possible that brief nature of the experiment could have influenced how intrinsic motivation operated to influence task performance. Specifically, given that the effect of autonomous motivation was both directly and directly influencing achievement scores in English language learning over weeks (see Study 2), it's possible that the performance gains of intrinsic motivation can be observed over time than in a single task. Second, statistically, the mean score of the students for the task was relatively high, which

means that there is little variation on task performance that intrinsic motivation can statistically account for, especially when self-assessment practice is also included in the model which also controls for variance in task performance. A task with increased difficulty may be explored in future research. Finally, the results of the experiment do not mean that intrinsic motivation does not influence task performance. The influence of intrinsic motivation on task performance is indirect via self-directed behavioral practices such as self-assessment. Hence, aligned with previous research, behavioral mechanisms exist to link intrinsic motivation to objective achievement and task performance scores.

Examiner 3 Comments

Examiner 3 Comment #1: The intercorrelations, regression coefficients, p values, model fit indices, and so on, whose values are in between -1 and +1 should be reported by excluding the zero before the decimal

Author's response: Thank you for this feedback. We've revised this across our tables and in-text statistical results.

Examiner 3 Comment #2: Skinner's model is greatly derived from and overlapping with SDT. Specifically, it resembles the notion of basic psychological need theory (BPNT), one mini-theory of SDT. So, I wonder why not regard SDT, or more specifically BPNT, as the core theory?

Author's response: Indeed, Skinner's model is drawn from, if not overlapping with, SDT. However, the reciprocal nature of the self-systems model (i.e., social contexts to student outcomes, and student outcomes to social contexts) appears to frame the research questions posed in the thesis accordingly. The focus on need-supportive teaching/instructions also argues that the larger SDT is the appropriate theoretical component that can be integrated under the self-systems model. BPNT is therefore conceptualized as an explanatory sub-theory or mechanism (see Chapter 4; Study 3). Because the Skinner's SSMMD also includes behavioral mechanisms and school outcomes in the model, I maintain that, specifically for this thesis, Skinner's model is the more appropriate central theoretical framework to integrate SDT and self-assessment.

Examiner 3 Comment #3: My second concern is the missing of basic psychological needs in the mechanism exploration. That is, when unpacking social and internal factors of self-assessment practices, why did not the author consider the satisfaction of basic needs?

Author's response: Related to my previous response, although we aimed to unpack internal factors that play a role in how need-supportive contexts influence self-assessment practice, our focus was on autonomous and controlled motivation as internal factors. There are statistical and conceptual reasons as to why the satisfaction of basic psychological needs (BPN) was not at the forefront of the studies. Statistically, the inclusion of BPN as an internal mechanism will entail a serial/sequential mediation with multiple mediators that can overwhelm the statistical model. Given that our data was cross-sectional in nature which limits temporal inferences, we were aware that we needed to be conservative and focus

on specific internal factors that we wanted to test empirically. Relatedly, given that the need-supportive teaching (NST) was student-reported, we surmised that due to the similarity of instruments evaluating NST and BPN when self-reported, very little variance can be accounted for or shared between the two. If we were able to collect teacher-reported NST, then it would have made more sense to assess students BPN satisfaction. Still, we agree that BPN are important internal mechanisms worthy of further exploration. I expanded the limitations and direction for future research section of Chapter 5, page 104, as below:

> "Given that the thesis is focused on the embedding self-assessment practice within the classroom ecology, little research attention has been given on basic psychological needs (BPN) as an internal mechanism. Aside from focusing on autonomous and controlled motivation, future studies can further explore whether or how basic psychological needs—as internal mechanisms—influence self-assessment practice, both directly and indirectly through motivation."

Examiner 3 Comment #4: Another concern is the research focus according to the title of the thesis. If the author aimed to unpack the social and internal mechanisms of student self-assessment practices, for me, the focus should be how social and internal factors work together in explaining self-assessment practices. In other words, and linking with the current research, I might tend to examine the effects of teacher support and autonomous and controlling motivation on self-assessment practices, including but not limited to their independent, simultaneous, and/or interactive effects. However, in both Studies 2 and 3, the focuses were the mediation of self-assessment practices in the relation between motivation and learning/task performance. In the conclusion section, the behavioral mechanism of self-assessment practices was highlighted. I wonder, how the author constructed this research and think about the focus.

Author's response: Thank you for this feedback. As a result, I have revised the title of the thesis to be more specific: "*Examining need-supportive contexts and motivation as psychosocial antecedents of students' self-assessment practice: Using the self-system model of motivational development as an integrative framework*". I agree that the merging the separate empirical studies coherently within the thesis may appear spread out or lacking focus. Although the studies were planned, conceptualized, and proposed with a specific and clear theoretical focus, as we wrote the empirical chapters for publications, they were treated as independent studies. This is because we avoided presenting a grand theoretical model for the rather straightforward empirical questions we aimed to test. Moreso, as a result of the review process, we pivoted and revised sections of the empirical chapters to respond to the comments and feedback of the reviewers, which may have stirred the chapters slightly off of the main focus of the thesis. Still, although imperfectly, I believe that the Integrated Introduction and Integrated Discussion weaves the three empirical chapters together. This comment is insightful and beneficial for me should I move on to write potentially multi-study papers in the future.

Examiner 3 Comment #5: It would be better to present the motivational variables, such as autonomous and controlling motivation as earlier as possible.

Author's response: I agree with this comment. I moved the introduction and definition of the motivation outcomes earlier in the Integrated Introduction. Please see pages 9 through 10, as below:

> "Motivation is an innate predisposition to learn, grow, and develop, which is activated by need-supportive learning environments (see Deci, 1985; Niemiec & Ryan, 2009; Ryan & Deci, 2000; Vansteenkiste et al., 2020 for reviews). It is conceptualised to have two major forms: autonomous motivation and controlled motivation (Deci & Ryan, 2000; Howard et al., 2017). Autonomous motivation stems from a sense of choice, volition, and personal agency (Deci & Ryan, 2000; Hagger et al., 2015). Autonomously-motivated students are more attentive in class, exert more effort, and attain higher grades (see Baeten et al., 2013; Bureau et al., 2022; Shahar et al., 2003; Taylor et al., 2014; Toste et al., 2020). Controlled motivation, on the other hand, is observed when the self does not initiate behaviour (i.e., when regulated by others or external factors), which often correlates with less adaptive school outcomes (Bureau et al., 2022; Howard et al., 2017; Ratelle et al., 2007; Ryan & Deci, 2000; Vallerand et al., 1992). Although often negatively correlated (e.g., Baeten et al., 2013; Haerens et al., 2015), both forms of motivation can, at times, be positively correlated and equally adaptive (see Caleon et al., 2015; King & McInerney, 2019; King & Mendoza, 2020). Still, when students are motivated, they are more likely to engage in activities and practices that will improve their learning outcomes (Reeve, 2012, 2013), one of which is self-assessment practices."

Examiner 3 Comment #6: For Study 1: First, were the one-factor and four-factor models nested models (p.28)? Is chi-square difference testing appropriate for non-nested model comparison for better model fit? My second question is the way to dealing with missing data. Some outliers were removed, and Mahalanobis parameters were calculated to examine normality. Why should these necessary for CFA? Structural equation modeling is powerful by taking missing values into account with FIML, and it has various estimators such as ML, MLR, and MLM to deal with non-normality with robustness. Third, SEFM was found not significantly related to any forms of engagement. The author explained it with students' focus on self-assessment practices. I wonder, are there any possibilities related to students' age, like developmental stage or Southeast Asian cultures?

Author's response: (1) The one- and four-factor models are nested hence chi-square difference testing was used as an appropriate computation to compare the model fit indices. (2) The data cleaning procedures we implemented (i.e., deleting observations with more than 5% missing data and those who had item-level responses which were detected as outliers) were commended by reviewers of the journal, including the use of multiply imputed chained equations for item-level missing data under 5%. We chose to follow such analytical procedures in treating our dataset given their known reliability. While we are aware of the available estimation procedures available for SEM, since our sample size was relatively sufficient, we opted for the more conventional yet reliable approach in cleaning the data. (3) This was also raised by Examiner 2, and our revision is on page 105, or as follows:

> "Relatedly, more specific self-assessment practices for English language learning can be further explored (e.g., recording and listening to their speaking accents, asking peers to read their written work, or using software to correct their written outputs). These types of external feedback-seeking practices of students can better capture monitoring practices, which were found to not significantly predict engagement outcomes, unlike the other self-assessment components. Seeking external feedback by monitoring (SEFM) is a core self-assessment practice, and it is possible that more specific monitoring practices are relevant to English language learning."

Examiner 3 Comment #7: I still have three questions for Study 2. First, if the outcomes were students' English learning performance, why did the author only test the mediation of self-assessment practices in the motivation-performance link? Why not to examine the mediation of autonomous and controlling motivations from need-supportive teaching to self-assessment practices? Or even further, to examine the sequential mediation from motivation to self- assessment practices in the association between teacher support and performance? In fact, with Figure 2, the reader might be misleading with an anticipation of the sequential mediation above mentioned. Second, I have noticed that in the modeling testing, self-assessment practices were used as a latent variable, whereas the remaining others were observed variables. I wonder, are there any special considerations not to see the four components of SaPS? Third, and more importantly, this study took a two-wave prospective research approach, collecting data of all the predictors in the first wave and obtained students' achievement scores as outcomes eight weeks later in the second wave. Therefore, self-assessment practices, as a mediator, went with motivation. The shortcoming of two-wave research leaves the issue of when to measure the mediators. Should the mediator go with antecedents or go with outcomes, and why? Why not go with three-wave data collection?

> **Author's response**: Thank you for this feedback. First, the reason why we did not run a serial mediation was because the model failed to converge when we regressed English learning achievement scores to the need-supportive teaching practices. I submit that despite self-assessment (SA) and motivation being regressed to need-supportive teaching (NST), the mediating role of autonomous and controlled motivation on the link between the NST and SA was not tested. This is due to the non-significant direct effect of the NST components to SA, except for involved teaching, which had significant albeit marginal effect on SA. Hence, we have focused on the connection between motivation and achievement, and the mediating role of SA.
>
> Secondly, SaPS was posited as a doubly latent construct given the high covariance between its four factors (see Study 1). Although the theoretical differences and conceptualization of the SaPS factors may have nuanced role in mediating motivation to achievement, given the findings of Study 1, we opted to operationalized SaPS as a latent variable in the multilevel model. A much specific research question can be answered in future research whether differences exist in the role of the four SaPS factors in the link between motivation and achievement.
>
> Finally, I agree that the use of mediation analysis on cross-sectional and prospective data remains heavily debated in the research community due to the limited causal assumptions that could be drawn from it, if any. However, the

writing of the discussion section of Study 2, we were cautious not to claim any causality. We maintained that variance of the outcome variable is predicted by the independent variables but did not mention that the former is caused by the latter. Still, I agree that to achieve a stronger claim for mediation, all variables under study should be collected in at least three time points. These limitations also motivated the experimental study of this thesis.

Examiner 3 Comment #8: For Study 3: I am curious why only intrinsic motivation was included. For the sake of consistency with Study 2, both autonomous and controlling motivation were supposed to be investigated. This inclusion of two types of motivation constructs could be used to replicate the research results in Study 2. Moreover, I have found that the three basic psychological needs were measured after the manipulation of task instructions. But it turns out that this variable was treated as a manipulation check, rather than a process variable. The title of this chapter is "Supporting students' basic psychological needs...". Why?

Author's response: Thank you for the insightful questions. Because the experiment was online and brief, we had a limited time frame in collecting pre- and post-manipulation data. If we included more questions in our repeated measures, we fear that participants could already be confused as to what the actual task is. While we agree that controlled motivation is equally important to examine, considering the aim of the study and the procedures of the experiment, we opted to focus on intrinsic motivation.

With regard to framing the difference in basic psychological needs as manipulation check, it was a decision made in lieu of potential comments about whether the manipulation or the difference in task instructions was indeed perceived by the students. However, we agree that this decision may not be reflected accurately with the title of the study and can be further clarified. Hence, especially after the review of Study 3, I intend to: (1) change the title of the study to "*Fostering students' intrinsic motivation in online learning tasks: The effect of need-supportive task instructions on motivation, self-assessment, and task performance*", (2) examine whether BPN predicts intrinsic motivation, and (3) recommend examining BPN satisfaction pre- and post-manipulation. These are reflected on the limitation and directions for future research, as below:

> "Fourth, in lieu of the research design and research questions, the satisfaction of basic psychological needs was operationalised as a manipulation test and was not included as an internal or psychological mechanism in the model. Future research work can focus on designing an SDT-informed theoretical framework that will include the satisfaction of basic psychological needs as a mediator between perceptions of need-supportive online task instructions and intrinsic motivation."

Examiner 3 Comment #9: In Chapter 2, the 1st paragraph under the subheading of measures:

"It comprises four subscales: seeking external feedback through monitoring, seeking external feedback through inquiry, seeking internal feedback and self-reflection (see Table 1 for scale items). The internal consistency of the subscales ranged from $\alpha = 0.69$ to 0.81 (see

Table 2).” I think the information should be “(see Table 2 for scale items)” and “(see Table 3)”, respectively.

> **Author’s response**: Thank you for this feedback. I have revised the referred Tables in-text.