



THE DEVELOPMENT OF AN ONLINE APPLICATION FOR ACADEMIC
PROCRASTINATION REDUCTION OF UNDERGRADUATE STUDENTS IN
THAILAND

CHANMEARDEY CHIV

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR DOCTOR DEGREE OF PHILOSOPHY
IN RESEARCH AND STATISTICS IN COGNITIVE SCIENCE
COLLEGE OF RESEARCH METHODOLOGY AND COGNITIVE SCIENCE
BURAPHA UNIVERSITY

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วิทยาลัยวิทยาการวิจัยและวิทยาการปัญญา มหาวิทยาลัยบูรพา
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The Dissertation of Chanmeardey Chiv has been approved by the examining committee to be partial fulfillment of the requirements for the Doctor Degree of Philosophy in Research and Statistics in Cognitive Science of Burapha University

Advisory Committee

Examining Committee

Principal advisor

(Associate Professor Dr. Patrawadee Makmee)

Co-advisor

(Assistant Professor Dr. Peera Wongupparaj)

----- Principal examiner
(Associate Professor Dr. Chaiwichit Chianchana)

----- Member
(Associate Professor Dr. Patrawadee Makmee)

----- Member
(Assistant Professor Dr. Peera Wongupparaj)

----- Member
(Assistant Professor Dr. Piyathip Pradujprom)

----- Member
(Assistant Professor Dr. Pratchaya Kaewkaen)

----- Dean of the Faculty of Education
(Associate Professor Dr. Sadayu Teeravanitrakul)

This Dissertation has been approved by Graduate School Burapha University to be partial fulfillment of the requirements for the Doctor Degree of Philosophy in Research and Statistics in Cognitive Science of Burapha University

----- Dean of Graduate School
(Associate Professor Dr. Witawat Jangiam)

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CHANMEARDEY CHIV : THE DEVELOPMENT OF AN ONLINE
APPLICATION FOR ACADEMIC PROCRASTINATION REDUCTION OF
UNDERGRADUATE STUDENTS IN THAILAND. ADVISORY COMMITTEE:
PATTRA WADEE MAK MEE, Ph.D. PEERA WONGUPPARAJ, Ph.D. 2025.

The purpose of this research was threefold: 1) to develop an academic procrastination and time management inventory, 2) to develop an online application for reducing academic procrastination, and 3) to examine the effectiveness of the online application for reducing academic procrastination among undergraduate students in Thailand. A research and development approach was employed. Data were collected through in-depth interviews with nine students, questionnaires completed by 450 students, and an intervention study involving 60 students, who were divided into experimental and control groups. The research instruments included an academic procrastination interview and time inventories management (Cronbach's alpha = .92 and .86, respectively), the General Health Questionnaire (Thai GHQ-28), and the STOPro application.

The result showed: 1) Qualitative interviews confirmed that academic procrastination is widespread among undergraduates, especially in completing individual tasks. Common issues included poor task prioritization and mismanagement of time. Both developed inventories demonstrated good construct validity. Overall, students' levels of academic procrastination were moderate, based on both qualitative and quantitative analyzes. 2) the online application (STOPro) was developed, integrating psychoeducation, a to-do list, and self-reflection activities. Content validity was confirmed by experts (CVI = 1.00), and pilot testing with students showed high user satisfaction. 3) The result of a pretest and posttest control design showed significant improvements in academic procrastination and time management among students in the experimental group. However, no significant differences in anxiety and depression were found, either within or between groups. These findings support the effectiveness of STOPro in enhancing time management and reducing academic procrastination, with implications for digital interventions.

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Chapter 1

Introduction

Introduction

Every day, students have numerous duties to perform in their academic lives. While some students can effectively manage their tasks, many struggle to keep up with their workload. Procrastination is thought to impact 15-20% of the population and up to 50-90 % of students (Steel, 2007) or college students procrastinate four times more than the general population (Rinaldi et al., 2019), and 70 percent of college students procrastinate to achieve academic success (Moonaghi & Beydokhti, 2017), even though they will experience stress trying to meet their deadlines.

Procrastination is defined as delaying an intended course of action despite anticipating that it will be worse off because of the delay (Steel, 2007), and it is linked to executive dysfunction (Michałowski et al., 2020). Academic procrastination is the unreasonable tendency to put off starting or finishing any homework, assignment, or academic task (DeArmond et al., 2014), and linked to increased fatigue and insufficient sleep (Kühnel et al., 2016), as well as working on complex or tedious tasks, rather than during the reward/punishment phase (Steel, 2007). Procrastination is a pervasive self-regulatory (Rozental & Carlbring, 2014), the rules or laws governing individual conduct and is understood to pertain to the individual's engagement with his or her ecology or context, including cognitive, emotional, and behavioral facets of the individual (Bowers et al., 2015) and attention in the process of meeting goals, possibly related to increasing societal demands for self-control as well as greater availability of instant gratification (Steel, 2012).

Procrastination has a negative impact on both the quantity and quality of work accomplished, and is linked to lower exam scores, poor study abilities, and late/missed assignments (Bolden & Fillauer, 2019). Furthermore, it is linked to dysfunction and executive function (Michłowski et al., 2020), decreased well-being, poorer mental health, lower performance, and financial difficulties, in addition to the negative consequences of the delayed activity (Rozental & Carlbring, 2014).

The bulk of college students' lives is centered around the internet in the internet era and the information age, due to the rapid advancement of science and technology. On the other hand, during the COVID-19 pandemic, more than 130 countries temporarily shut down their educational facilities to prevent the virus from spreading. As a result, students were forced to adapt to taking several courses online, which led to an increase in academic procrastination (Arifiana et al., 2020). To counteract learner isolation and reduce spontaneous online contact, which can lead to procrastination in distance learning, students must possess a higher level of self-control in their online classrooms (Rasheed et al., 2020).

The researcher has considered the relationship between procrastination and various factors, as well as the challenges of academic procrastination among undergraduate students. Procrastination has negative relationship with executive function (Bolden & Fillauer, 2019; Michałowski et al., 2020; Rabin et al., 2011; Rinaldi et al., 2019), self-regulation (Garzón-Umerenkova et al., 2018; Hofmann et al., 2012; Hong et al., 2021; Naderi et al., 2021; Shalev, 2018; Zhang et al., 2018; Ziegler & Opdenakker, 2018), self-regulation strategy training (Hong et al., 2021; Naderi et al., 2021; Steel, 2007), self-regulated learning were significant predictors of procrastination (Wolters et al., 2017), and self-efficacy (Przepiórka et al., 2019; Ziegler & Opdenakker, 2018). Procrastination has adverse effects on academic performance (Stead et al., 2010), sleep quality (Przepiórka et al., 2019), and physical health (Klingsieck, 2013), time management skills (Askikainen et al., 2024; Atalayin et al., 2018), and produces many adverse effects such as negative emotion, anxiety, and depression, lower academic self-esteem, and academic pressure (Klibert et al., 2016; Krispenz et al., 2019). Therefore, procrastination appears to be a significant issue for many people, particularly university students.

Numerous intervention approaches have been developed to address academic procrastination, given its negative impact on academic performance, psychological well-being, and life satisfaction. van Eerde and Klingsieck (2018) reviewed four different behavioral therapy approaches for procrastination, including self-regulation, cognitive behavioral therapy (CBT), therapeutic approaches, and strength-based approaches that focus on enhancing individuals' internal resources. Similarly, Rozental et al. (2015) investigated the use of internet-based CBT, while

Lukas and Berking (2018) implemented a smartphone-based intervention program, both of which demonstrated significant reductions in procrastination behaviors. Despite the effectiveness of these interventions, accessibility remains a significant barrier—many require face-to-face interaction with mental health professionals or participation in structured group therapy.

To overcome these limitations, developing an online application tailored to reduce academic procrastination presents a promising solution. Online interventions offer several advantages: they are cost-effective, easily scalable, and accessible regardless of time or location (Eckert et al., 2018). Additionally, digital tools can incorporate evidence-based strategies, such as psychoeducation, self-monitoring, cognitive restructuring, and task management features, making them ideal for promoting self-regulation and reducing procrastination among students. As demonstrated by Lukas and Berking (2018) and Rozental et al. (2015), such digital approaches can deliver measurable improvements in procrastination-related outcomes, highlighting the value of online application development for this purpose.

Self-regulated learning (SRL) refers to the process by which learners actively manage their learning through goal setting, self-monitoring, strategic action, and self-reflection (Zimmerman, 2002). Since procrastination is widely regarded as a breakdown in self-regulatory processes, students who lack effective self-regulation are more prone to delay academic tasks (Steel, 2007). Research by Atmojo et al. (2024) demonstrated that enhancing students' self-regulation skills significantly improves their learning behaviors, fostering greater autonomy, deeper engagement, and more critical thinking. By cultivating SRL skills, students become better equipped to initiate tasks, maintain focus, and reflect constructively on their progress—behaviors that are crucial in combating academic procrastination.

Time management, similarly, plays a central role in addressing procrastination. It is conceptualized as a self-regulated effort to use time efficiently and effectively to accomplish specific goals (Koch & Kleinmann, 2002). Häfner and Stock (2010) identified key components of time management, including time assessment, goal setting, planning, and ongoing task monitoring. Poor time management habits—such as underestimating time requirements or failing to prioritize—are closely linked to procrastinatory behavior (Steel, 2007). Interventions

focused on time management strategies, such as task prioritization, scheduling, and breaking assignments into smaller units, have been shown to significantly reduce procrastination among students (Kim & Seo, 2015).

Therefore, integrating both self-regulated learning and time management as foundational elements in the design of an academic procrastination reduction application provides a theoretically sound and empirically supported framework for equipping students with the skills necessary to take control of their academic responsibilities.

To guide the development of the application, the ADDIE model—a widely recognized and systematic instructional design framework—was employed. This model is commonly used in the creation of educational programs, including web-based and mobile learning applications (Danks, 2011). The ADDIE model consists of five interrelated and often iterative phases: Analysis, Design, Development, Implementation, and Evaluation. In the Analysis phase, the primary objective is to assess the needs, goals, and challenges of the target audience. This involves identifying the learning problem, understanding user characteristics, and gathering relevant data to inform the design. Consequently, a comprehensive investigation into academic procrastination was conducted, utilizing both qualitative and quantitative methods, to ensure a thorough understanding of the behaviors and needs of undergraduate students.

Although academic procrastination and time management inventory, as the measure variable, several gaps persist in the development and validation of measurement tools assessing these constructs, particularly within diverse cultural and educational contexts. Many widely used academic procrastination inventories, such as the Procrastination Assessment Scale–Students (PASS) by Solomon and Rothblum (1984), and time management tools like the Time Management Behavior Scale (TMBS) by Macan et al. (1990), were developed in Western contexts. These instruments may not fully capture the cultural, educational, and psychological nuances influencing procrastination and time management behaviors in non-Western or collectivist cultures (Klassen et al., 2009). Therefore, there is a need for culturally adapted or newly developed instruments that reflect the unique educational systems and values of different populations. Many existing tools do not account for modern-

day distractions such as technology use, social media engagement, and digital multitasking, which play a significant role in students' procrastination and time mismanagement.

To summarize, this research study aims to gain an in-depth understanding of academic procrastination among undergraduate students through the use of both qualitative and quantitative methods. It seeks to develop and validate measurement tools—specifically inventories for academic procrastination and time management—to assess key behavioral and psychological variables. Furthermore, the study focuses on designing and developing a web-based application that integrates evidence-based strategies, such as self-regulated learning and time management techniques, to help students effectively reduce academic procrastination. This application is intended to provide accessible, flexible, and user-friendly support for students in managing their academic tasks more efficiently.

Research Objectives

1. To develop an academic procrastination inventory and time management inventory of undergraduate students in Thailand.
2. To develop an online application for academic procrastination reduction of undergraduate students in Thailand.
3. To examine the effectiveness of an online application for academic procrastination reduction of undergraduate students in Thailand.

Conceptual Framework

Online or web-based applications have emerged as a widely used intervention in numerous research studies due to their flexibility, cost-effectiveness, scalability, and accessibility across time and location (Eckert et al., 2018). One of the main challenges in addressing academic procrastination is the need for personalized and adaptable interventions that cater to students' varying needs, schedules, and preferences. Digital tools address this gap by incorporating evidence-based techniques such as psychoeducation, self-monitoring, cognitive restructuring, and task management, making them highly suitable for supporting self-regulation and reducing

procrastination among students. As shown by Lukas and Berking (2018) and Rozental et al. (2015), these digital approaches have demonstrated significant improvements in procrastination-related behaviors.

Since the reasons for procrastination vary across individuals, with some affected by a lack of task value or reward, and others influenced by a preference for immediate gratification (Steel, 2007; van Eerde, 2000), interventions aimed at increasing awareness, fostering self-regulation, and promoting autonomous action are necessary. Furthermore, incorporating time management strategies is critical, as effective planning and organization can significantly mitigate procrastination behaviors (van Eerde, 2000). Procrastinators often underestimate the effort or time required to complete academic tasks; additionally, they frequently misjudge the temporal distance or effort needed to achieve future goals (Steel et al., 2018).

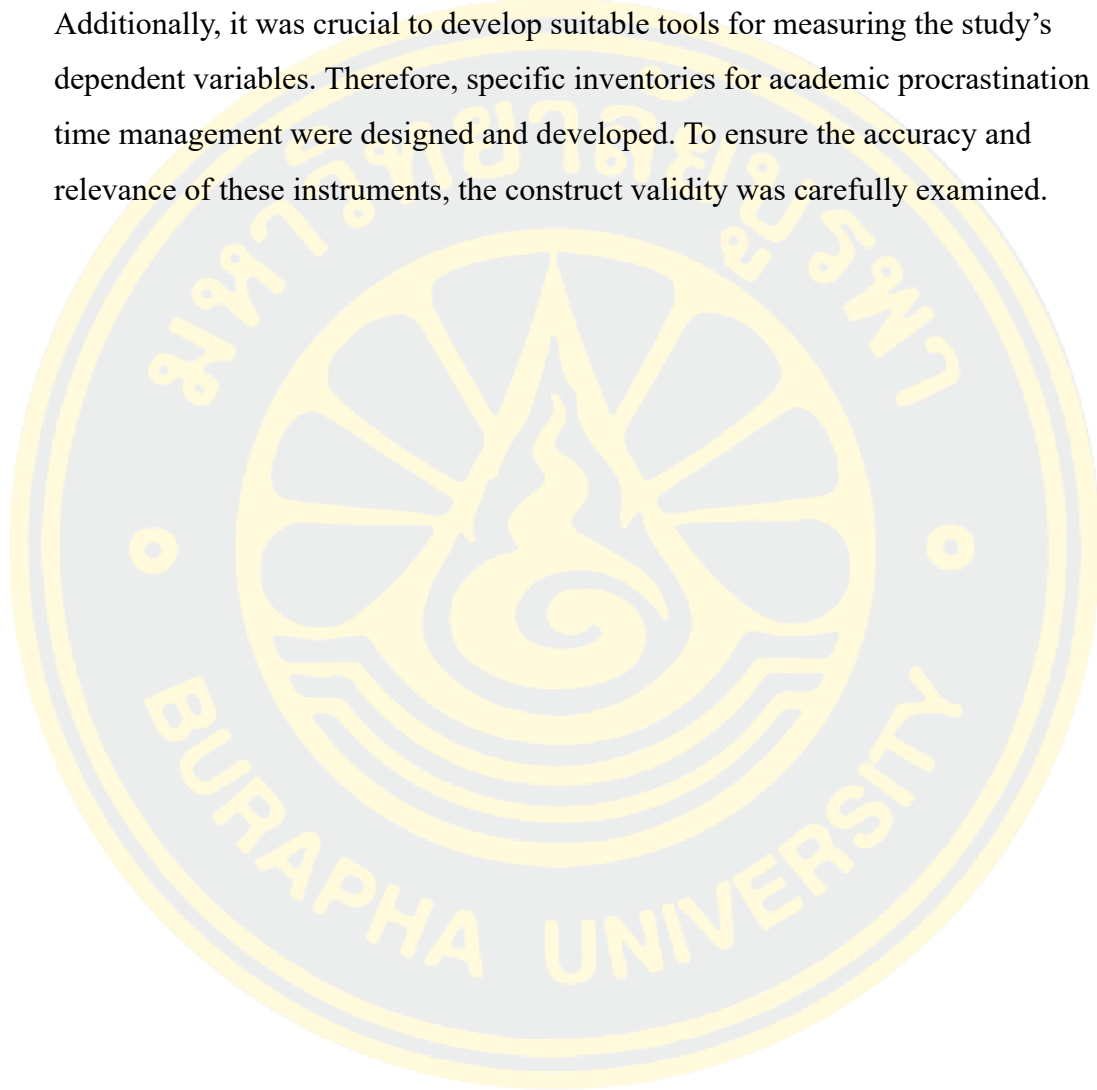
Given that academic procrastination is closely tied to self-regulatory failure (Steel, 2007), applying Zimmerman's (2000) Self-Regulated Learning (SRL) model provides a structured framework for how learners can manage their behavior, thoughts, and emotions to achieve academic success, which might be beneficial to procrastinators. Each phase of the SRL model directly targets key areas where procrastination typically emerges, thereby offering practical strategies for reducing it. The self-regulated learning model is divided into three phases: 1) forethought phase: task analysis and self-motivation belief. In this phase, help setting goals and plan how to approach tasks. By engaging in task analysis and setting clear, achievable goals, students gain a sense of direction and motivation. Additionally, strengthening self-efficacy beliefs helps students feel more capable of succeeding, which in turn increases their willingness to undertake tasks. 2) performance phase: self-control and self-observation. This phase involves implementing strategies to stay focused and monitoring one's behavior during task completion. Students learn to minimize distractions (e.g., turning off phone notifications) and track their progress. Regular self-observation keeps them accountable and aware of how they are spending their time, which helps prevent task avoidance. And 3) self-reflection phase: self-judgment and self-reaction. After completing a task, students evaluate their performance and emotional responses to it. Reflecting on what worked and what did not help students identify patterns of procrastination and develop improved strategies.

Moreover, research has shown that strong time management skills are negatively associated with academic procrastination; that is, students who manage their time well are less likely to procrastinate (Asikainen et al., 2024; Atalayin et al., 2018). To support students in developing these skills, it is helpful to incorporate practical and evidence-based strategies such as the Eisenhower Matrix (which helps prioritize tasks by urgency and importance), to-do lists (which make tasks more manageable and visible), time blocking (which assigns specific time slots to tasks), and the Pomodoro Technique (which breaks work into focused intervals with scheduled breaks). These tools not only increase students' sense of control and organization but also reduce feelings of being overwhelmed, one of the key triggers for procrastination.

Psychoeducation, a therapeutic and educational approach that involves providing individuals with the information and practical skills needed to understand better and effectively manage psychological, emotional, or behavioral challenges (Rholeeter, 2024), is one of the interventions that help decrease the academic procrastination behaviors of university students (Tolan, 2023). When these strategies are taught through psychoeducation, they increase students' awareness of how they currently use their time, what tasks they tend to delay, and how they can change these patterns (Covey et al., 2015; Cirillo, 2018). Therefore, integrated SLR learning along with structured time management skills or techniques can provide students with practical strategies to enhance their ability to plan, organize, monitor, and reflect on their learning tasks. As such, it provides a strong foundation for the design of interventions in the present study.

This research focuses on developing a web-based application designed to help reduce academic procrastination among undergraduate students. The application integrates Self-Regulated Learning (SRL) strategies and time management techniques to support students in staying on track with their academic tasks. To guide the development process, the study employed the ADDIE model, an instructional design framework widely recognized for creating effective educational programs, including digital and mobile learning tools (Danks, 2011; Molenda, 2003). The ADDIE model includes five interconnected and often cyclical phases: Analysis, Design, Development, Implementation, and Evaluation.

As part of the Analysis phase of the ADDIE model, it was important to gain a deep understanding of academic procrastination among the target population. Therefore, before developing the online application, in-depth interviews were conducted to explore students' behaviors and challenges more thoroughly. Additionally, it was crucial to develop suitable tools for measuring the study's dependent variables. Therefore, specific inventories for academic procrastination and time management were designed and developed. To ensure the accuracy and relevance of these instruments, the construct validity was carefully examined.



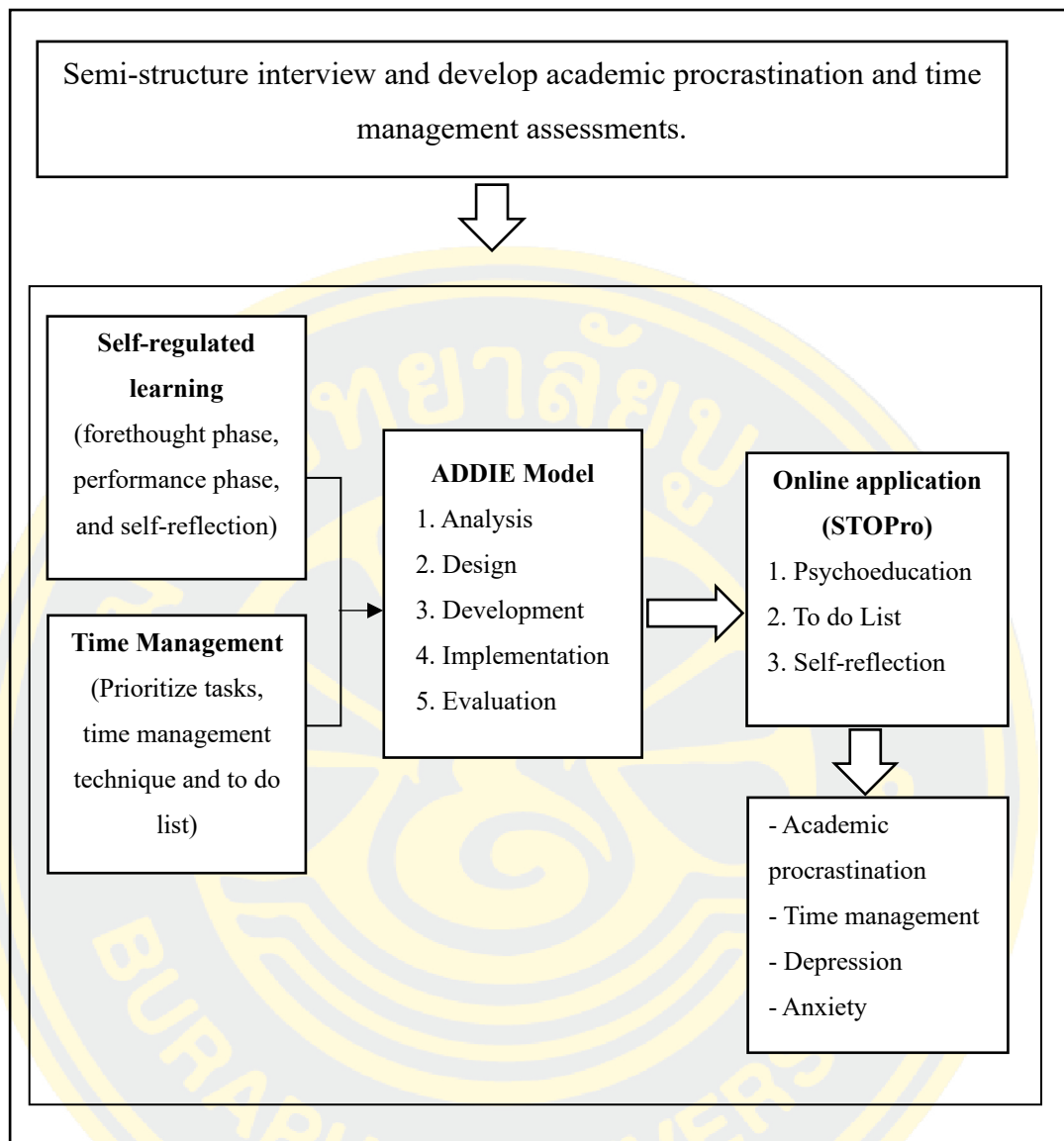


Figure 1 Conceptual Framework

Hypothesis

1. The experiment group, after getting an online application for academic procrastination reduction, has an academic procrastination score lower than before training.

2. The experiment group, after getting an online application for academic procrastination reduction, had a time management score higher than before the training.

3. The experiment group, after getting an online application for academic procrastination reduction, had depression and anxiety scores better than before training.

4. After the training, the experimental group has a lower academic procrastination score than the control group.

5. After the training, the experimental group has a higher time management score than the control group.

6. After the training, the experimental group had better depression and anxiety scores than the control group.

Contribution of Research

The findings of this study offer several valuable contributions to understanding and addressing academic procrastination among undergraduate students:

1. The research resulted in the creation of validated inventories specifically designed to measure academic procrastination and time management in undergraduate students.

2. A new online application was developed to help reduce academic procrastination, offering students an accessible and engaging tool grounded in effective behavioral strategies.

3. Students who participated in the experimental group showed a noticeable reduction in procrastination behaviors and an improvement in their time management skills after using the application, indicating the effectiveness of the intervention.

Scope of the research

Population

The population of this study are undergraduate students age 18 years old and over 18 years old, totaling approximately 1,707,250 students (Ministry of Higher Education, Science, Research and Innovation, 2024)

Sample of research

The sample of the study consists of undergraduate students aged 18 years and above. The detail of each sample of the three phases is as follows:

Phase 1: The sample was separated into two groups

1. Qualitative research: 9 undergraduate students from three distinct fields of study, Social Sciences and Humanities, Health Sciences, and Science and Technology, were interviewed to gain in-depth insights into academic procrastination.

2. Quantitative research: 450 undergraduate students from Burapha University, Nakhon Ratchasima Rajabhat University, and Rajamangala University of Technology Thanyaburi employed for the construct validity of research measurement and study of academic procrastination. Their responses were used to examine the construct validity of the developed measurement tools and to explore academic procrastination behaviors.

Phase 2: The development of an online application for the academic procrastination reduction of undergraduate students with a pilot study of five students.

Phase 3: The examination of online application effectiveness with 60 participants randomly assigned into two groups: 30 for the experimental group and 30 for the control group.

Variables

1. Independent variable: an online application for academic procrastination reduction of undergraduate students in Thailand.

2. Dependent variables:

2.1 Academic procrastination

2.2 Time management

2.2.1 Setting goals and Priorities

2.2.2 Mechanic of time management

2.2.3 Preference for Organization

2.2.4 Perceived control of time

2.3 Depression

2.4 Anxiety

Operational definition

Academic procrastination is a self-regulatory problem characterized by the delay of intended academic activities and tasks, such as willfully postponing, delaying, or putting off a task or choice, despite knowing that the outcome will be worse due to the delay. Academic procrastination is assessed using the Academic Procrastination Inventory, a 13-item rating scale.

Self-regulated learning (SLR) refers to the self-directed and goal-oriented process by which students actively manage their learning through planning, monitoring, evaluating, and adjusting their cognitive, motivational, and behavioral strategies to achieve academic goals and reduce academic procrastination. SLR involves key subfunctions including self-observation, self-judgment or evaluation, and self-reaction.

Time management is a crucial skill for undergraduate students, as they plan, organize, prioritize, monitor, and adjust their time use to accomplish academic tasks effectively and efficiently. Time management can be measured through time management inventory, which was adopted from Macan et al. (1990) and divided into four components as follows:

1. Setting goals and Priorities refers to assessing the extent to which students set specific goals related to their study and prioritize the academic tasks to achieve these goals. It reflects proactive planning and the ability to distinguish between tasks of varying importance.
2. Mechanics of time management refer to the practical and operational behaviors of students involved in effective time use for their academic purpose, including creating to-do lists, scheduling tasks, and following planned activities.
3. Preference for organization refers to an individual's tendency to maintain an orderly study space and adopt a structured approach to tasks, reflecting a systematic method of managing responsibilities.
4. Perceived time control refers to an individual's subjective sense of control over their time, encompassing feelings of being organized and effective versus overwhelmed by time-related demands.

Depression is a common and serious mental health disorder characterized by persistent feelings of sadness, emptiness, or hopelessness, along with a marked loss of interest or pleasure in activities that were once found enjoyable or fulfilling. It often affects a student's emotional, cognitive, and physical functioning, leading to symptoms such as fatigue, changes in appetite or sleep patterns, difficulty concentrating, and feelings of worthlessness or guilt.

Anxiety is a psychological and physiological state characterized by feelings of fear, worry, nervousness, or uneasiness, often accompanied by physical symptoms such as increased heart rate, sweating, muscle tension, restlessness, and difficulty concentrating. While anxiety is a natural response to perceived threats or stressful situations, excessive or chronic anxiety can interfere with the daily functioning and academic performance of students.

STOPro, an online application designed to reduce academic procrastination, is a web-based platform accessible via computers, mobile phones, or tablets, which supports students in managing and overcoming procrastination behaviors. This application integrates principles of self-regulated learning (SRL) and evidence-based time management strategies to enhance students' self-awareness, understanding of academic procrastination, planning, time management techniques, and reflection skills. STOPro supported undergraduate students in recognizing their procrastination habits, understanding the negative impact on academic achievement, and practicing techniques such as goal setting, task prioritization, scheduling, and weekly self-evaluation. Through its interactive and accessible features, the application promotes continuous self-monitoring and strategic behavior change, aiming to improve academic productivity and overall learning outcomes.

Undergraduate students refer to individuals enrolled in a post-secondary education program at a university who are 18 years old or older.

Chapter 2

Literature Review

This research aims 1) to develop an academic procrastination inventory and time management inventory of undergraduate students in Thailand, 2) to develop an online application for academic procrastination reduction of undergraduate students in Thailand, and 3) to examine the effectiveness of an online application for academic procrastination reduction of undergraduate students in Thailand. The researcher had review literature, concept, theory, and related studies as follows:

Part 1 Procrastination and related studies

Part 2 Self-regulation, self-regulated learning, and related studies

Part 3 Time-management and related studies

Part 4 Anxiety and related studies

Part 5 Depression and related studies

Part 6 Online application and related studies

Part 1: Procrastination and related studies

1. Definition of procrastination

Ferrari et al. (1995) have contributions on procrastination as a major difficulty in studying, understanding, and treating and derived from Latin verbs, “pro” refers to motion and “crastinus” refers to belonging to tomorrow.

Steel (2007) Procrastination is defined as a concept of an unreasonable delay of activity, such as willfully postponing, delaying, or deferring a task or choice, despite expecting the outcome to be worse off as a result of the delay. It's also a matter of self-regulatory failure.

Rabin et al. (2011) define procrastination as a lack of self-control that results in a reduced ability to resist social temptations, pleasure activities, and immediate rewards, as well as a failure to make effective use of internal and external cues to determine when to initiate, maintain, and terminate goal-directed actions.

Steel (2012) proposed that procrastination is an increasing self-regulatory failure, presumably linked to greater societal demands for self-control.

Krause and Freund (2013) defined procrastination as the inability to initiate and complete tasks, as well as to pursue a goal, and it is quite common in academic settings.

Sabri et al. (2016) proposed that academic procrastination is the deliberate delaying of the start or completion of an important and timely academic task within the intended time limit.

Michałowski et al. (2020) Procrastination is a self-regulatory problem in which people willfully and destructively delay necessary or personally significant tasks and is associated with executive dysfunctions.

Academic procrastination is the deliberate postponement of critical and time-sensitive academic activities and responsibilities (Day et al., 2000; Schouwenburg, 2004).

In sum, academic procrastination is a self-regulatory problem in delaying intended academic activities and tasks, such as willfully postponing, delaying, or putting off a task or choice of undergraduate students, although knowing that the outcome will be worse as a result of the delay.

2. Problems related to academic procrastination

Academic procrastination is defined as procrastinating or delaying an academic task despite knowing the consequences. Procrastinators, in general, do not complete their tasks as quickly as feasible; instead, they begin working as the submission deadline approaches. This practice causes an individual to encounter numerous challenges as the deadline approaches, resulting in depression and anxiety, affecting learning and achievement. Moreover, around 90% of undergraduates admit to procrastinating during exams and assignments, whereas 60% admit to procrastinating when it comes to completing academic activities. Procrastination is thought to impact 15-20% of the population and up to 50-90 percent of students (Steel, 2007).

Procrastination, link to the tendency to delay tasks until the last minute, often leads to poor time management, incomplete work, and diminished learning outcomes. Research consistently demonstrates a significant negative correlation between procrastination and academic achievement, with procrastinators reporting

lower self-confidence and a more negative attitude toward learning (Ahmed et al., 2023) and having lower academic performance (Kim & Seo, 2015).

Beyond academic outcomes, procrastination has substantial effects on mental and physical health. Individuals who habitually procrastinate experience higher levels of stress, anxiety, and depression, with many reporting feelings of guilt, shame, and low self-esteem as a result of their behavior (Reinecke et al., 2018; Rozental et al., 2022), have a positive correlation exists between the improvement in time management disposition and the improvement in anxiety, depression, and sleep quality (Ping & Xiaochun, 2018). Moreover, the study of Sirois (2016) revealed that procrastination may be an important epidemiological factor for understanding the development and management of not only acute but also chronic health issues, due in part to its links with stress and poor health behaviors.

3. Procrastination and brain function

Steel suggested that procrastination is a result of the limbic system's interaction with the prefrontal cortex (PFC) (Steel, 2007). Furthermore, previous research using fMRI, task-related EEG, and MRI reveals that procrastinators have a weaker ability to make decisions that benefit long-term goals and have difficulty inhibiting undesirable behaviors (Wypych et al., 2019). Procrastination has been linked to functional connectivity in numerous networks involving the anterior insula/operculum, dorsal anterior cingulate cortex, thalamus, and other subcortical structures, according to recent neuroimaging research (SU et al., 2018). Given that it is associated with difficulty in executive tasks such as planning, time management (Gutiérrez-García et al., 2020), maintaining focus, learning from mistakes, and decision-making.

4. Causes and factors influence procrastination

Steel (2007) grouped the causes and correlates of procrastination into four primary sections: task characteristics, individual differences, outcomes, and demographics.

4.1 By rewarding oneself after completing a task, task characteristics refer to the timing of rewards and punishment. For example, after finishing schoolwork, reward yourself with a slice of your favorite cake. The incentives can encourage task completion and are a more convenient solution to avoid procrastinating. Aside from

that, task aversiveness is classified as a task characteristic. People try to avoid aversive stimuli; hence, the more aversive the circumstance, the more likely they are to avoid it, resulting in procrastination.

4.2 Individual differences are another source of procrastination. A person with a distinct personality may complete work differently. Because procrastinators are merely averse or bothered, Neuroticism, a worried or anxious disposition, has been regarded as a source of procrastination. Conscientiousness, on the other hand, has a negative relationship with procrastination. Because of their high self-control and approach motivation, people with high conscientiousness may be less likely to procrastinate. Conformity socially dictated impulse control, accomplishment orientation, cautiousness, morality, organization, thoroughness, and reliability have all been classified as conscientiousness (Costa Jr et al., 1991). The NEO five-factor personality model, which is divided into facets, was used to investigate procrastination. Impulsivity, one of Neuroticism's features, has .41 correlated with procrastination. Sensation seeking, one of Extraversion's aspects, was found to have .40 correlated with procrastination, defined as the behavior of putting off activities till the last minute, and boredom proneness. However, there was a strong negative association of -.62 between conscientiousness and procrastination (Steel, 2007).

4.3 Outcomes: refers to how individuals feel and what they accomplish. The way people feel may have an impact on or cause procrastination. Depression, for example, can cause procrastination and is characterized by negative affect and a low mood. It is claimed that procrastination causes poor performance.

4.4 Demographics: there are three possible demographic moderators procrastination, such as age, gender, and year. Researchers have consistently provided the data needed to assess three potential procrastination demographic moderators: age, gender, and year. People should procrastinate less as they age and learn, according to Steel (2007), because people may learn to avoid procrastinating. Much research has found that gender has an impact on procrastination differences, with male students having a higher level of academic procrastination (Duru & Balkis, 2017); however, higher or lower procrastination scores for males depend on the measure (Steel, 2007).

Balkis and Duru (2007) reported that procrastination is caused by:

1. Poor time management: Procrastinators are unable to prioritize tasks, goals, and objectives, making it difficult for them to manage their time effectively. When confronted with a task, it may make a person feel overwhelmed. Individuals postpone academic responsibilities until a later date as a result of this feeling, and occasionally choose to focus on unproductive pursuits.

2. Inability to concentrate on work: This could be due to a distraction in the environment, such as noise or an uncomfortable study atmosphere, among other things.

3. Fear and anxiety related to failure: An individual in this category would spend more time fretting over the work she or he needs to perform rather than doing it. When one is afraid to work on the subject at hand, procrastination has been shown to increase anxiety (Solomon & Rothblum, 1984). Moreover, the fear of failure leads to task avoidance, which causes tasks to be delayed (Krause & Freund, 2013).

4. Negative convictions about one's abilities: Individual concerns might also stymie one's ability to complete a task. Furthermore, irrational beliefs and compulsiveness may be two different types of procrastination roadblocks.

Aside from the studies mentioned above, there are several studies on procrastination and executive function. Executive function (EFs) is a set of mental processes that are necessary for cognitive control (Diamond, 2013) and related to the functions of the prefrontal cortex (Barkley, 2012). EF is made up of several brain processes that allow for innovative problem solving, shifting, working memory, planning, inhibition, initiation, task monitoring, self-monitoring, emotional management, goal setting, and material organization (Dawson & Guare, 2018; Maskill & Tempest, 2017; Roth et al., 2005). Rabin et al. (2011) used the Behavior Rating Inventory of Executive Functioning (Gioia et al., 2000), a self-report measure, and found a statistically significant relationship between all subcomponents and academic procrastination.

Procrastination is characterized as self-regulation failure (Häfner et al., 2014; Steel, 2007), according to studies on procrastination and self-regulation. A procrastinator is someone unable to regulate their thoughts, excitements, emotions, and functioning following predetermined standards. Milgram et al. (1988) claim that students who use self-control skills are less likely to procrastinate. Self-regulation is

the ability to manage one's behavior, monitor one's activities, and alter one's performance as needed in order to achieve a specific objective (Zimmerman & Schunk, 1989). Many studies (Garzón-Umerenkova et al., 2018; Hong et al., 2021; Naderi et al., 2021; Steel, 2007; Zhang et al., 2018; Ziegler & Opdenakker, 2018) have found a negative association between self-regulation and procrastination. Apart from self-regulation, self-regulated learning (SRL) is a set of learning practices used by students to learn (Pintrich, 2004; Zimmerman, 2000, 2008). Self-regulation is defined as an active and organized process in which learners change their learning goals and work hard to self-monitor their cognition, purpose, and behavior (Pintrich, 2004). Many studies have discovered that procrastination is connected with self-regulation strategy training and self-regulated learning (Hong et al., 2021; Naderi et al., 2021; Steel, 2007). Self-regulated learning was a significant predictor of procrastination (Wolters et al., 2017).

To summarize, the researcher can deduce from the above that self-regulation and time management are the most important predictors of academic procrastination. As a result, these two variables are used as the primary variables in this study of academic procrastination.

5. Procrastination Intervention

There are extensively various of interventions aim to reduce academic procrastination as follow:

5.1 Cognitive-Behavioral Interventions

Cognitive-behavioral therapy (CBT) is a structured, goal-oriented form of psychotherapy that helps individuals identify and modify unhelpful patterns of thinking and behavior. It integrates principles from both cognitive and behavioral therapy approaches (InformedHealth.org, 2022). Numerous studies have demonstrated that CBT significantly improves functioning and quality of life (APA, 2017). In the context of academic procrastination, CBT has been identified as one of the most effective treatment methods (van Eerde & Klingsieck, 2018).

Several studies have implemented CBT as an intervention to address procrastination and related academic difficulties. For example, Rozental et al. (2018) conducted a randomized controlled trial examining the effectiveness of CBT for treating severe procrastination in university students. Ninety-two participants were

assigned to either self-guided internet-based CBT (ICBT) or group-based CBT for eight weeks. Both groups exhibited substantial reductions in procrastination and moderate improvements in depression, anxiety, and well-being. Although no significant difference was observed between the two delivery formats immediately after treatment, participants in the group CBT condition maintained or further improved their outcomes at a six-month follow-up. At the same time, some deterioration was noted in the ICBT group. These findings suggest that while CBT is effective for reducing procrastination, group-based formats may offer more sustained benefits over time.

Tolan (2023) developed an eight-session CBT-based psychoeducation program, each session lasting 90 minutes, aimed at enhancing coping skills to reduce academic procrastination. Khurshid et al. (2025) applied CBT to address a range of academic and psychological issues among adolescents, including academic burnout, procrastination, self-handicapping behavior, and test anxiety.

5.2 Self-Regulation and Time Management Training

Research consistently shows that self-regulation and time management training are effective interventions for reducing academic procrastination. According to self-regulated learning theory, time management is a key positive form of self-regulation, while procrastination reflects poor self-regulation.

This study of Salguero-Pazos and Reyes-de-Cózar (2023) conducted a systematic review of 32 educational interventions from the past decade aimed at reducing academic procrastination in the classroom. Procrastination, often driven by psychological, personal, and pedagogical factors, negatively impacts students' academic performance and well-being by disrupting self-regulation. The review found that most interventions primarily target self-regulation skills, while areas like personality and anxiety are less frequently addressed. The findings provide valuable insights for evaluating current approaches and guiding the development of future interventions.

The study of Naderi et al. (2021) used a self-regulation strategy training that revealed the difference in procrastination score between the experimental and control groups. However, Gustavson and Miyake (2018), using SMART goals as the intervention for academic procrastination over three weeks, showed not significantly

reduce procrastination and highlights the need for more effective strategies to reduce academic procrastination.

5.3 Digital and App-Based Interventions

Several recent research studies have explored digital or app-based interventions targeting procrastination, demonstrating their effectiveness and potential advantages. Amarnath et al. (2023) outlined a study protocol for a randomized controlled trial evaluating the effectiveness of GetStarted. In this study, 176 students from seven Dutch universities will be randomly assigned to either a four-week guided intervention group or a waitlist control group. Assessments are scheduled at baseline, post-intervention (4 weeks), and follow-up (6 months). The primary outcome is a reduction, measured by the Irrational Procrastination Scale, with secondary outcomes including depression, anxiety, stress, and quality of life. The trial aims to generate robust evidence for a low-intensity, cost-effective e-health solution for managing procrastination in college students.

In addition, Zhou and Wang (2023) are preparing a study involving a self-directed internet-based intervention, with assessments of procrastination behavior at 6 and 12 weeks after baseline. They propose that such low-cost, high-coverage online interventions could serve as effective tools for addressing procrastination.

To sum up, this research study employed an internet-based intervention that incorporated self-regulated learning strategies and focused on time management techniques to reduce academic procrastination. Although the duration of interventions in previous studies has varied from three to twelve weeks, a meta-analysis by van Eerde and Klingsieck (2018) found that intervention length does not significantly impact outcomes in studies targeting procrastination. Therefore, this study utilized a four-week intervention period.

6. Procrastination Measurement

The General Procrastination Scale (GPS) (Lay, 1986) examines procrastinatory behavior. GPS is assessing arousal procrastination, putting off seeking thrills. This scale consisted of 20 items. Those with a high score on the procrastination scale were more likely to return their task late. The Pure Procrastination Scale (PPS), introduced a novel instrument by Steel (2010), consisted of 12 items that directly

related to general procrastination. It is a self-reported measure using a 5-point Likert scale.

Irrational Procrastination Scale (Steel, 2010) is a self-report measure using a 5-point Likert scale, with higher scores reflecting greater procrastination.

The Academic Procrastination State Inventory (Schouwenburg, 1995) has 23 items supposed to assess procrastination on various study-related activities. The inventory after factor analysis resulted in three factors emerging.

The Procrastination Assessment Scale-Student (PASS) (Solomon & Rothblum, 1984) consists of three components: affective, cognitive, and behavioral.

The Adult Inventory of Procrastination Scale (AIP) (McCown & Johnson, 1989) examines avoidance procrastination, putting off protecting self-esteem, or due to fear of failure.

According to the study of Svartdal and Steel (2017) focused on different facets of procrastination between five different procrastination scales: Decisional Procrastination Scale (DPS), Irrational Procrastination Scale (IPS), Pure Procrastination Scale (PPS), Adult Inventory of Procrastination Scale (AIP), and General Procrastination Scale (GPS). According to the findings, the PPS (12 items chosen from DPS, AIP, and GPS) measures distinct aspects of procrastination even better than the three scales on which it is based. This study also revealed that the nine-item IPS corresponds well to a reduced version of the PPS (5 items focusing on illogical delay). Both scales have good psychometric features and appear to be more accurate assessments of core procrastination characteristics than other procrastination scales.

7. Related studies of procrastination

Gustavson and Miyake (2018) explored how academic procrastination relates to goal accomplishment by testing two approaches. First, it examined whether setting SMART goals and forming implementation intentions could reduce procrastination over three weeks among 177 undergraduates. Second, it analyzed whether baseline procrastination predicted later goal outcomes while controlling for personality, motivation, and situational factors. The results showed that the interventions did not significantly reduce procrastination. However, initial procrastination levels strongly predicted goal achievement, suggesting that

procrastination itself is a key barrier to success. The study highlights the need for more effective strategies to reduce academic procrastination.

Rozental et al. (2018) investigated the effectiveness of cognitive behavioral therapy (CBT) for treating severe procrastination in university students through a randomized controlled trial. Ninety-two students were assigned to either self-guided internet-based CBT (ICBT) or group CBT over 8 weeks. Both groups showed large reductions in procrastination, with small to moderate improvements in depression, anxiety, and well-being. While no significant difference was found between the two methods immediately after treatment, group CBT participants maintained or improved their gains at a 6-month follow-up, whereas ICBT participants showed some decline. The results suggest that CBT is effective for reducing procrastination, with group formats offering more lasting benefits.

Uma et al. (2020) investigated dentistry undergraduate students' procrastination, self-efficacy, and related factors. Three hundred sixty-one dental undergraduate students participated in a cross-sectional study. The study used Lay's procrastination measure and a generic self-efficacy scale. According to the findings, 28.5 percent of students engage in excessive procrastination. There was no significant variation in procrastination ratings between genders or academic years. Males had significantly higher self-efficacy, and there was no significant difference in self-efficacy between academic years, albeit there was a trend for year 5 students to have lower self-efficacy scores. Self-efficacy was found to be adversely connected with academic procrastination.

Koppenborg and Klingsieck (2022) studied social factors of procrastination: group work can reduce procrastination among students. It explores how social dynamics, particularly interdependence in group work, influence academic procrastination. Through two vignette-based experiments involving university students, the researchers found that tasks designed with high interdependence—where each member's contribution is essential—led to significantly lower levels of state procrastination compared to individual tasks. This effect was especially pronounced among students with high trait procrastination. Moreover, when group members made explicit commitments to complete tasks on time, procrastination decreased further, accompanied by increased positive emotions and reduced negative emotions. These

findings suggest that incorporating structured, interdependent group work into academic settings can serve as an effective strategy to mitigate procrastination, highlighting the importance of social and situational factors in addressing this common academic challenge.

Atomjo et al. (2023) investigated the impact of a self-regulated learning (SRL) module on academic procrastination and critical thinking among Primary School Teacher Education students at Universitas Sebelas Maret. Using a quasi-experimental design with 67 participants divided into experimental and control groups, the study confirmed the validity and reliability of its instruments. Multivariate analysis (MANOVA) revealed that the SRL module significantly reduced academic procrastination and improved critical thinking skills ($p < .05$). The findings suggest that enhancing students' self-regulation abilities can motivate them to engage more effectively in their learning, thereby decreasing procrastination and fostering critical thinking development.

Zhou and Wang (2023) used an internet-based self-help intervention for procrastination. This randomized controlled trial examined the effectiveness of a self-guided, internet-based intervention to reduce procrastination among undergraduate psychology students. Participants ($N=320$) were divided into two groups: one received immediate access to the intervention, while the other served as a waitlist control. Procrastination was assessed using validated scales, with follow-ups at 6 and 12 weeks. Secondary outcomes included stress, well-being, self-efficacy, and emotional regulation. The result of the study provides data on the effectiveness of online interventions for adult procrastination. If deemed effective, this low-cost, high-coverage internet-based intervention could aid more people who seek to address their procrastination.

Part 2: Self-regulation, self-regulated learning, and related studies

1. Definition of Self-regulation

Zimmerman (2002) Self-regulation is the self-directed process by which each individual transforms their mental ability into academic competence for superior learning results, rather than a cognitive ability or academic performance skill. Self-

control is critical since it is a key educational function in the development of lifelong learning abilities.

Hall and Goetz (2013, pp. 125–126) Self-regulation refers to three critical elements such as learning, regulation, and self. Any activity involving the acquisition of knowledge and abilities is referred to as learning. Regulation refers to the process of comparing one's current state to a target state, with the perceived gap motivating subsequent actions aimed at reducing it. Self, on the other hand, is defined as an individual's initiative in terms of goal setting. As a result, self-regulated learning is a method of acquiring knowledge and skills in which students select their learning objectives and tactics.

According to social cognitive theory, self-regulation is developed and initiated with subfunctions such as self-observation, self-judgment, self-evaluation, and self-reaction (Bandura, 1986, cited in Usher & Schunk, 2018). Self-observation gives the information needed to make changes. When students begin a new task, they must be aware of their thoughts and behaviors. Individuals judge their own selves and their surroundings by comparing themselves to both external and internal criteria during self-evaluation. Furthermore, self-evaluation is influenced by how much a person values a certain activity. Self-reaction, or the ability to respond to one's ideas, feelings, and behaviors, allows people to take control of their lives. People learn to apply self-reactive influence by promising themselves tangible benefits if they achieve their goals.

Heatherton (2011) Self-regulation necessitates the integration of four psychological factors. People must first be conscious of their behavior to compare it to societal norms. Second, people must be aware of how others react to their actions to forecast how others will respond to them. This needs the development of a third mechanism to detect threats, particularly in complicated social circumstances. Finally, a method for resolving differences between self-knowledge and societal expectations or norms is required to motivate behavior to overcome any existing conflict.

The empirical findings reported that procrastination could be understood as a failure of self-regulation (Häfner et al., 2014; Steel, 2007). As a result, it is useful to characterize the cognitive, metacognitive, and motivational techniques required to

regulate one's learning processes successfully. Self-regulated learning (Zimmerman, 2000) is defined as a set of learning strategies.

The study of Heatherton (2011) revealed that self-regulation requires four psychological components:

1. People must be conscious of their actions to compare them to social norms.
2. To forecast how others will react to their actions, people must first understand how others will respond to their actions.
3. People must be aware of how others will react to them.
4. People must serve as a tool for resolving differences between self-awareness and society's expectations or standards, thereby motivating behavior to overcome any existing conflict.

2. Self-regulated Learning (SRL)

The knowledge base of self-regulated learning is under social cognitive theory, which is very important for gradually controlling external behavior through self-managing, motivation, social, and moral factors.

Self-regulated learning is the ability of students to direct their learning process by using their reasoning, motivating, and actions (Zimmerman & Schunk, 1989). SRL is a critical activity for students in the twenty-first century since it aids in the control and regulation of students' learning outside of the classroom (Jongjaisurathum et al., 2015).

SRL is defined by Pintrich (2000) as a creatively active process in which learners set learning goals and attempt to follow up and manage their thoughts, motivations, and behaviors by using the goals and the environment as rules and limits on how to achieve these goals. SRL is a three-part mix of a person's abilities and determination:

1. Knowledge: SRL requires a broad understanding of oneself, encompassing subject matter knowledge, task knowledge, learning processes, and the context in which the information will be used.
2. Motivation: Self-regulated students are more likely to study since tasks are more interesting and important to them.

3. Self-discipline is defined as the ability of students with good self-regulation to resist distractions.

Zimmerman and Martinez-Pons (1988) conducted research on the construct validity of a strategy model of student self-regulated learning and identified 14 strategies: 1) Self-evaluation, 2) Organization and transforming, 3) Goal setting and planning, 4) Seeking information, 5) Keeping records and monitoring, 6) Environmental structuring, 7) Self-consequences, 8) Rehearsing and memorizing, 9) Seeking peer assistance, 10) Seeking teacher assistance, 11) Reviewing tests, 12) Reviewing notes, 13) Reviewing texts, and 14) other.

Thus, self-regulated learning (SLR) refers to the self-directed and goal-oriented process by which students actively manage their learning through planning, monitoring, evaluating, and adjusting their cognitive, motivational, and behavioral strategies to achieve academic goals and reduce academic procrastination. SLR involves key subfunctions including self-observation, self-judgment or evaluation, and self-reaction.

3. The cycle of self-regulated learning of Zimmerman

Zimmerman was one of the original SRL authors. He created three SRL models, the first of which was published in 1989 and represented the first attempt to describe the relationships that drive SRL. He began his studies with cognitive modeling and then moved on to investigating how individual learners acquire cognitive models and become specialists in various tasks.

Zimmerman's first model, known as the Triadic Analysis of SRL, depicts the interaction of three types of SRL: environment, behavior, and individual level (Zimmerman & Schunk, 1989). The second model offered the SRL Cyclical Phases, which describe the interrelationship of metacognitive and motivational processes at the individual level. The third model, dubbed the Multi-Level model recently, depicts the four levels during which kids develop self-regulatory ability (Zimmerman, 2000).

SRL model of Zimmerman (2000) contains three phases:

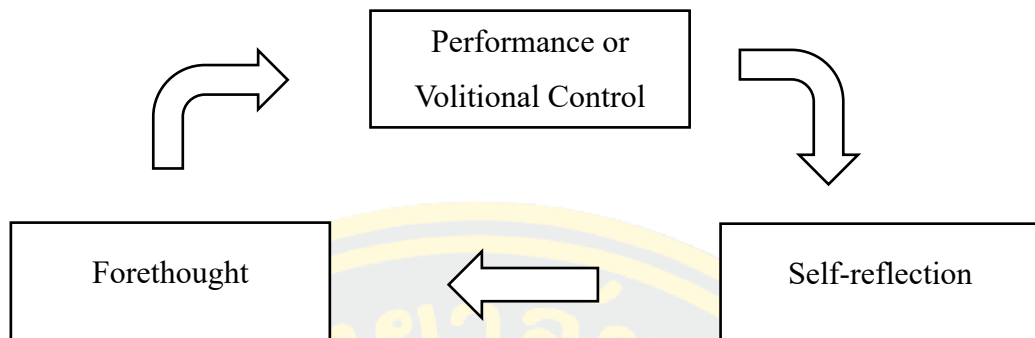


Figure 2 Cyclical phases of self-regulation

Source: Zimmerman (2000, p. 16)

1. Forethought phase

There are two distinctive but closely link categories of forethought: (1) task analysis and (2) self-motivation belief (see Table 1). Setting goals is an important aspect of task analysis. In mathematics, goal setting refers to deciding on specific learning or performance outcomes, such as answering a collection of division problems during a study session. Highly self-regulated people's goal systems are arranged hierarchically, with process objectives acting as proximal regulators of more distal end goals.

A second form of task analysis is strategic planning. Learners require strategies that are appropriate for the job and the situation in order to master or perform a skill optimally. Purposive personal processes and activities aimed at learning or exhibiting expertise are known as self-regulative techniques. Appropriately chosen techniques facilitate cognition, control affect, and direct motoric execution, all of which improve performance. Because of oscillations in the personal, behavioral, and environmental components, the planning and choosing of tactics necessitates cyclical modifications. Few, if any, self-regulatory solutions will work effectively for a person in all situations or jobs.

Self-regulatory skills are useless if a person cannot inspire himself or herself to apply them. A number of essential self-motivational beliefs underpin goal-setting and strategic planning thinking processes: self-efficacy, outcome expectations, intrinsic interest or valuing, and goal orientation. Self-efficacy relates to personal

views about one's ability to learn or perform well, whereas outcome expectations are beliefs about one's ultimate goals (Bandura, 1997). Self-efficacy, for example, relates to the idea that one can earn an A in a course. In contrast, outcomes refer to expectations regarding the ramifications of that grade after graduation, such as a coveted job. Self-regulatory efficacy, or views about one's ability to plan and govern specific areas of functioning, is a key factor in a person's motivation to engage in and maintain self-regulatory activities.

2. Performance/volitional control

Self-control and self-observation are two key forms of performance or volitional control mechanisms that have been investigated thus far. Self-control procedures such as self-instruction, imagery, attention concentrating, and task methods assist learners and performers in focusing on the work at hand and maximizing their effort. Self-instruction entails articulating how to proceed while performing a task, such as solving a math problem or remembering a formula, either overtly or covertly. Another extensively utilized self-control approach to aid encoding and performance is imagery, or the creation of mental pictures. The goal of attention focusing is to improve one's concentration while filtering out other hidden processes or external inputs. Task strategies aid learning and performance by breaking down a task into its most basic components and rearranging them in a meaningful way.

Self-observation is the second sort of volition or performance control technique. This refers to a person's monitoring of certain areas of their performance, as well as the circumstances that surround it and the outcomes that result. Self-observation has two components: self-recording and self-experimentation. Self-recording is a typical strategy for self-observation that can improve proximity, informativeness, accuracy, and valence of feedback. Personal information can be captured at the place of occurrence, structured in the most meaningful way, preserved without the need for intrusive rehearsal, and provided with a larger database for deciphering proof of improvement. People can engage in personal experimentation by systematically modifying the components of their functioning that are in issue when self-observation of natural changes in behavior does not provide conclusive diagnostic evidence. When a smoker's urge to smoke appears random and spontaneous, he or she may test several contextual hypotheses, such as stress, ashtrays, or commercials.

Systematic self-observation can help gain a better understanding and improve self-performance or volitional control in this way.

3. Self-reflection phase

Self-judgment and self-reactions are two self-reflection processes that are strongly linked to self-observation. Self-judgment entails assessing one's performance and assigning causal meaning to the outcomes. Self-evaluation is the process of comparing self-monitored data to a standard or goal, such as a sprinter rating practice runs based on his or her prior best effort. When one's performance creates straightforward objective outcomes, such as being able to swim, drive a motorbike, or solve a mathematical issue, judging the adequacy of one's performance is quite simple. High degrees of expertise, on the other hand, rely on judgments based on precise criteria, such as swimming 100 meters in a specific time or faster than 98 percent of other swimmers. Self-evaluative judgments are linked to causal attributions regarding the outcomes, such as whether low performance is due to a lack of aptitude or a lack of effort. According to new findings, attributing errors to learning methods is particularly helpful in maintaining motivation during periods of poor performance because strategy attributions maintain efficacy beliefs until all viable strategies have been attempted. Attributions are not the result of instinctive positive or negative self-evaluations, but rather of a cognitive assessment of extenuating circumstances such as personal efficacy perceptions or mitigating environmental conditions (Bandura, 1991).

Self-evaluative and attributional self-judgments are tightly linked to self-satisfaction and adaptive inferences, two important types of self-reactions. Self-satisfaction refers to one's perceptions of satisfaction or dissatisfaction with one's performance, as well as the associated effect. This is important because people prefer to pursue courses of action that lead to satisfaction and positive affect, rather than those that lead to dissatisfaction and negative affect, such as anxiety (Bandura, 1991). People give direction to their actions and generate self-incentives to persist in their efforts when self-satisfaction is conditional on achieving adopted goals. Thus, a person's motivation is derived from self-evaluative reactions to behavioral outcomes rather than from the goals themselves. Adaptive or defensive inferences are judgments on how to change one's self-regulatory strategy throughout subsequent learning or

performance attempts. Adaptive inferences are crucial because they guide people to new and potentially superior ways of self-regulating performance, such as altering goals hierarchically or selecting a more effective technique.

Table 1 Phase structure and subprocesses of self-regulation

Cyclical self-regulatory phases		
Forethought	Performance/volitional control	Self-reflection
Task analysis	Self-control	Self-judgment
Goal setting	Self-instruction	Self-evaluation
Strategic planning	Imagery	Causal attribution
	Attention focusing	
	Task strategies	
Self-motivation beliefs	Self-observation	Self-reaction
Self-efficacy	Self-recoding	Self-satisfaction/affect
Outcome expectations	Self-experimentation	Adaptive defensive
Intrinsic interest/value		
Goal orientation		

Source: Zimmerman (2000, p. 16)

4. Boekaerts' Dual Processing Model

Boekaerts is also a pioneer in SRL research, having presented her first SRL model in 1991 (Boekaerts, 1991). She was the first to apply situation-specific measures to evaluate motivation and SRL. Boekaerts first proposed a six-part structure for SRL: 1) domain-specific knowledge and abilities, 2) cognitive techniques, 3) cognitive self-regulatory methods, 4) motivational beliefs and philosophy of mind, 5) motivation strategies, and 6) motivational self-regulatory strategies (Boekaerts, 1996).

The Adaptable Learning Model is Boekaerts' second model. The Adaptable Learning Model provided a theoretical framework for comprehending findings from a variety of psychological frameworks, such as motivation, emotion, metacognition,

self-concept, and learning. This paradigm identified two concurrent processing modes: mastery or learning and coping or well-being. She then presented her Dual Processing self-regulation model, which was eventually termed after her concept of top-down and bottom-up theory. Boekaerts presented an expanded version of this model in the 2011 SRL handbook of Self-regulation, pointing to the various purposes of self-regulation during the learning process, including (1) expanding one's knowledge and skills, (2) protecting one's commitment to the learning activity, and (3) preventing threat and harm to oneself. Boekaerts underlined the importance of good and negative emotions in SRL and suggested two types of bottom-up methods, volitional and emotion control strategies (Boekaerts, 2011).

1. The pursuit of task goals is driven by the students' values, needs, and personal ambitions (mastery/growth pathway); hence, expanding one's knowledge and skills is called top-down.

2. Protecting one's commitment to the learning activity was called bottom-up, as the strategies try to prevent the self from being damaged (well-being pathway), and students may experience a mismatch between the task goals and their personal goals.

3. Preventing threat and harm to the self occurs when students try to redirect their strategies from the well-being to the mastery/growth pathway, which may happen via external or internal forces.

Therefore, emotions are essential in Boekaerts' model because when students experience negative emotions, they will activate the well-being pathway and use bottom-up strategies. According to this interest, Boekaerts has studied the different emotion regulation strategies (Boekaerts, 2011).

5. Winne and Hadwin's model

Information Processing Theory heavily influences Winne and Hadwin's model, and it goes into greater detail on the cognitive and metacognitive aspects of SRL than previous SRL models. Winne and Hadwin's model is divided into four phases (Winne, 2001 cited in Panadero, 2017)

1. Job definition: Students understand the task at hand.

2. Goal-setting and planning: Students develop goals and a strategy for achieving them.

3. Putting study tactics and strategies into action: taking the steps necessary to achieve those objectives.

4. Metacognitively adjusting studying: occurs after the major procedures have been finished and the student has decided to make long-term adjustments in her motives, beliefs, and future methods

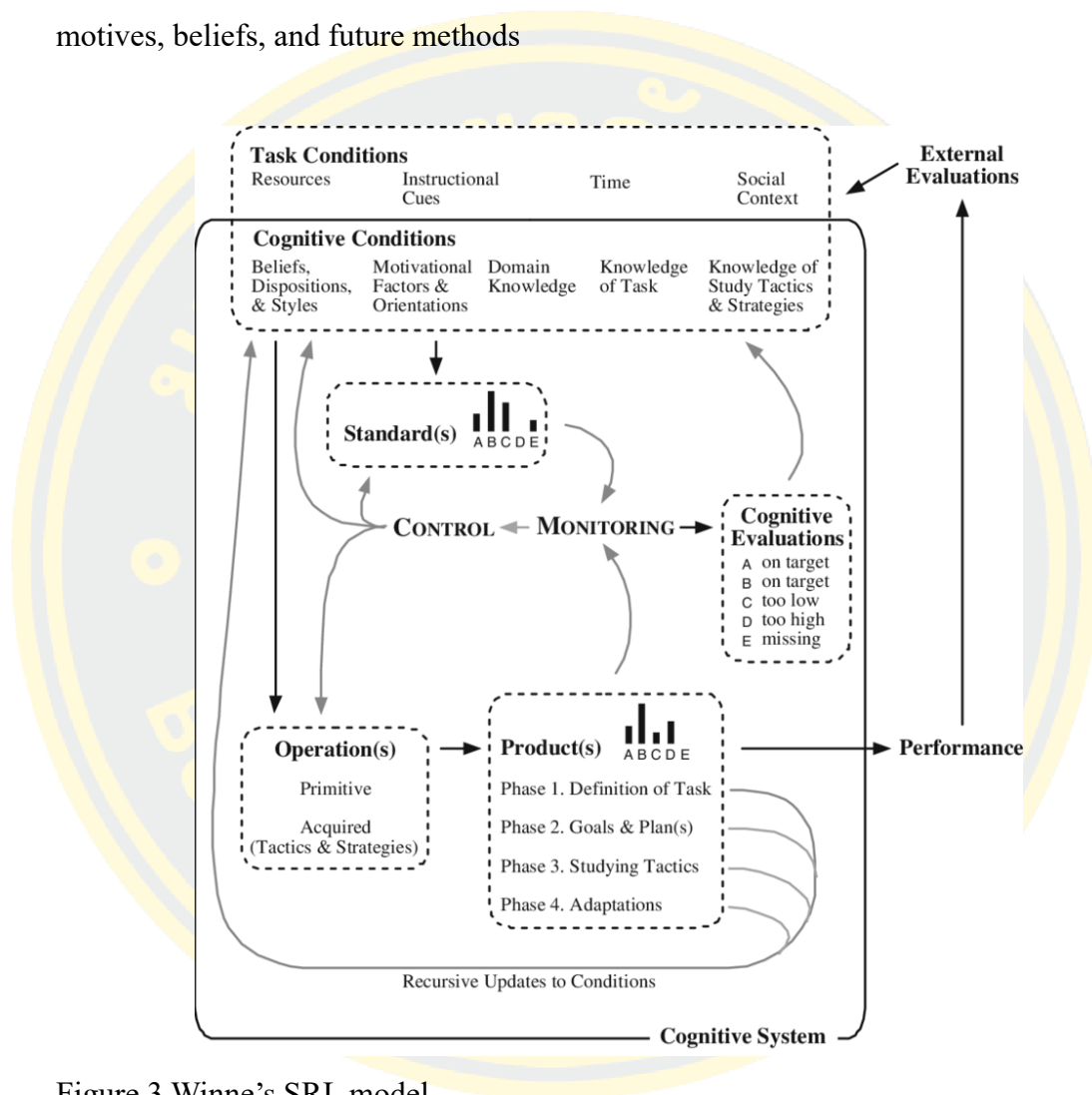


Figure 3 Winne's SRL model

Source: Panadero (2017)

6. Pintrich's SRL Model

Pintrich was one of the first to analyze the relationship between SRL and motivation empirically, and the lack of connections between motivation and cognition (Panadero, 2017; Pintrich & De Groot, 1990). According to Pintrich's (2000) model, SRL is compounded by four phases: (1) Forethought, planning, and activation; (2)

Monitoring; (3) Control; and (4) Reaction and reflection. Each of them has four different areas for regulation: cognition, motivation/affect, behavior, and context.

Table 2 Phases and area for SRL

Phases	Areas for regulation			
	Cognition	Motivation	Behavior	Context
1. Forethought, planning, and activation	Target goal setting Prior content knowledge activation Metacognitive knowledge activation	Goal orientation adoption Efficacy judgments Ease of learning judgments (EOLs); perception of task difficulty Task value activation Interest activation	Time and effort planning Planning for self- observations of behavior	Perceptions of task Perceptions of context
2. Monitoring	Metacognitive awareness and monitoring of cognition (FOKs, JOLs)	Awareness and monitoring of motivation and affect	Awareness of monitoring of effort, time use, need for help Self-observation of behavior	Monitoring changing task and context conditions
3. Control	Selection and adaptation of cognitive strategies for learning, thinking	Selection and adaptation of strategies for managing motivation and affect	Increase/decrease effort	Change or renegotiate task

Table 2 Continue

Phases	Areas for regulation			
	Cognition	Motivation	Behavior	Context
			Persist, give up	
			Help-seeking behavior	
4. Reaction and reflection	Cognitive judgments	Affective reactions	Choice behavior	Evaluation of task
	Attributions	Attributions		Evaluation of context

Source: Panadero (2017)

7. Metacognitive and Affective Model of Self-regulation Learning (MASRL)

The Metacognitive and Affective Model of Self-Regulated Learning (MASRL) (Efklides, 2011) has a stronger metacognitive foundation than the other models, except for Winne and Hadwin's, which is also metacognitively based. MASRL is divided into two levels. The first is the Person level, also known as the macro level, which is the most "conventional" view of SRL and encompasses the student's traits such as (1) cognition, (2) motivation, (3) self-concept, (4) emotion, (5) volition, (6) metacognition in the form of metacognitive knowledge, and (7) metacognition in the form of metacognitive skills make up this initial level. The Task Person level, also known as the microlevel, is where the interaction between the type of task and the student's qualities, i.e., person level, takes place. This level is bottom-up, as the metacognitive activity takes control of the student's actions, which causes activity to be "data-driven" with the focus on addressing the demands of the specific task.

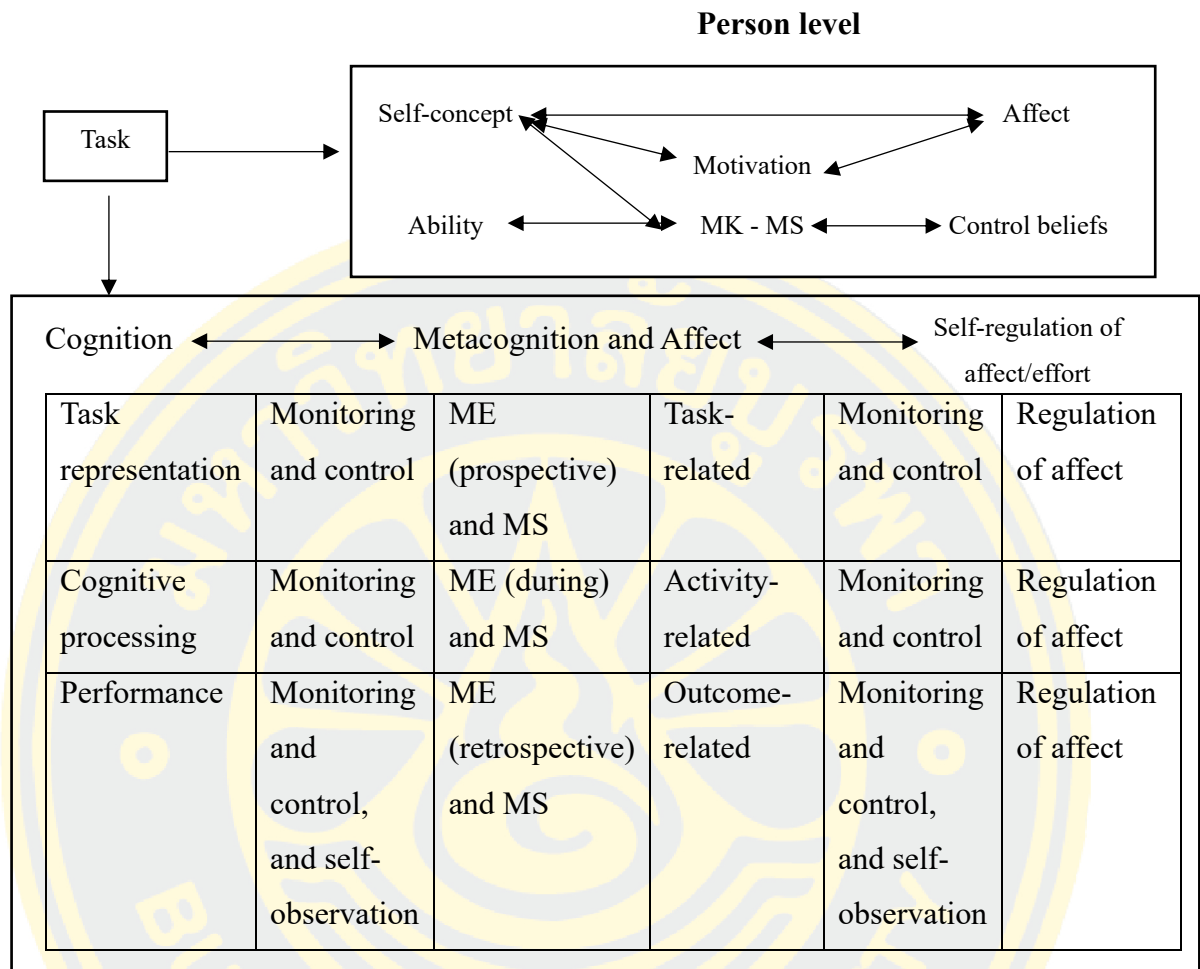


Figure 4 Metacognitive and affective Model of Self-Regulated Learning model (MASRL)

Source: Panadero (2017)

Artino et al. (2011) Describe Self-Regulated learning as a cyclical process in which an individual pursues their objectives. It is a multidimensional construct of learners who are involved in the learning process cognitively, affectively, and behaviorally. Self-regulated learners are those who effectively govern their own learning experience, such as maintaining emotional control during unpleasant or dull academic work, organizing and rehearsing material, monitoring their thought processes, and requesting help when needed.

Schmiz (2001, cited in Hall & Goetz, 2013, p. 135) developed a process-oriented model of self-regulation by separating learning into three phases: the pre-actional phase, actional phase, and post-actional phase.

1. Preactional phase marks the start of the learning process. The learner was presented with a task that needed to be completed either by others or by themselves. Several factors, including the physical learning environment and the specifications of the learning activity, influence the learner's goals and motivation in completing the task during this phase. Learners, for example, may experience negative feelings such as anxiety, stress, or hopelessness as a result of their perception that the work is too challenging and unattainable.

2. Actional phase: Learning strategies, volition, and time are three characteristics that are significant in task completion. The learner must choose learning tactics for the task, which will take time to accomplish. Volition, on the other hand, refers to how well students stay focused on what they're studying or doing without being distracted by outside variables.

3. Postactional phase: The task outcomes are evaluated against the initial learning objectives after the task is completed. There are three things to consider when assessing the learning process: quantitative factors (the number of completed tasks), qualitative aspects (how effectively the task is completed and learned), and subjective factors (how well the task is completed and learnt) (related to emotion, such as satisfaction or pride). Learners are stratified based on the evaluation's conclusion and will utilize the same learning strategies in their future learning, thereby shortening the learning process. Learners who achieve poor results, on the other hand, may adjust their learning strategies and slow down the learning process.

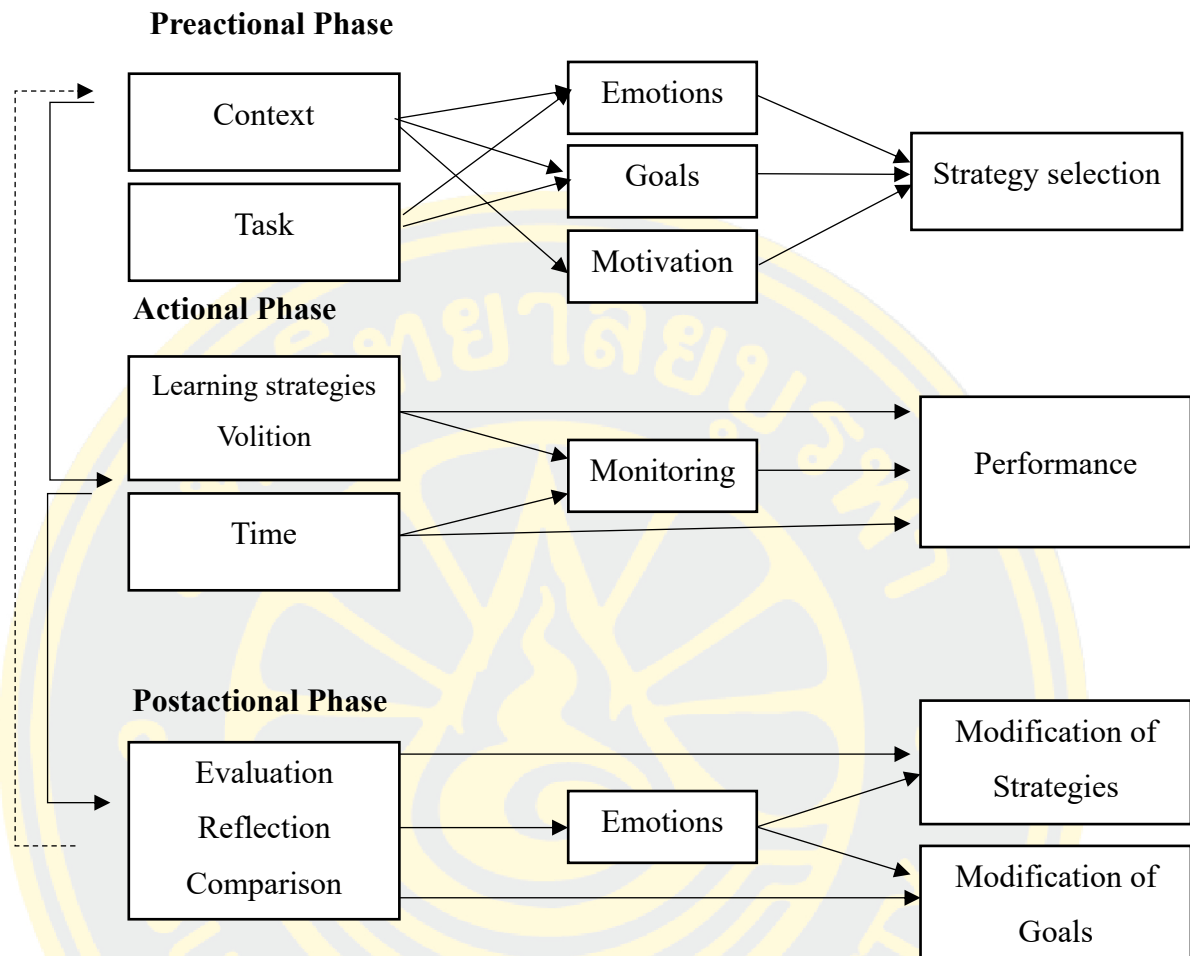


Figure 5 The process model of self-regulated learning by Schmitz

Source: Hall and Goetz (2013, p. 135)

Toering et al. (2012) designed a self-regulation of learning self-report measure, based on the notion that self-regulated learners aim to improve to achieve their goals. As a result, they believe they must understand what needs to be improved and how this may be accomplished. Planning, self-monitoring, evaluation, reflection, and self-efficacy are among the six subscales on this scale, which describe aspects of an individual's need to develop.

1. Planning refers to how to approach a task in advance, prioritizing essential tasks and managing present and future-oriented task demands within situational situations.

2. Self-monitoring refers to monitoring and regulating one's emotions and behaviors and modifying behaviors in response to the social environment and situations.

3. Evaluation is the ability to examine yourself to determine how much progress you have made.

4. Reflection refers to witnessing and evaluating our own cognitive, emotional, and behavioral processes.

5. Self-efficacy refers to people's beliefs about their ability to complete a task; these beliefs influence how people feel, think, motivate, and act (Bandura, 1997). It plays a key role in the process of control through motivation and the accomplishment of one's actions, as well as the amount of effort a person puts in and stands up to. People with strong self-efficacy put forth more effort than those with low self-efficacy (Wood & Bandura, 1989).

8. Related studies of self-regulation

Jansen et al. (2017) studied the validation of the self-regulated online learning questionnaire, as online learners need to regulate their learning more than in face-to-face learning. The data in this study were analyzed using exploratory and confirmatory factor analysis. The questionnaire was completed by 162 students representing 92 different nations. The experimentally derived model fit the data significantly better than the theoretical model. When the task strategies scale was removed and the measures assessing metacognitive activities were combined, all of the models under examination fit better. Based on the findings of the EFA and CFA, it is evident that the questionnaire requires further improvement.

Garzón-Umerenkova et al. (2018) investigate the linear bivariate correlation and structural relationships between self-regulation, health, procrastination, and academic achievement. A total of 363 college students were included in the study. The findings revealed that: 1) self-regulation has a positive relationship with flourishing and overall health, but has a negative relationship with procrastination; 2) Self-regulation is a direct and positive predictor of flourishing and health; 3) self-regulation predicts procrastination directly and negatively, as well as academic performance indirectly and positively; and 4) age and gender have a predictive effect on the analyzed variables.

Grunschel et al. (2018) studied fostering specific processes of self-regulated learning to reduce academic procrastination. The goal of this study was to develop and evaluate a group training program designed to assist students with academic procrastination. This study focused on correcting inadequate self-regulated learning processes among academic procrastinators by training them in a cyclical process model of self-regulated learning. The instruction consisted of five sessions, each lasting 90 minutes and taking place in groups of no more than ten pupils once a week. A total of 106 students completed the course—a repeated measures design with a large control group. The trained intervention group demonstrated a significant reduction in academic procrastination and showed improvements in specific self-regulated learning processes, according to the findings. In contrast, the untrained control group exhibited no change in these variables. The students rated the training overall as good and found it recommendable for friends who tend to procrastinate.

Yen et al. (2018) investigated a framework for self-directed digital learning (SRDL). The framework highlights learning plan, records and portfolios, sharing, evaluation, human feedback, machine feedback, visualization of goals/procedures/concepts, scaffolding, and agents. Each feature aids or aids one or more SRL skills, such as planning, monitoring, and assessing learning, employing suitable cognitive strategies, and establishing product or performance criteria. The use of web-based inquiry and problem-solving as examples of implementation in domain-general and domain-specific systems is examined. To exemplify various designs, examples, and learning effects are elicited from the literature.

Loeffler et al. (2019) introduced an innovative Interactive Ambulatory Assessment (IAA) method that integrates self-regulation support directly into students' daily routines via smartphone prompts. In a randomized trial involving 89 participants (43 in the intervention group and 46 in the control group), all students completed daily electronic diary entries during the days leading up to academic deadlines. The intervention group received automated, individualized feedback based on their self-reports, along with tailored self-regulation strategies designed to address their procrastination triggers. As a result, the intervention group experienced a significant reduction in procrastination behaviors and a notable increase in completed workload compared to the control group.

Zheng and Zhang (2020) investigate which self-regulated learning skills impact student learning performance during the first two years of medical school at a university in the midwestern United States. The use of self-regulated learning strategies by 146 first- and second-year medical students was found to influence their performance on standardized tests. Regression analysis and content analysis revealed that using peer learning and seeking help had a positive impact on the performance of first- and second-year students, respectively; however, using rehearsal hurt student learning outcomes. The findings suggest that encouraging peer learning and seeking help during the transition from traditional lecture-intensive learning to flipped-classroom learning could considerably increase students' academic achievement.

Cheng and Xie (2021) studied the reasons behind college students' procrastination. This study included a total of 207 college students. Through the functions of task value and emotional cost, path modeling revealed that students' perceived content relevance and technological usability indirectly predicted academic procrastination. Academic procrastination was also linked to a high level of conscientiousness. Academic procrastination was not predicted by perceived instructor engagement or peer interaction. These findings demonstrated that academic procrastination in online courses is a complicated phenomenon that stems from the interplay between college students' views of the learning situation, personal traits, and motivational beliefs. This paper discusses the practical implications of tackling academic procrastination in online courses.

Hong et al. (2021) studied how procrastination predicts online self-regulated learning and online learning ineffectiveness during the coronavirus lockdown. The goal of this research was to examine the factors that influence self-regulated online learning during the COVID-19 lockdown. Data from 433 individuals were gathered and subjected to confirmatory factor analysis and structural equation modeling. According to the findings, Procrastination was found to be adversely associated with six sub-constructs of self-regulated online learning: task strategy, mood adjustment, self-evaluation, environmental structuring, time management, and help-seeking. These sub-constructs were negatively associated with the learners' perception of online learning ineffectiveness.

Part 3: Time-management and related studies

1. Definition of time management

Time management is a significant issue among students in higher education, as it influences how they perceive and utilize time, enabling them to juggle their academic tasks effectively (Macan et al., 1990).

Time management is a self-regulated attempt to utilize time in a subjectively efficient manner to achieve outcomes (Koch & Kleinmann, 2002).

Time management is the process of planning and practicing highly attentive management of time spent on specific activities to increase effectiveness, efficiency, and production. It is regarded as a talent that people from all areas of life should master. It is essential to effectively apply time management to avoid feeling stressed or overwhelmed by work (Ranjitha et al., 2020). Time management is the method of designing and executing acute awareness of time spent on specific activities, particularly to enhance effectiveness, efficiency, and productivity.

Time management is a combination of time assessment, goal setting, planning, and monitoring activities (Häfner & Stock, 2010).

Kirillov et al. (2015) stated that time management is recognized as a technique for enhancing the efficient use of time in completing tasks. It involves the deliberate allocation of time to specific activities, ultimately improving both the effectiveness and quality of the outcomes produced.

Aeon and Aguinis (2017) reported that time management can be understood as a decision-making process in which individuals structure, protect, and adapt their time to changing conditions, comprising three key components: structuring, protecting, and adapting time.

Chansaengsee (2017) notes that time management involves prioritizing tasks based on their level of importance and urgency. It requires individuals to identify which tasks should be completed first and allocate time accordingly. Effective time managers plan and complete their responsibilities in advance, rather than delaying them, which allows for greater productivity, reduced stress, and a better use of available time. Time management skills are crucial for students, as they help reduce the overwhelming stress caused by a heavy workload and multiple assignments.

Time management is defined as a form of decision-making used by individuals to structure, protect, and adapt their time to changing conditions (Aeon et al., 2021).

In conclusion, Time management is a critical skill for undergraduate students, as it influences their ability to allocate time effectively across their academic responsibilities.

2. Key Component of Time management

Britton and Glynn (1989) specified time management components as followed: choosing goals and subgoals, prioritizing the goals, generating tasks and subtasks from the goals, prioritizing the tasks, listing the tasks on a “to-do” list, scheduling the tasks, and carrying out the tasks.

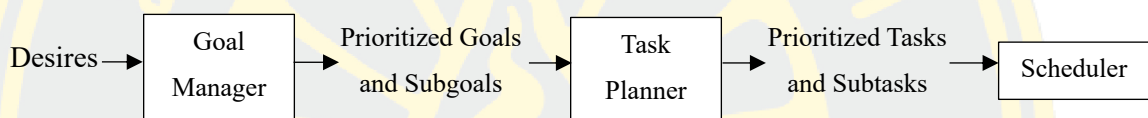


Figure 6 Top-level components of a mental time management system

Macan et al. (1990) have provided a comprehensive framework for understanding and measuring time management behaviors. The scale aims to offer insights into how students manage their time to enhance their academic performance and reduce procrastination. They have studied and divided time management into four different components, including:

1. **Setting goals and Priorities:** This factor assesses the extent to which individuals set specific goals and prioritize tasks to achieve these goals. It reflects proactive planning and the ability to distinguish between functions of varying importance.

2. **Mechanic of time management:** This dimension evaluates the practical aspects of time management, such as making to-do lists, scheduling tasks, and adhering to planned activities. It represents the operational behaviors associated with effective time use.

3. **Preference for organization:** This factor measures an individual's inclination towards maintaining an organized workspace and structured approach to tasks. A higher preference indicates a systematic method of handling responsibilities.

4. Perceived control of time: This component gauges the individual's perception of their power over time, including feelings of being in control versus overwhelmed by time demands. It reflects the subjective experience of time management efficacy.

Bandura (1991) emphasizes that effective time management is not merely a matter of organizing schedules but also depends on internal cognitive and motivational processes. He analyzes the new factors of time management result in a composite of three factors:

1. Short-range planning refers to the ability to organize and schedule daily or weekly tasks, such as setting priorities, creating to-do lists, and managing immediate deadlines. This helps individuals maintain a structured routine and reduces last-minute stress.

2. Time attitudes: refers to an individual's perception and value of time—how seriously they take deadlines, their sense of urgency, and their overall attitude toward punctuality and productivity.

3. Long-range planning refers to the setting of broader academic or life goals and managing time in a way that aligns daily activities with these long-term objectives.

Jackson (2009) has studies time management and divided its component into four components as follows:

1. Goals refer to setting clear, measurable academic or personal objectives that guide daily activities. It is foundational to effective time use, helping individuals stay focused and motivated. Without knowing what to achieve, it is challenging to direct efforts effectively.

2. Organization refers to the structuring of time and resources. It involves planning and scheduling, prioritization, minimizing time waste, and maintaining an organized environment.

- 2.1 Planning and scheduling: refers to creating plans and schedules for tasks and activities.

- 2.2 Prioritization: Identifying and ranking tasks based on importance and urgency.

2.3 Minimizing the waste of time: Identifying and avoiding useless activities that consume time or can't benefit or help an individual to reach their goals.

2.4 Maintaining an organized environment: Keeping your physical and digital workspaces tidy to reduce time spent searching for information.

3. Delegation refers to recognizing when tasks can and should be assigned to others. Effective delegation frees up your time for more critical activities that require specific skills and expertise, and it can also foster the development of others.

Chansaengsee (2017) effective time management is built upon several key elements, including goal setting, delegation, decision-making, and prioritization. It involves organizing time efficiently through strategies such as planning, creating activity schedules and to-do lists, and minimizing procrastination and engagement in unproductive tasks.

3. Benefits of Effective Time Management

Effective time management is widely recognized as a critical skill for academic success and personal development among undergraduate students. It not only supports academic performance but also contributes significantly to students' psychological well-being and self-regulation.

One of the primary benefits of time management is its positive impact on academic performance. Students who manage their time effectively are more likely to complete their work before deadlines, prepare thoroughly for examinations, and maintain consistent study habits. According to Britton and Tesser (1991), students with strong time management skills tend to achieve higher academic results because they allocate sufficient time to high-priority academic tasks and avoid last-minute cramming.

In addition to academic outcomes, time management plays a key role in reducing stress and anxiety. Misra and McKean (2000) reported that students who implemented effective time management strategies experienced lower levels of academic stress. By organizing their schedules and avoiding procrastination, these students were able to approach academic tasks with a sense of control and confidence. This stress reduction also had a positive impact on their mental health and emotional balance.

Time management also fosters self-discipline and self-regulation, which are essential for lifelong learning. Zimmerman (2000) emphasized that students who develop time management strategies are more likely to monitor their learning progress, reflect on their study habits, and adjust their goals accordingly. These behaviors are closely associated with self-regulated learning, where students take an active role in controlling their educational activities. Furthermore, effective time management promotes a better work-life balance, enabling students to balance academic obligations with extracurricular activities, part-time work, and social life. As noted by Eilam and Aharon (2003), students who maintain a balanced schedule are more likely to sustain motivation and engagement throughout the semester. They are also less likely to experience burnout or academic fatigue.

For university students, mastering time management can be one of the most crucial yet challenging skills to develop, particularly during stressful periods like the COVID-19 pandemic. Essentially, time management focuses on optimizing the allocation of your time to activities that support your goals and personal priorities (Oxford Brookes University, 2012).

4. Challenges and Barriers to Time Management

Effective time management is critical for academic success, particularly among undergraduate students who must balance multiple academic, social, and personal responsibilities. Despite its importance, many students struggle with managing their time effectively due to a variety of internal and external barriers.

4.1 Procrastination

One of the most frequently cited barriers to time management is procrastination, which is defined as the voluntary delay of an intended course of action despite expecting to be worse off for the delay (Steel, 2007). Although some individuals may underestimate the seriousness of procrastination, its impact on time management can be substantial. When tasks are postponed, the amount of available time to complete them is reduced, often leading to increased pressure and rushed efforts. As tasks accumulate, individuals may find themselves trapped in a self-perpetuating cycle of delay, stress, and diminished productivity (A Cognitive Connection, 2023).

This cycle not only results in time constraints but also affects the quality of performance, as individuals are more likely to complete tasks hastily in an attempt to meet looming deadlines. Over time, chronic procrastination can lead to academic underachievement, burnout, and heightened levels of anxiety and guilt (Tice & Baumeister, 1997).

4.2 Lack of awareness or skills in prioritizing

Students often struggle to set clear goals and prioritize tasks, which are essential components of effective time management. Individuals who prioritize by using any technique may experience better time management. For example, if a technique for task prioritization, such as Stephen R. Covey's Time Management Matrix Technique (TMMT), is used, then it will improve time management skills (Covey, 2020; Offiah & Doherty, 2018).

4.3 External distractions

A variety of external distractions can significantly undermine students' concentration and hinder effective learning. Among the most prevalent are technological distractions, particularly the use of laptops, smartphones, and social media platforms. These tools, while offering educational benefits, have increasingly permeated academic environments, raising concerns about their potential to distract students during class (Attia et al., 2017). Despite being in learning settings, many students devote substantial time to non-academic activities on their mobile devices, particularly engaging with social media.

This misuse of time can divert attention from essential academic tasks, resulting in a reduction of the time allocated for studying or completing coursework. Shanshal et al. (2024) highlight that university students exhibit high levels of social media dependency, a trend that intensified during the COVID-19 pandemic. The pandemic saw a surge in social media use across all demographics, with university students being particularly affected. This overuse has been associated with adverse mental health outcomes, including increased stress, anxiety, and depression, which further compromise students' academic performance and overall time management.

In sum, effective time management is hampered by a combination of psychological, behavioral, and contextual factors. Recognizing these challenges is the

first step toward developing interventions to help students acquire time management skills, reduce procrastination, and enhance academic performance.

5. Time Management Tools and Strategies

Time management is widely regarded as a crucial factor in achieving academic success, enhancing personal productivity, and promoting mental well-being. Over the years, various tools and strategies have been proposed to improve individuals' ability to manage their time effectively. These tools can be classified into cognitive-behavioral approaches, technological aids, and self-regulated learning strategies.

5.1 Goal Setting and Prioritization

Setting clear and achievable goals is a foundational time management strategy, and effective time management is pivotal for academic success. According to Locke and Latham (1990)'s Goal Setting Theory, individuals who establish specific and challenging goals tend to perform better than those with vague or easy objectives. One widely used framework is the SMART goal model, which emphasizes goals that are Specific, Measurable, Achievable, Relevant, and Time-bound. In academic settings, goal setting helps students organize their study routines, focus on their planning, and maintain motivation. Research indicates that students who set clear goals are more likely to exhibit enhanced academic performance and self-regulation skills (Ranjith, 2020).

Additionally, prioritization tools like the Eisenhower Matrix help individuals effectively identify and manage tasks by distinguishing between those that are urgent and important, thereby improving decision-making and the allocation of time and effort. The Eisenhower Matrix is a management philosophy based upon the study of President Dwight D. Eisenhower's management beliefs and style; the matrix helps individuals separate urgent tasks from important tasks. The matrix organizes tasks into four quadrants to enhance productivity (Covey et al., 2015):

1) Important and Urgent – Tasks with significant impact that require immediate attention, often involving pressing deadlines or crises.

2) Important but Not Urgent – Tasks that contribute to long-term goals and personal or professional growth, such as writing publications, applying for grants, or strategic planning.

3) Urgent but Not Important – Tasks that demand quick action but have low long-term value, such as routine emails or interruptions.

4) Neither Urgent nor Important – Low-priority activities with minimal benefit, often distractions or time-wasters without deadlines.

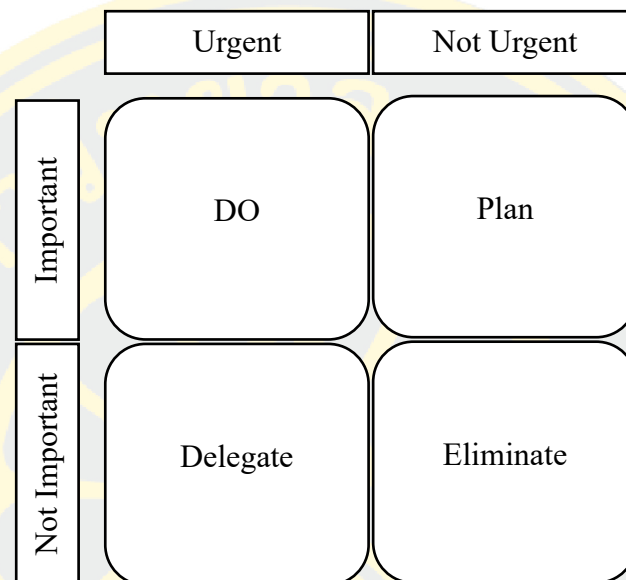


Figure 7 Eisenhower Matrix

Source: Alhasani et al. (2022)

5.2 Scheduling and Planning Tools

Among the various strategies employed, scheduling and planning tools stand out as essential instruments that facilitate the organization and execution of tasks. These tools encompass a range of methodologies and technologies designed to help individuals and organizations allocate time efficiently. For scheduling and planning, many techniques could help as follows:

1) A daily and weekly planner is a tool that helps individuals schedule, track, and manage tasks, appointments, and activities on a day-to-day or weekly basis. It allows users to prioritize tasks, set deadlines, and allocate specific time blocks to ensure efficient use of each day.

2) Time blocking is a technique that involves dividing the day into distinct blocks of time, each dedicated to a specific task or group of tasks. This

method promotes focused work sessions and minimizes distractions. By assigning specific time slots to activities, individuals can enhance concentration and productivity. Research indicates that time blocking can lead to better task management and increased efficiency.

3) The Pomodoro Technique is a time management method developed by Francesco Cirillo in the late 1980s. The name "Pomodoro" (Italian for "tomato") comes from the tomato-shaped kitchen timer that Cirillo used as a university student. This technique is designed to enhance focus, reduce distractions, and prevent mental fatigue by working in short, focused bursts followed by regular breaks. This technique requires working or studying for 25 minutes, followed by short breaks. 25-minute sessions are long enough to allow for deep focus but short enough to maintain energy and motivation, thereby helping to reduce burnout. Additionally, tracking Pomodoro intervals enhances awareness of the time required for tasks, enabling more accurate planning and time estimation (Cirillo, 2018).

5.3 Self-Monitoring and Reflection

Self-monitoring and self-reflection are essential metacognitive strategies that contribute significantly to effective time management, particularly among university students. These strategies are closely linked to self-regulated learning theory, which emphasizes the role of self-awareness, goal setting, and self-evaluation in achieving academic success (Zimmerman, 2002). Self-monitoring refers to the process by which individuals track their behaviors, performance, and time use in real-time. It enables individuals to identify patterns of productivity and procrastination, assess progress toward goals, and make informed adjustments to their schedules (Schraw et al., 2006). By keeping track of how time is spent, students become more aware of their habits and are better able to avoid time-wasting behaviors. Reflection involves analyzing past actions and outcomes to derive insights for future improvement.

Through reflection, students critically evaluate how effectively they have utilized their time, the challenges they faced, and how they can improve their productivity. This cyclical process promotes continuous improvement in time management skills. A study by Macan et al. (1990) emphasized that reflective practices contribute to the perceived control of time, one of the core dimensions of

effective time management. Moreover, Pintrich (2004) emphasized that reflection enables learners to evaluate their strategy use and outcomes, leading to more informed academic decision-making and planning.

5.4 Cognitive-Behavioral Strategies

Time management difficulties are often rooted not only in skill deficits but also in psychological barriers, such as anxiety, negative self-talk, perfectionism, avoidance behavior, and procrastination. Cognitive-Behavioral Therapy (CBT) strategies have been increasingly utilized to address these psychological factors by helping individuals recognize, challenge, and change maladaptive thoughts and behaviors (Beck, 2011). Psychological barriers to effective time management included perfectionism, avoidance behavior, and a lack of self-regulation. Therefore, Cognitive-behavioral strategies offer a structured approach to restructuring negative thought patterns and developing adaptive behaviors that support better time use. Nakashim et al. (2021) have used Group Cognitive Behavior Therapy targeting Time Management for Adults with ADHD.

6. Time Management Assessment tool

6.1 Macan et al. (1990) developed the Time Management Behavior (TMBS), which measures four core components:

- 1) Setting Goals and Priorities (SGP): The extent to which individuals set goals and determine task importance.
- 2) Mechanics of Time Management (MTM): The use of planning tools such as to-do lists and schedules.
- 3) Preference for Organization (PFO): Personal preferences toward being organized and structured.
- 4) Perceived Control of Time (PCT): The individual's belief that they have control over their use of time.

6.2 Time Structure Questionnaire (TSQ), developed by Bond and Feather (1988), evaluates how structured and purposeful individuals perceive their use of time.

6.3 The Time Management Questionnaire (TMQ) by Britton and Tesser (1991) was specifically designed for student populations and focuses on three dimensions:

- 1) Short-range planning: Day-to-day planning and prioritization.
- 2) Time attitudes: Perception of time use and satisfaction with it.
- 3) Long-range planning: Setting long-term goals and working towards them.

Numerous well-validated instruments exist to assess time management. Among the most widely used are the TMBS by Macan et al. (1990), the TMQ by Britton & Tesser (1991), and the TSQ by Bond and Feather (1988). These tools vary in scope, from measuring behavioral practices and preferences to assessing attitudes and setting long-term goals. However, in this research study, TMBS by Macan et al. (1990) was adapted as the research measurement for time management of undergraduate students.

7. Related studies of time management

Wolters et al. (2017) investigated the relationship between time management and procrastination within the context of a self-regulated learning model. The primary goal of this study was to examine whether academic time management can be used to understand how college students engage in traditional and active types of procrastination within a self-regulated learning framework. A self-report survey of 446 college students evaluated motivational and strategic components of self-regulated learning, time management, and procrastination. Self-efficacy and metacognitive methods were found to be significant predictors of traditional and active types of procrastination in regression studies. Incorporating time management into the analysis increased the amount of variance explained, and time management emerged as a significant predictor of both traditional and active types of procrastination, even when motivation and strategy variables were controlled for. The findings support the notion that effective academic time management is a crucial component of self-regulated learning. As such, it can be beneficial in determining the extent of procrastination among college students when completing their academic work.

Ahmady et al. (2021) aim to consolidate the findings of studies on the relationship between time management and academic failure, thereby providing a more in-depth understanding of the impact of these two elements on academic failure. In the research investigating the relationship between stress and academic

performance, the Funnel plot (results not shown) and Egger's test revealed no publication bias ($p = 0.719$). The estimated pooled correlation between stress and academic achievement (reverted via hyperbolic tangent transformation) was determined to be -0.32 based on this result (95 percent confidence interval: -0.38—0.25). Finally, the study identified several medium-to-large, changeable correlates of academic achievement, time management, and stress. Experimental data on how easily such self-regulatory capacities can be improved would be critical, and these interventions could help students maximize their potential by providing empirical checks for proposed models of academic accomplishment.

Aeon et al. (2021) studied a meta-analysis was undertaken to determine the impact of time management on performance and well-being. Time management is associated with job success, academic achievement, and well-being, according to the findings. Distress has a moderate, negative association with time management. Individual characteristics and environmental factors, with the noteworthy exception of conscientiousness, have a substantially weaker association with time management. The extremely weak link between gender and time management was unexpected: women appear to manage time better than men, but the difference is negligible. The researchers discovered that the link between time management and job performance has strengthened over time: time management is now more likely than it was in the early 1990s to result in a positive performance review at work. The researcher discovered that time management appears to improve well-being, specifically life satisfaction, to a greater extent than performance. This contradicts the widely held belief that time management improves work performance primarily and that well-being is merely a secondary effect.

Part 4: Anxiety and related studies

Anxiety is broadly defined as a future-oriented emotional state characterized by apprehension, tension, and worry related to the anticipation of potential danger or adverse events. It involves both psychological and physiological components, including increased cognitive and emotional arousal and somatic symptoms such as

muscle tension and increased heart rate (American Psychiatric Association, 2025; Craske & Stein, 2016)

Anxiety is a common emotional experience that most people encounter at some point in their lives. However, for many students, especially at the college level. Anxiety can become overwhelming and persistent, affecting their academic performance, mental health, and overall quality of life. It often shows up as worry about deadlines, exams, or social expectations, and can lead to difficulty focusing, sleeping, or managing daily responsibilities.

Anxiety disorders represent the most prevalent category of psychiatric disorders globally, affecting millions of individuals across diverse populations. Recent systematic reviews and meta-analyses have established that anxiety disorders maintain a worldwide prevalence rate of approximately 7.3% (range: 4.8%-10.9%), making them a significant public health concern (Thibaut, 2017). Among the various anxiety disorders, specific phobias emerge as the most common subtype, followed by generalized anxiety disorder and panic disorder. The high prevalence of anxiety disorders is particularly notable in developed countries with universal healthcare systems, where these conditions are predominantly managed in primary care settings (Santoft et al., 2019).

Several studies have explored how anxiety affects students. Beiter et al. (2015), for example, found that a large number of university students experience high levels of anxiety related to academic demands. This kind of anxiety doesn't just make students feel stressed—it can also interfere with their ability to concentrate, manage their time, or stay motivated. When anxiety goes unmanaged, students may begin to avoid tasks altogether, leading to procrastination, which creates even more stress (Sirois, 2014).

Interestingly, research also shows that students who struggle with anxiety often also face difficulties with self-regulation and time management (Misra & McKean, 2000). On the other hand, developing strong self-regulated learning (SRL) strategies—such as setting goals, planning, and tracking one's progress—can help reduce anxiety and empower students to feel more in control (Pintrich, 2004).

In recent years, technology has opened new doors for helping students manage anxiety. Mobile apps and online platforms have become increasingly popular

as convenient, private, and accessible tools for communication and information sharing. Studies by Firth et al. (2017) and Bakker et al. (2016) demonstrate that mental health apps can effectively reduce anxiety symptoms by offering features such as mindfulness exercises, daily check-ins, and goal tracking. These digital tools provide support that integrates into students' everyday routines, enabling them to develop healthier coping strategies and habits.

Related Studies

Saplavska and Jerkunkova (2018) conducted a study to explore the relationship between academic procrastination and anxiety among students. The sample included 60 second-year students from the Faculty of Engineering at the Latvia University of Life Sciences and Technologies, aged between 20 and 27. Academic procrastination was measured using the Procrastination Scale, while anxiety was assessed using the State-Trait Anxiety Inventory (Form Y). The results revealed that 48% of students showed high levels of academic procrastination, 27% were in the medium range, and 25% had low levels. A clear connection was found between academic procrastination and both state (situational) and trait (personal) anxiety. In particular, the data showed that as anxiety levels increased, so did levels of academic procrastination.

Barel et al. (2023) explore whether neuroendocrine factors, specifically testosterone and cortisol, moderate the relationship between state anxiety and procrastination. A total of 88 participants were included in the study: 29 men, 32 women using oral contraceptives, and 27 women not using contraceptives and in their luteal phase. Participants provided biological samples for hormone analysis and completed questionnaires assessing anxiety and procrastination levels. The findings revealed a positive correlation between state anxiety and procrastination. Significantly, testosterone levels moderated this relationship. When testosterone levels were lower, the link between anxiety and procrastination was stronger. However, at higher testosterone levels, this relationship was no longer significant. In contrast, cortisol levels did not show any moderating effect on the association between anxiety and procrastination.

Govindan et al. (2024) investigated procrastination as a potential indicator of anxiety disorder among college students. The study involved 347 graduate students

from various disciplines at a tertiary care hospital in Puducherry, India. Results revealed that about 124 (35.7%), with an average procrastination score of 3.15 ± 1.02 . This was followed by procrastination in studying for exams and writing term papers. The most reported reasons for procrastination were evaluation anxiety, followed by low self-esteem and perfectionism. A significant number of students (157, 45.2%) had mild anxiety, and 58 (16.7%) students were found to have severe anxiety. A statistically significant but weak positive correlation was observed between overall procrastination scores and anxiety levels, with a Spearman correlation coefficient of 0.26 (95% CI: 0.16–0.36, $p < 0.05$). Similarly, weak positive correlations were found between task aversiveness, fear of failure, and anxiety, suggesting that while the relationship is modest, anxiety-related traits may still play a role in academic procrastination among students.

Lethbridge et al. (2024)'s study aimed to explore how students' attitudes toward statistics, statistics-related anxiety, and procrastination interact to influence academic performance in a statistics course. The researchers proposed a sequential model, predicting that negative attitudes toward statistics would indirectly affect students' performance by increasing statistics anxiety, which would then lead to higher procrastination, ultimately resulting in lower course achievement. One hundred seventy-one undergraduate psychology students were employed. A sequential mediation analysis confirmed a significant indirect effect, even after controlling for age and gender. The findings indicated that students with more negative attitudes toward statistics experienced higher levels of statistics anxiety, which was associated with increased procrastination and, in turn, poorer academic performance in their statistics course.

Part 5: Depression and related studies

Depression is one of the most prevalent mental health issues worldwide and has become increasingly common among adolescents and young adults, particularly those in academic environments. It is more than just occasional sadness or a stress reaction. It is a persistent condition that affects a person's feelings, thoughts, and daily functioning (American Psychiatric Association, 2013). Symptoms of depression

include a lack of motivation, feelings of hopelessness, difficulty concentrating, low energy, and, in many cases, disrupted sleep and appetite.

Among university students, depression can significantly impact academic performance, relationships, and long-term well-being. Studies have consistently shown that students experiencing depressive symptoms are more likely to struggle with academic tasks, withdraw socially, and have difficulties with time management and self-regulation (Ibrahim et al., 2013; Kausar, 2010).

In educational settings, depression is often linked with academic procrastination, a behavior that further reinforces feelings of failure and low self-worth. When students feel overwhelmed or emotionally drained, they are more likely to delay tasks, not because of laziness, but due to emotional and cognitive barriers (Sirois & Pychyl, 2013). This creates a cycle in which procrastination leads to poor outcomes, which then reinforces depressive thoughts and avoidance behaviors.

Given the rising rates of depression among students, especially post-pandemic, there is growing interest in digital and psychological interventions that promote self-regulation, emotional awareness, and healthy coping strategies. Encouraging reflection, time management, and personalized support can help reduce the emotional burden students face and promote more adaptive academic behaviors (Lee et al., 2021; Cuijpers et al., 2016).

Related studies

Lee et al. (2021) examined symptoms of stress, anxiety, and depression among students at a public research university in Kentucky during the early phase of the pandemic. The findings were striking: approximately 88% of students reported experiencing moderate to severe stress, while 44% showed signs of moderate to severe anxiety, and 36% suffered from mild to severe depression. Certain groups were found to be particularly vulnerable, including female students, those from rural areas, low-income backgrounds, and students with lower academic performance. Despite the prevalence of these mental health challenges, the study found that many students with moderate or severe symptoms had not accessed any mental health services. These findings highlight a critical need for universities to proactively reach out to students, especially those at higher risk, and to ensure that mental health support is accessible, visible, and destigmatized. Institutions must take a more proactive role in identifying

students who are struggling and connecting them with the care they need during times of crisis—and beyond.

Kavvadas et al. (2023) have assessed levels of stress, anxiety, and depression among students at Aristotle University of Thessaloniki toward the end of the pandemic's third year. A questionnaire was distributed to students via the university's email system. The survey utilized the DASS-21 scale to measure psychological symptoms. Data analysis included correlation assessments and effect size calculations using t-tests. Most respondents were undergraduates in their first or second year of study, predominantly female (67%), aged 18 to 21, unmarried or single (91%), and had received a COVID-19 vaccination (83.4%). Severe levels of stress, anxiety, and depression were reported by 21.3%, 23.3%, and 25.1% of participants, respectively. Additionally, mild to normal symptom levels were observed in 64.0%, 66.5%, and 57.2% of students for stress, anxiety, and depression, respectively. Female and younger students faced a significantly higher risk of severe psychological distress, with odds ratios reaching up to 2.07 ($p < 0.00001$). Students already receiving psychological or psychiatric treatment showed even higher odds of severe stress, anxiety, and depression (odds ratios above 2.9, $p < 0.01$).

Liangruenrom et al. (2025) examine the prevalence of depressive disorders and identify associated risk factors among university students across Thailand. Data were collected through a nationwide cross-sectional survey using the HAPPINOMETER and the Patient Health Questionnaire-9 (PHQ-9). A total of 14,621 students from 33 universities participated in the study. To analyze the data, binary logistic regression was used to explore the impact of sociodemographic factors and health-related behaviors on the likelihood of experiencing depression. The findings revealed that 31.4% of students reported depressive symptoms, and 14.2% met the criteria for major depressive disorder. Students who identified as non-binary had the highest risk, with an adjusted odds ratio of 2.10 (95% CI: 1.7–2.6, $p < 0.001$). Other high-risk groups included female students, fourth-year students, those studying in Bangkok, and students without part-time jobs, living alone, or engaging in risky health behaviors such as smoking, heavy drinking, and poor dietary habits.

Part 6: Online application and related studies

1. Definition and significance of Online Application

Online applications, also known as web-based or mobile applications, are software programs designed to operate through a web browser or mobile operating system. They allow real-time interaction and accessibility across various devices, making them powerful tools for educational and psychological interventions.

Online applications in educational contexts are developed to enhance learning efficiency, support self-regulated learning, improve time management, and reduce procrastination behaviors (Ebner & Gegenfurtner, 2019). With the increasing accessibility of the internet and smartphones, online apps are being used more frequently to deliver scalable and personalized interventions.

An online application is a tool or software hosted on a website that users can access without downloading, allowing them to create an account, log in, and use various functionalities ranging from productivity tools to entertainment applications and games (Lior, 2013)

A web application is software that runs in a web browser. Businesses have to exchange information and deliver services remotely. They use web applications to connect with customers conveniently and securely. The most common website features, such as shopping carts, product search and filtering, instant messaging, and social media newsfeeds, are web applications in their design. They enable access to complex functionality without the need to install or configure software (Amazon Web Services, 2024).

2. Type of Application

An application is a program that facilitates various tasks in different fields. Designed for mobile phones, tablets, or mobile devices. Applications were categories into three types as follows:

2.1 Native application is an application developed with a library or SDK, a tool for developing programs or applications for the OS Mobile or Android. The advantage of using this native application is that it is easily accessible and can be downloaded from the Google Play Store or the Apple App Store. Additionally, some

applications can be used without an internet connection, making them convenient to use.

2.2 Web Application is an application that is written to be a browser for the use of various web pages, which is adjusted to display only the necessary parts in order to reduce the processing resources of the device of a smartphone or tablet, making the website load faster. Users can use it through the Internet at low speeds.

2.3 is a type of software that is designed to run across multiple operating systems, such as iOS, Android, and Windows, using a single codebase. It combines elements of both native and web applications, typically utilizing web technologies such as HTML, CSS, and JavaScript, wrapped in a native container. This allows hybrid apps to access device features (e.g., camera, GPS) while also being compatible across maintain than fully native apps (Charland & Leroux, 2011).

To sum up, this research study utilized a web application as the platform for developing the academic procrastination reduction tool, due to its cross-platform compatibility. It can be accessed on smartphones, tablets, or computers, offering flexibility and convenience for the target sample, who can easily use the application through their devices.

In developing digital interventions such as educational or behavioral applications, several instructional and design models are commonly applied to ensure systematic, user-centered development. One of the most widely used is the ADDIE model (Analyze, Design, Develop, Implement, Evaluate), which provides a structured framework for creating practical digital learning tools. The ADDIE model has been successfully applied in educational and health app development, offering flexibility for iterative testing and user feedback (Molenda, 2003).

In contrast, the Successive Approximation Model (SAM) emphasizes rapid prototyping and collaboration, making it ideal for agile e-learning development environments (Allen, 2012). Similarly, Agile methodology—originating from software engineering—supports iterative development through short cycles (sprints) and continuous user involvement, which is especially valuable for mobile and web application development (Beck et al., 2001).

While each model offers distinct strengths, recent research suggests that combining structured models, such as ADDIE, with iterative and user-driven

approaches, like Agile or Design Thinking, can lead to more effective and engaging application outcomes (Rozental et al., 2018).

3. ADDIE Model

The ADDIE model is a widely used and systematic instructional design framework that guides the development of educational programs, including online and mobile applications. Initially developed for the U.S. military in the 1970s, it has since been broadly applied in various academic and technological contexts due to its structured and iterative approach (Danks, 2011). The model includes five sequential but often overlapping phases: Analysis, Design, Development, Implementation, and Evaluation.

3.1 Analysis

In this phase, the researcher must address questions related to various issues, assessing the needs, goals, and problems of the target audience. For application development, this may involve user research, need assessment, and understanding behavioral issues, such as academic procrastination. Understanding related topics, such as recognizing that procrastination stems from poor time management and low self-regulation (Steel, 2007), would inform the features needed in the application. Or if they refer to educational technology, the analysis phase often includes identifying learner characteristics, content scope, learning context, and technological limitations.

3.2 Design

The design phase translates the analysis findings into a blueprint for the application. This includes defining learning objectives, outlining the content covered, designing the user interface, creating wireframes, establishing content structure, and developing engagement strategies. Program designers and developers can use the information they obtain to design a program, which consists of various processes, including defining the program's purpose, outlining and sequencing content, specifying learning activities, selecting appropriate teaching media, establishing assessment criteria, and creating a flowchart that shows the presentation sequence.

3.3 Development

During this phase, the actual content, assessments, and interfaces are created and integrated into the application. Prototypes and iterations are common as

feedback is collected from stakeholders or test users. Technologies such as HTML5, Python, JavaScript, and frameworks like React or Flutter may be used.

3.4 Implementation

This is the phase where the application is launched and made accessible to the target audience. It may involve deployment to servers, mobile app stores, or integration into existing learning management systems (LMS).

3.5 Evaluation

Evaluation occurs formatively throughout the process and summative after deployment. This phase assesses the app's effectiveness in meeting learning outcomes and user satisfaction.

The benefits of ADDIE in Application Development, including Its Structured and systematic approach, make it suitable for educational interventions. This approach encourages learner-centered design, aligns features with cognitive and behavioral goals, and supports continuous feedback loops, which are essential for improving app usability and effectiveness.

4. Related research studies

Patel et al. (2018) applied the ADDIE instructional design model (Analyze, Design, Develop, Implement, Evaluate) to create and assess e-learning modules that support the implementation of Individual Placement and Support (IPS)—an evidence-based employment model for behavioral health programs in New York State. Using both qualitative and quantitative methods, the researchers developed three modules: Introduction to IPS, IPS Job Development, and Using the IPS Employment Resource Book. Formative evaluations, informed by stakeholder feedback, guided the design of the module. In contrast, summative assessments (guided by the Kirkpatrick training model) demonstrated high learner satisfaction and knowledge acquisition (mean ratings 4.4–4.6/5), with nearly half of the participants reporting planned changes in their practice. Most learners demonstrated strong knowledge retention ($\geq 80\%$). The Consolidated Framework for Implementation Research (CFIR) was used to identify barriers and facilitators to implementation. The study concludes that instructional design models, such as ADDIE, can offer a systematic and context-sensitive approach to developing practical online training tools for evidence-based practices.

Zhang et al. (2018) study implemented a flipped classroom approach grounded in the ADDIE instructional design model to enhance clinical teaching for neurology residents. Ninety neurology residents in standardized training at our hospital, from the classes of 2019 and 2020, were included as participants in this study. Throughout the program, residents engaged in pre-class preparation via text and video materials, followed by interactive, student-centered classroom activities during in-person sessions. Evaluated through Mini Clinical Evaluation Exercises (Mini CEX) and other assessments, the program demonstrated significant improvements in residents' autonomous learning, critical thinking, theoretical knowledge, and comprehensive clinical skills compared to traditional teaching methods.

Saeidnia et al. (2022) study aimed to design, develop, and evaluate MyShield, a low-cost, user-friendly mobile app to promote self-care for COVID-19 prevention in underdeveloped countries. Using the ADDIE instructional design model (Analysis, Design, Development, Implementation, and Evaluation), the researchers created an Android-based educational app. A total of 27 participants assessed the app's usability and its impact on self-care using pre- and posttest measures. Results showed improvements in both physical health (average score: 4.17/5) and mental well-being (average score: 3.88/5), along with high ratings for ease of use, satisfaction, and usefulness. The findings suggest that MyShield effectively enhances self-care practices and can serve as a valuable public health tool in low-income settings, particularly during health crises such as the COVID-19 pandemic.

Li and Cheong (2023) address the decline in students' physical fitness by integrating functional training into traditional school-based physical education (PE) lessons. Employing the ADDIE model—which includes the Analysis, Design, Development, Implementation, and Evaluation phases—the researchers designed a 12-week functional training program tailored for primary school PE classes. After development, the program was implemented and evaluated to gauge its impact. The results demonstrated that the program successfully captured students' interest and led to significant improvements in their physical fitness. The study concludes that incorporating functional training within the established PE curriculum is both feasible and effective, offering a practical model for enhancing school-based physical fitness education.

Chae and Kim (2024), in their study "Effects of a Mobile Application on Improving Self-Management of Adult Patients Receiving Peritoneal Dialysis: A Randomized Controlled Trial," evaluated a mobile self-management app developed using the ADDIE model and grounded in social cognitive theory. Conducted over 10 weeks with 53 adult patients, the study found that participants who used the app showed significant improvements in disease-related knowledge, self-efficacy, health behaviors (such as diet and medication adherence), and clinical markers (albumin and hemoglobin levels), along with enhanced quality of life. The findings demonstrate that mobile applications designed with structured instructional models can effectively support self-regulated behaviors and improve health outcomes.

LaMarca and LaMarca (2024) explore the application of the ADDIE instructional design model—Analyze, Design, Develop, Implement, Evaluate—to create comprehensive Applied Behavior Analysis (ABA) programming. Unlike focused ABA interventions that target only a few behaviors, comprehensive ABA seeks to address multiple developmental domains across diverse behavioral sets. The ADDIE model provided a structured framework with consistent steps, essential tasks, and practical resources, guiding practitioners in the design and implementation of extensive behavior change programs for individuals with autism.

Chapter 3

Research Methodology

The research employed a Research and Development (R&D) design. The process of this research was divided into three phases as follows:

Phase I: The development of an academic procrastination assessment and time management inventory of undergraduate students in Thailand. A mixed-methods research approach was employed in this phase to develop assessments for academic procrastination and time management among undergraduate students. The data-validation design approach (Edmonds & Kennedy, 2017, p.185).

Phase II: The development of an online application for the academic procrastination reduction of undergraduate students in Thailand. This phase focused on developing an online application (STOPPro) to reduce academic procrastination. This stage followed a developmental research process, incorporating expert review for content validity and a pilot test with five students to assess usability and satisfaction.

Phase III: The result of the examine of the effectiveness of an online application for academic procrastination reduction of undergraduate students. This phase employed a quasi-experimental design to evaluate the effectiveness of the STOPPro application. Sixty students were recruited and divided into an experimental group and a control group. Pre-test and post-test data were collected using the Academic Procrastination, Time-Management Inventory, and General Health Questionnaire to measure academic procrastination, time management, anxiety, and depression.

Phase I: The development of an academic procrastination assessment and time management inventory of undergraduate students in Thailand.

A mixed-methods research approach was employed in this phase to develop assessments for academic procrastination and time management among undergraduate students, utilizing the data validation design approach (Edmonds & Kennedy, 2017, p. 185).

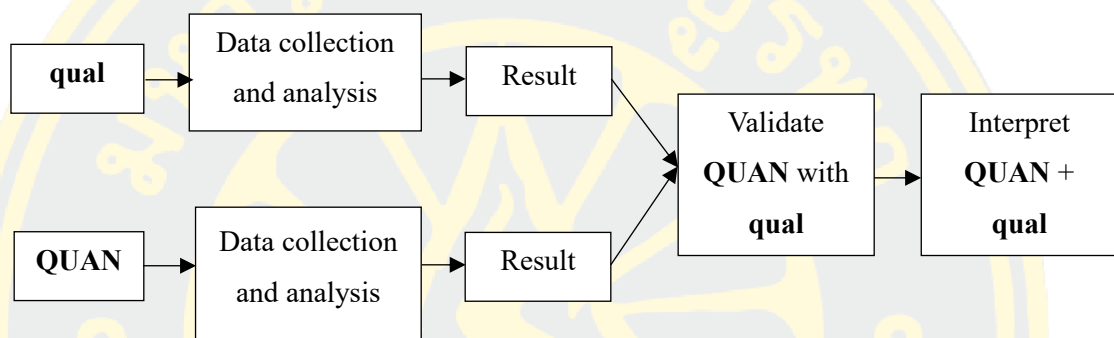


Figure 8 The Data-Validation Design of the research study

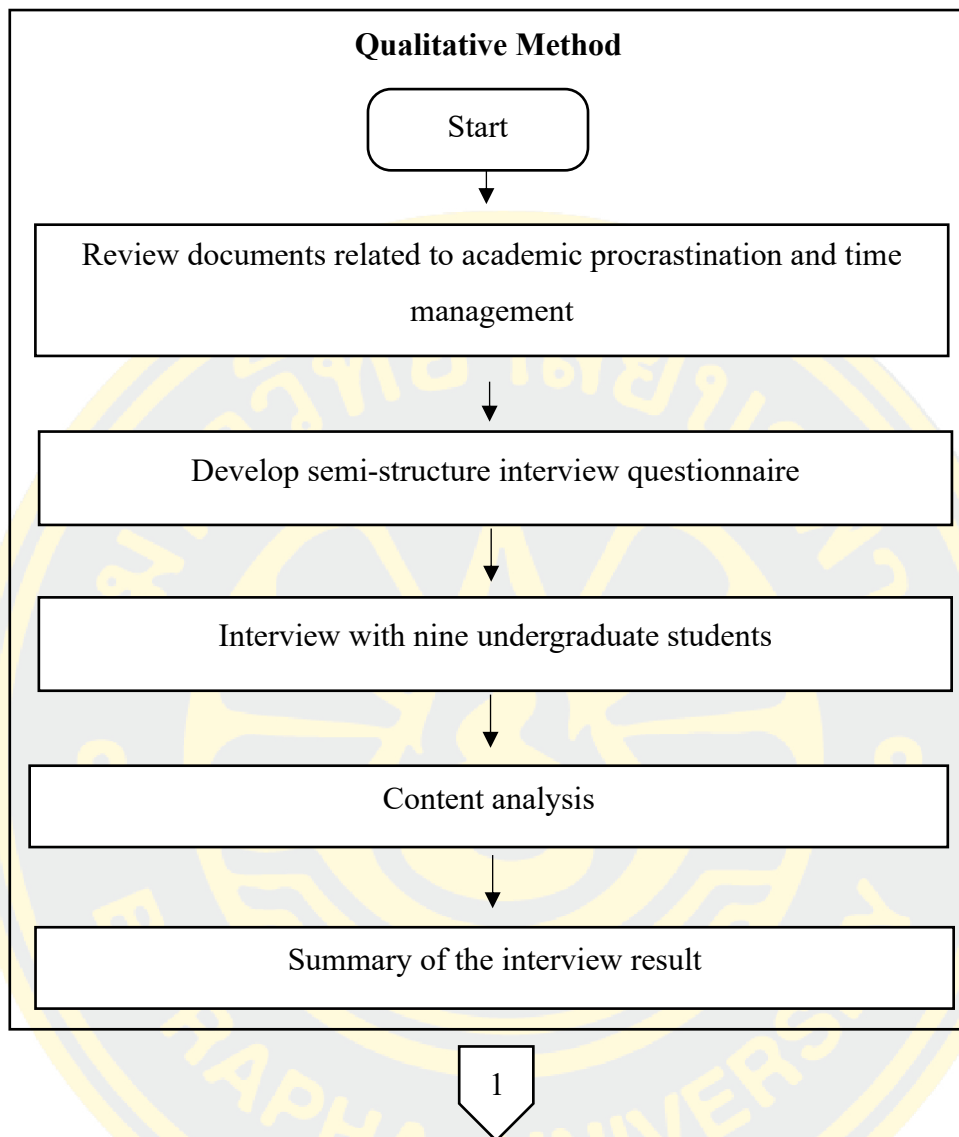


Figure 9 Process of developing an academic procrastination and time management inventory for undergraduate students

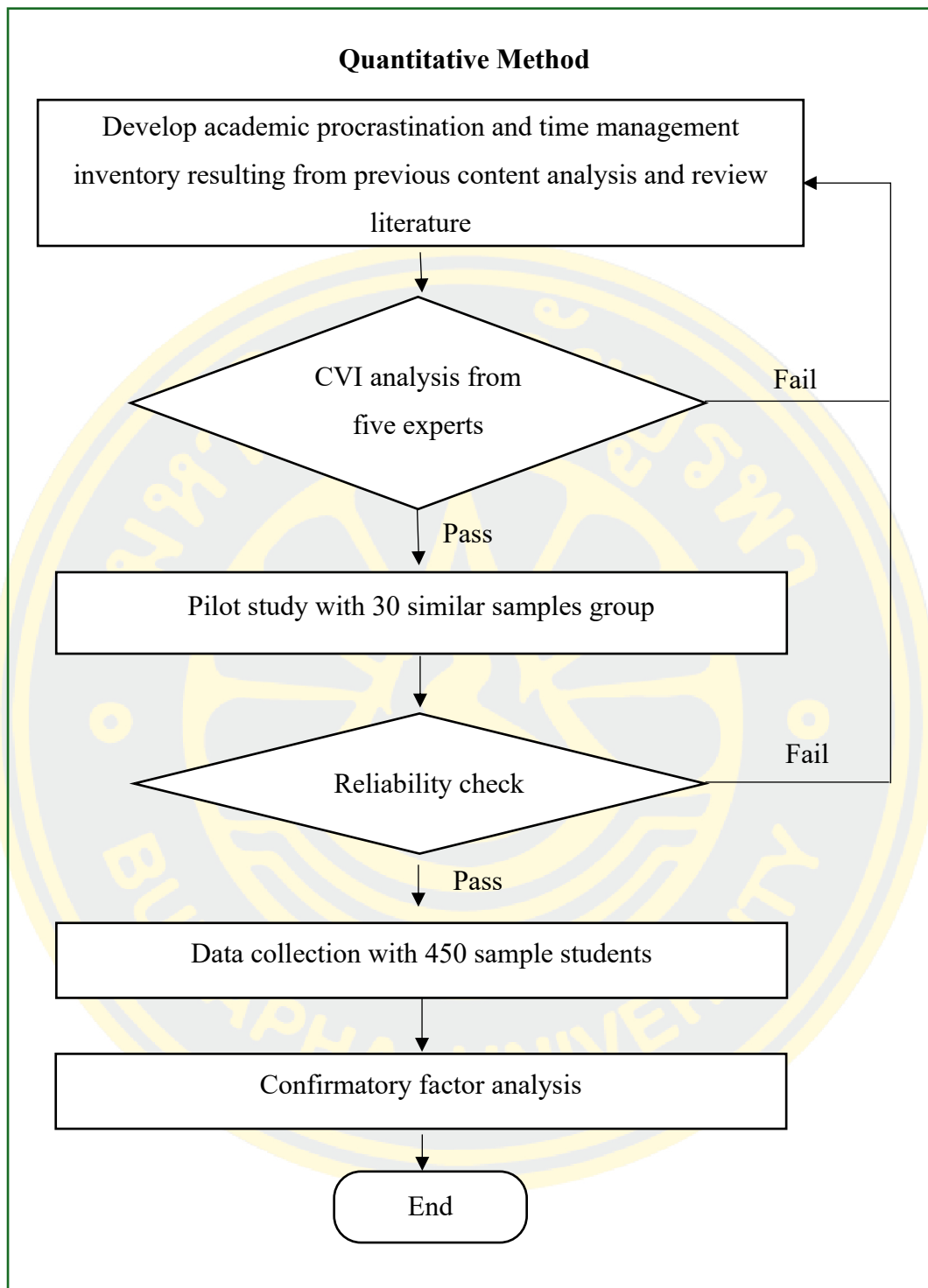


Figure 9 Continue

Figure 9 shows the step for developing academic procrastination and time management inventory for undergraduate students as follows:

1. Qualitative Research

The qualitative research at this stage aimed to explore and gather in-depth information about the academic procrastination of undergraduate students. Below was the process of the study:

- 1.1 The research conducted a literature review related to procrastination, academic procrastination, time management, and related studies.
- 1.2 The draft of semi-structured interview questions related to academic procrastination was developed and submitted to research advisors.
- 1.3 Revise the questionnaire according to the advisors' suggestions.
- 1.4 Conduct in-depth interviews with undergraduate students.
- 1.5 Analyze data using content analysis

2. Quantitative Research

2.1 Developing the academic procrastination inventory

The researcher reviewed documents related to the definition of procrastination and academic procrastination, as well as factors contributing to academic procrastination, assessment methods for academic procrastination, and relevant studies on academic procrastination.

Academic procrastination is a self-regulatory problem characterized by the delay of intended academic activities and tasks, such as willfully postponing, delaying, or putting off a task or choice, despite knowing that the outcome will be worse due to the delay. There are many causes and related factors for procrastination, such as self-regulation failure, poor time management, inability, fear, and anxiety (Balkis & Duru, 2007; Steel, 2007), failure and aversiveness (Solomon & Rothblum, 1984), and procrastination has a negative relation with self-regulation (Garzón-Umerenkova et al., 2018; Hong et al., 2021; Naderi et al., 2021; Shalev, 2018; Steel, 2007; Zhang et al., 2018; Ziegler & Opdenakker, 2018).

The review of procrastination related inventory such as international research studied on development of procrastination assessment or self-report such General Procrastination Scale (GPS) (Lay, 1986), Adult Inventory of Procrastination Scale (AIP) (McCown & Johnson, 1989), Academic Procrastination State Inventory (Schouwenburg, 1995), Pure Procrastination Scale (PPS) (Steel, 2010), Irrational

Procrastination Scale (Steel, 2010), to synthesis and develop a new inventory's items for academic procrastination. The aspect of inventory is exhibited as follows:

2.2 Developing time management inventory

The researcher conducted a comprehensive review of the literature related to time management and relevant prior studies. For this study, the Time Management Behavior Scale (TMBS) developed by Macan et al. (1990) was adopted as the framework for assessing time management skills. This framework comprises four key components: (1) Setting Goals and Priorities (SGP), (2) Mechanics of Time Management (MTM), (3) Preference for Organization (PO), and (4) Perceived Control of Time (PCT). Based on the variables of time management, an operational definition was created, and time management items were established according to the definition of each variable.

2.3 Research instrument development of academic procrastination inventory and time management inventory

The aspect of the questionnaire is exhibited as follows:

Part 1: The personal information of undergraduate students focuses on gender, age, year of study, fields of study, university, number of study tasks, and number of study plans within a one-week period.

Part 2: Academic Procrastination Inventory of undergraduate students, consisting of 16 items in 5 rating scales.

Part 3: A time management inventory for undergraduate students, consisting of four components with 30 items, expressed in 5-point rating scales.

- 1) Setting Goals and Priorities (SGP) consisted of eight items.
- 2) Mechanics of Time Management (MTM) consisted of eight items.
- 3) Preference for Organization (PO) consisted of seven items.
- 4) Perceived Control of Time (PCT) consisted of seven items.

Table 3 The inventory structure

Inventory	Number of items	Items number
Part I: Personal Information		
1. Gender	1	1
2. Age	1	2
3. Year of study	1	3
4. Area of study	1	4
5. University	1	5
Part II: Academic Procrastination Inventory	16	1-16
Part III: Time-management Inventory		1-30
1. Setting Goals and Priorities (SGP)	8	1-8
2. Mechanics of Time Management (MTM)	8	1-8
3. Preference for Organization (PO)	7	1-7
4. Perceived Control of Time (PCT)	7	1-7

Positive questions

- 5 = Strongly agree
- 4 = Agree
- 3 = Neutral
- 2 = Disagree
- 1 = Strongly disagree

Negative questions

- 5 = Strongly disagree
- 4 = Disagree
- 3 = Neutral
- 2 = Agree
- 1 = Strongly agree

Content Validity

The content validity of the academic procrastination and time management inventories was evaluated using the Content Validity Index (CVI), based on ratings from five experts. The CVI reflects the degree to which the content of each item is relevant and appropriate, as determined by expert judgment. According to Polit and Beck (2006), items rated as either 3 (relevant) or 4 (highly relevant) by the experts are considered to have acceptable content validity.

1 = Not relevant

2 = Somewhat relevant

3 = Quite relevant

4 = High relevant

The content validity index is divided into two main parts: item-level content validity (ICVI) and scale-level content validity index (S-CVI).

Item-content validity index: I-CVI

$$\text{Item-content validity index(I-CVI)} = \frac{\text{The score of 3 or 4 that given by experts}}{\text{All experts}}$$

Items that rate five with an I-CVI of .78 or higher can be considered to have good content validity stability (Polit et al., 2007).

Scale-level content validity (S-CVI)

S-CVI is divided into two essential parts, including Scale-level content validity index universal (S-CVI/UA) and Scale-level content validity index average (S-CVI/Ave). S-CVI/UA was the percentage of items on a scale that got a relevance rating of 3 or 4 by all experts. S-CVI/Ave was the meaning of the I-CVIs for all items on the scale. The SCVI/UA should be greater than .80, and SCVI/Ave should be from 0.90 up. Polit and Beck (2006) and Polit et al. (2007) further showed how to calculate the score of S-CVI/Ave by averaging the I-CVIs.

$$\text{S-CVI} = \frac{\text{Sum of I-CVI}}{\text{Amount of questions}}$$

The items with a score of less than 0.78 were removed. As a result, the I-CVI of all the questions equaled 1, and the S-CVI/UA equaled 1, indicating that the quality of each item was excellent.

As a result, after conducting the content validity check on the inventory, it was found that two items in the Academic Procrastination Inventory and zero items in the Time-Management Inventory were removed from the research instruments.

Reliability

Reliability refers to the degree to which measurements are free from error, thereby yielding accurate and efficient results. The research tools were considered reliable when a measurement device or process consistently assigns the same score to individuals or objects using the same principles (Thanasegaran, 2009). The data for the pilot of the questionnaire were collected from 30 students who were not part of the research, but had similar characteristics to those in real samples, to determine the discriminant index of each item and the reliability index (Cronbach's alpha). Ebel and Frisbie (1991, p. 232) pointed out that a perfect item of the discriminant index should be from .40 and up; good items of the discriminant index should be from .30 to .39; usable items of the discriminant index should be from .20 to .29. Excellent reliability should be from .90 and up; good reliability should be from .80 to .89; acceptable reliability should be from .70 to .89 (George & Mallery, 2024).

The results of the reliability analysis for academic procrastination and time management inventories are presented in Tables 4 and 5. The Academic Procrastination Inventory had coefficient values of reliability $\alpha = .92$, indicating excellent reliability. At the same time, the time-management inventory had an overall coefficient value of reliability of $\alpha = .86$, while each variable had a Cronbach's Alpha in the range of .78 to .86, indicating good reliability.

Table 4 Summary of research instrument and reliability results to Academic Procrastination Inventory

Inventory	Number of Items	Reliability
1. Proposed items	16	-
2. Applied items on content validity	14	-
3. Applied items on discriminate index	13	.92

Table 5 Summary of research instrument and reliability results to Time Management Inventory

Inventory	Number of Items	Reliability
1. Proposed items	30	-
2. Applied items on content validity	30	-
3. Applied items on discriminate index	25	.86
Setting goals and Priorities	6	.78
Mechanic of time management	7	.86
Preference for organization	7	.83
Perceived control of time	5	.79

After analyzing the content validity and reliability of the academic procrastination and time management inventory, the final number of items for each component is presented as follows:

Research sample

The sample in this research phase is divided into two qualitative and quantitative methodologies.

1. Qualitative methodology

According to Creswell and Creswell (2017, p. 262), qualitative research typically involves a sample size ranging from 3 to 10 participants. In line with this guideline, the present study conducted in-depth interviews with nine undergraduate

students. The selection aimed to gain a comprehensive understanding of academic procrastination behaviors, which may vary across different academic disciplines. Therefore, participants were purposefully chosen from three distinct fields of study: Social Sciences and Humanities, Health Sciences, and Science and Technology. The conditions required for participants include:

Inclusion Criteria:

- 1) Being an undergraduate student aged 18 years and above
- 2) Having experience of procrastination (or behavior related to planning university work) using the developed academic procrastination inventory. A moderate level ($M \geq 2.61$) of academic procrastination was used as the cut-off score for selection.

Exclusion Criteria:

- 1) Unable to provide complete information until the end of the interview
- 2) Withdrawal from the research

2. Quantitative methodology

The sample for studying confirmatory factor analysis (CFA) was indicated to be in the range of 250 to 500, which is suitable for data analysis (Schumacker & Lomax, 2016). Hair et al. (2019) stated that the sample size should be 5-20 times the number of observed variables. Therefore, the sample size used in this phase should be 450 undergraduate students, and multi-stage random sampling will be employed as follows:

Step 1: Simple Random Sampling of 6 regions to obtain three regions: Eastern, Northeastern, and Central.

Step 2: Simple Random Sampling of 1 province from all three regions: Eastern (Nakhon Ratchasima Province), Northeastern (Pathum Thani Province), and Central (Chonburi Province).

Step 3: Simple Random Sampling of a university from each province as follows: Burapha University, Nakhon Ratchasima Rajabhat University, and Rajamangala University of Technology Thanyaburi.

Step 4: Cluster Random Sampling by dividing the sample groups of each university equally, i.e., 150 people per university, totaling 450 people.

The conditions required for participants include:

Inclusion Criteria:

- 1) Be an undergraduate student aged 18 years and above
- 2) Agree to complete the Academic Procrastination and Time

Management Inventories

Exclusion Criteria:

- 1) Unable to complete all items of the Academic Procrastination and Time

Management Inventories

Data collection

The researchers submitted the research protocol for ethical approval to the Burapha University Ethics Committee for Human Research and received approval under code number G-HU 115/2567 with certificate number IRB4-224/2567.

1. Qualitative methodology

1. Formal permission to collect data was requested from the Graduate School and subsequently sent to the target institutions: Burapha University.

2. The researcher then sought permission from lecturers to assist in identifying and facilitating interviews with students who met the research's inclusion criteria. These students were selected based on their academic areas of study: Social Sciences and Humanities, Health Sciences, and Science and Technology. After receiving permission, the researcher contacted eligible students and scheduled interview sessions accordingly.

3. To reach additional participants, the researcher employed snowball sampling, whereby initial interviewees referred other students who met the criteria. This process continued until interviews were conducted with a total of nine students across the three academic disciplines.

4. To ensure the completeness of data, after the interview, the researcher draws a conclusion based on the results obtained from each interviewee's interview and then confirms their answer to prevent misunderstanding.

2. Quantitative methodology

1. Formal permission to collect data was requested from the Graduate School and subsequently sent to the target institutions: Burapha University, Nakhon

Ratchasima Rajabhat University, and Rajamangala University of Technology Thanyaburi.

2. The researcher coordinated with designated representatives from each university to facilitate the data collection process. This included providing them with the survey link and QR code for the Google Form used in the study.

3. Once 150 valid responses were received from each target university, the researcher closed the Google Form to prevent the collection of additional responses and to proceed with data analysis.

Data analysis

1. Qualitative data analysis: Content analysis was employed to analyze the qualitative data, following these steps:

1.1 Transcription: Audio recordings of the interviews were transcribed verbatim to ensure accuracy and completeness of the data.

1.2 Familiarization: The researcher carefully read and reviewed the transcripts multiple times to develop a deep understanding of the content.

1.3 Coding and Theming: Key statements and phrases were coded, and similar codes were grouped into categories or themes that reflected common meanings and patterns in the data.

1.4 Interpretation: The identified themes were interpreted to draw insights and understand the significance of students' perspectives on academic procrastination.

1.5 The interpreted results were cross-validated with insights from document reviews and findings from the quantitative survey to ensure the trustworthiness and credibility of the data.

2. Quantitative data analysis: data were analyzed using descriptive statistics, assumption testing, correlation analysis, and Confirmatory Factor Analysis (CFA) to examine the construct validity of the proposed model.

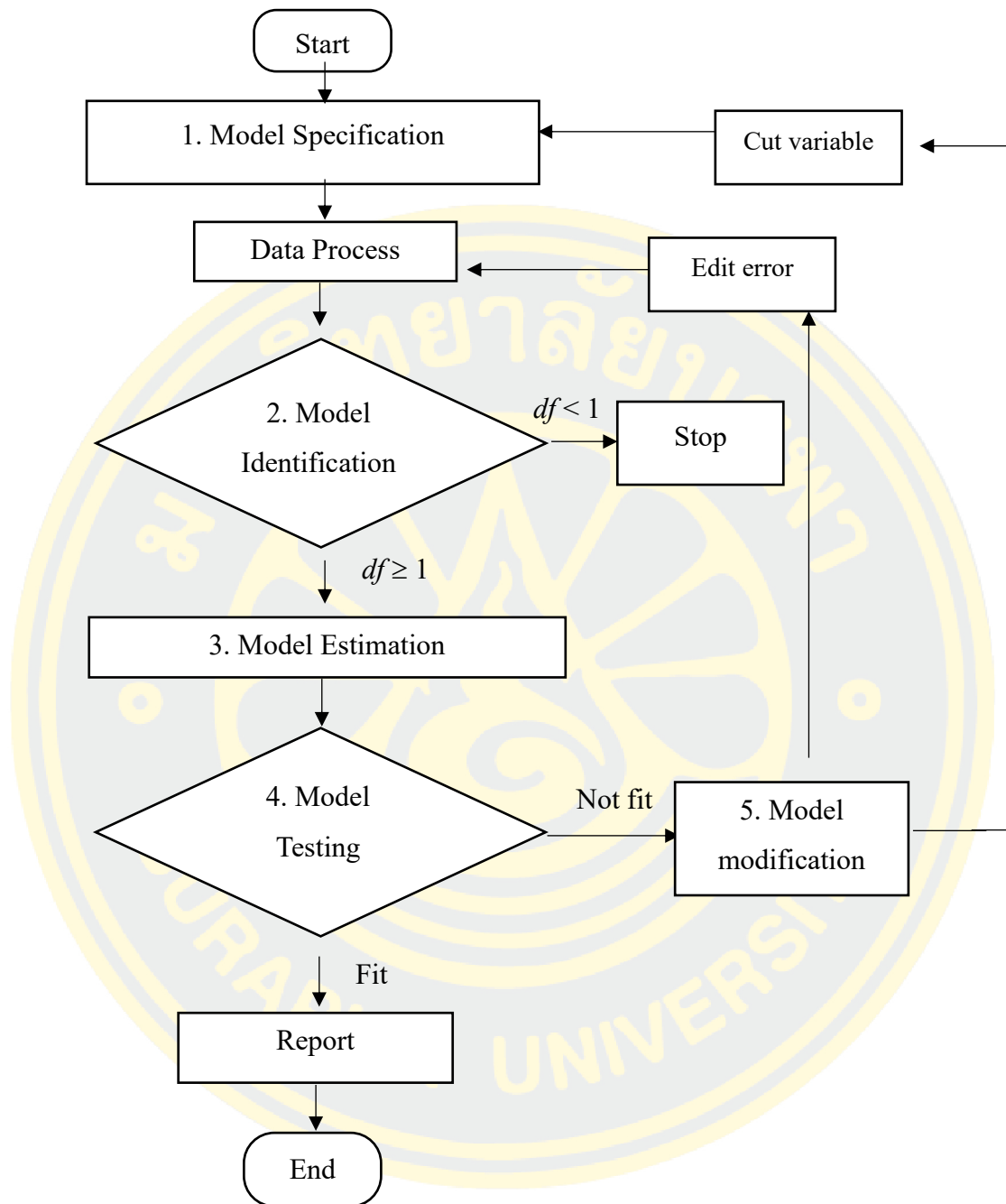


Figure 10 Confirmatory factor analysis of academic procrastination and time management model

Table 6 Model fit criteria and acceptable fit interpretation of the academic procrastination and time management model

Model fit criterion	Acceptable level	Interpretation
Chi-square	χ^2 values	Compares obtained χ^2 value with tabled value for given df
Relative Chi-square	χ^2	Less than 2
Goodness-of-fit index (<i>GFI</i>)	0 (no fit) to 1 (perfect fit)	Value close to .90 or .95 reflects a good model fit
Adjusted GFI (<i>AGFI</i>)	0 (no fit) to 1 (perfect fit)	Value close to .90 or .95 reflects a good model fit
Root means square residual (<i>RMR</i>)	Researcher defines level	
Standardized RMR (<i>SRMR</i>)	< .05	Value less than .05 indicates a good model fit
Root means square error of approximation (<i>RMSEA</i>)	.05 To .08	Value of .05 to .0 indicates close fit
Tucker-Lewis Index (<i>TLI</i>)	0 (no fit) to 1 (perfect fit)	Value close to .90 or .95 reflects a good model fit
Normed fit index (<i>NFI</i>)	0 (no fit) to 1 (perfect fit)	Value close to .90 or .95 reflects a good model fit

Source: Schumacker and Lomax (2016)

Phase II The development of an online application for academic procrastination reduction of undergraduate students in Thailand.

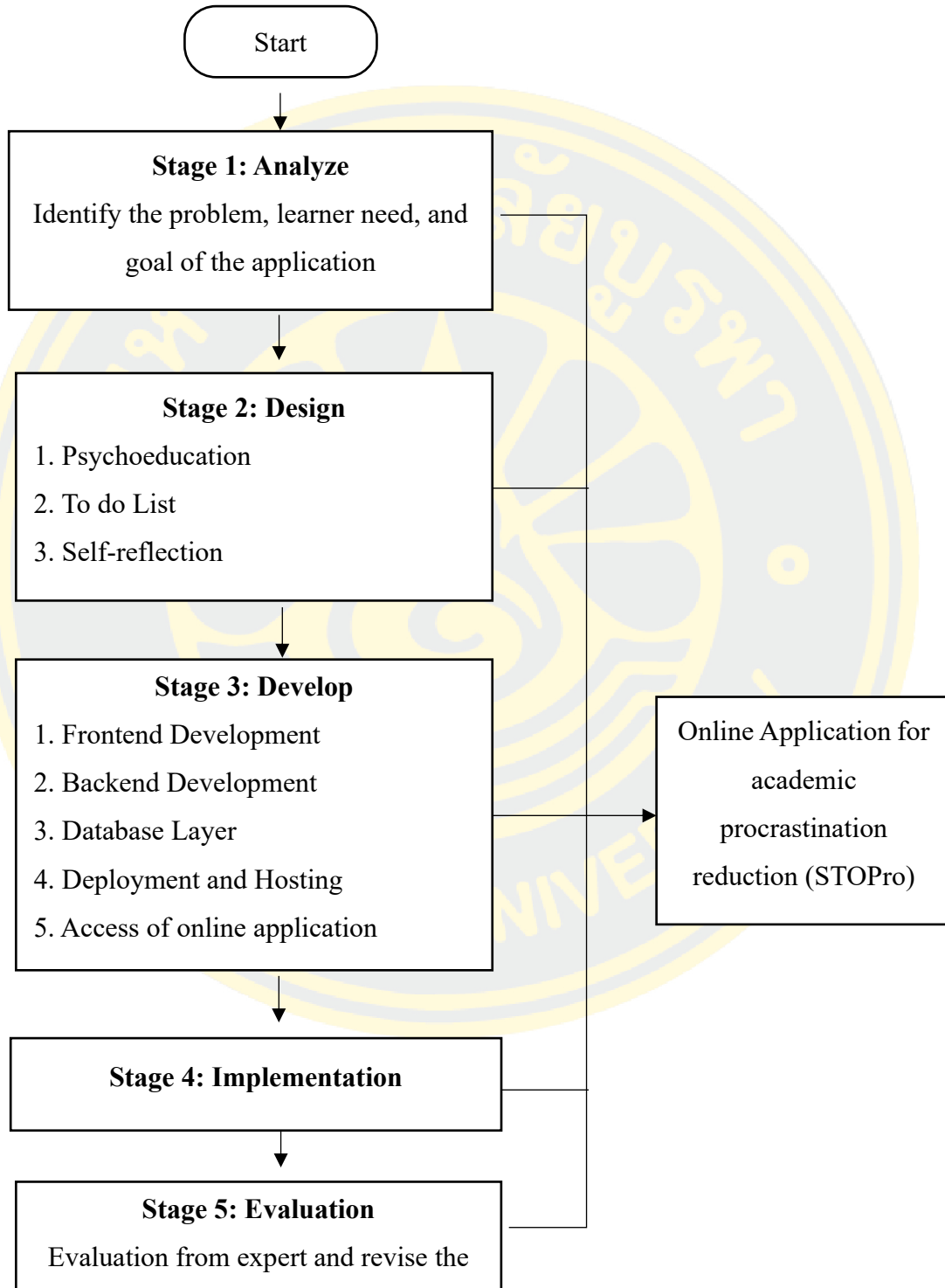


Figure 11 Process of developing online application for academic procrastination reduction for undergraduate students

According to the above, Figure 11 describes the process of Phase I, the development of an online application for academic procrastination reduction of undergraduate students as follows:

1. Literature review of related theory, concept, and studies of procrastination reduction, executive function, and self-regulated learning as follows:

- 1.1 Synthesis of the theory and concept of academic procrastination with information obtained from qualitative research from Phase I.

- 1.2 Synthesis of the theory and concept of Time management

- 1.3 Synthesis the theory and concept of self-regulated learning (Zimmerman, 2002).

2. Design an online application for academic procrastination reduction of undergraduate students by integrating time management and self-regulated learning theory. The flowchart and storyboard will be designed by writing descriptions and visuals of tasks in the application.

The ADDIE model was included as the application development process, which is divided into 1) Analyze, 2) Design, 3) Develop, 4) Implement, and 5) Evaluation.

- 2.1 Analyze: The initial phase of development began with a literature review of related theories, concepts, and studies of procrastination reduction, time management, and self-regulated learning. Besides this, qualitative analysis of interview data collected from nine undergraduate students (Phase I) was also included. These interviews served as a foundational step in identifying students' perceptions, challenges, and needs related to academic procrastination.

This insight was instrumental in shaping the application's design direction. Based on the interview findings, the development focused on integrating key principles from time management theory and self-regulated learning (SRL). These two theoretical frameworks were selected as the foundation for the application's core features and learning activities. Time management components were designed to help students set goals, plan their academic work, and effectively monitor deadlines. Meanwhile, self-regulated learning strategies were embedded to promote reflection, self-monitoring, and behavioral adjustment.

2.2 Design:

2.2.1 Storyboard design for online application design

The training of an online application for academic procrastination reduction was named STOPro, which stands for the following: S: Self-regulation, T: Time management, O: Organization, and Pro: Procrastination. The STOPro is designed to train participants over a one-month duration. Activities for reducing academic procrastination are divided into three main modules: 1) Psychoeducation, 2) To-Do List, and 3) Self-reflection.

Table 7 Storyboard of the online application development

Modules	Setting	Activities	Duration
User Authentication and Authorization		- Secure login system - Role-based access: Admin vs Regular User - Other authentication features: registration, password reset	
Psychoeducation	Browse educational content: download documents or view documents online.	1. Academic procrastination 1.1 Introduction 1.2 Reasons of academic procrastination 2. Reduce academic procrastination strategy 2.1 Self-regulated learning 2.2 Goal Setting 2.3 Time management	1 st day training
To Do List	Personal task tracking system with drag-and-drop workflow.	1. Personal task tracking system with drag-and-drop 1.1 Upcoming 1.2 In Progress 1.3 Completed 2. Detail filled in each task include: 2.1 Title 2.3 Description 2.4 Due date	4 weeks

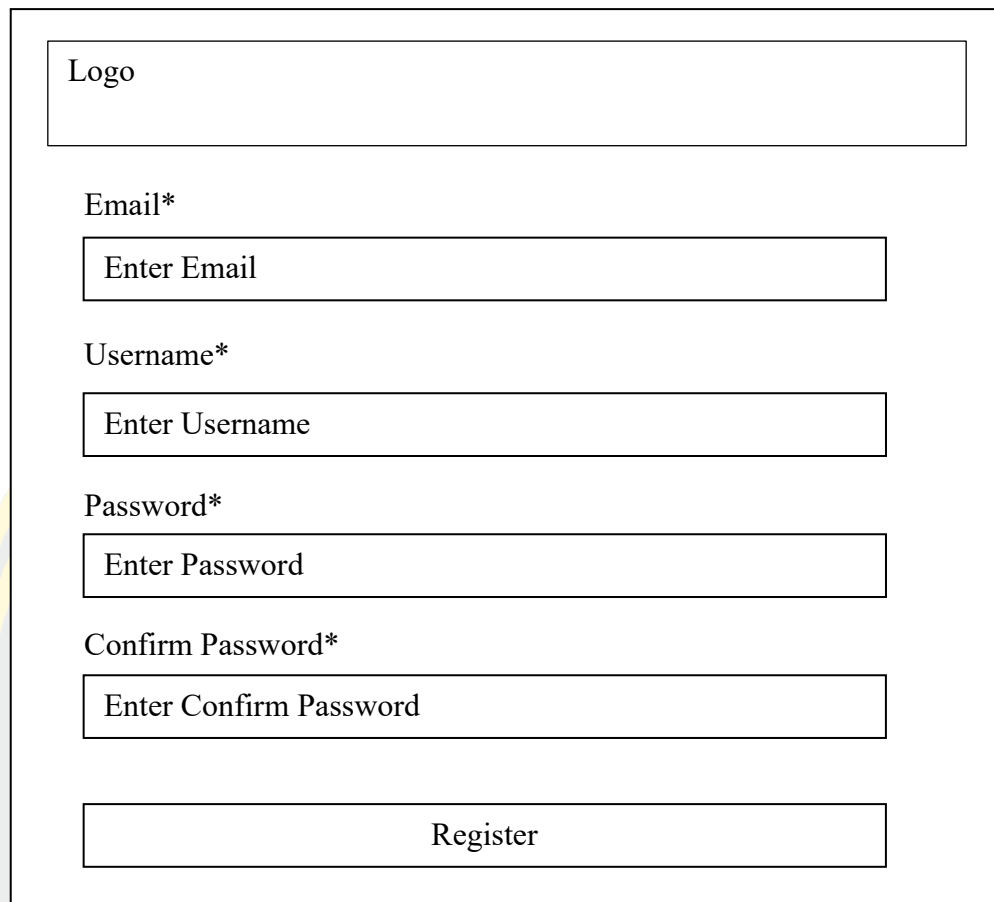
Table 7 Continue

Modules	Setting	Activities	Duration
		2.5 Priority level (e.g., Low, Medium)	
		3. Summary button: for overview the score of take completion.	
	Setting	- Configure notification reminder settings - Users/admins can define how many days in advance the system sends notifications	
Self-Reflection	Users can log personal reflection entries	Each entry contains: 1. Title 2. Timestamp 3. Optional notes Users can add new reflections, review previous ones	4 weeks: with writing once for a week

3.2.2 Application Interface Design

After completing the storyboard design for the online application, the next step involves developing the graphical user interface (GUI) as follows:

1) **Registration Page:** This screen allows both administrators and users to create an account by entering their email address, username, and password.



Logo

Email*

Enter Email

Username*

Enter Username

Password*

Enter Password

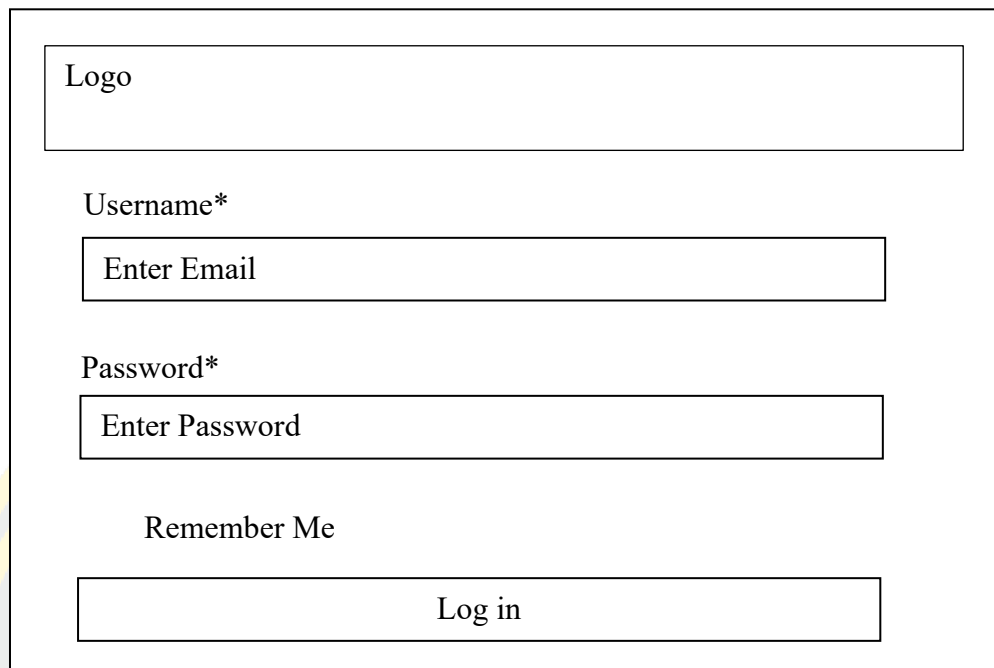
Confirm Password*

Enter Confirm Password

Register

Figure 12 The design of register page

2) **Sign in page:** After the register of new account, members need to log in for access the application as shown on Figure 13.



Logo

Username*

Enter Email

Password*

Enter Password

Remember Me

Log in

Figure 13 The design of Sign in page

3) **Home page of Application:** The home page displays the main navigation menu, which provides access to various modules, including the Document section, To-Do List, Self-Reflection, Research Inventory, and Settings. The layout and design of the home page are illustrated in Figure 14.

	Language Account
MENU	
Document	
To-Do List	
Self-reflection	
Research Inventory	
Setting	

Figure 14 The design of home page

4) **Document/ Psychoeducation Module:** The first module of the application is the Psychoeducation section, which provides informative documents designed to raise awareness about academic procrastination. These resources help users better understand the causes, effects, and strategies for overcoming procrastination. An example of this module is shown in Figure 15.

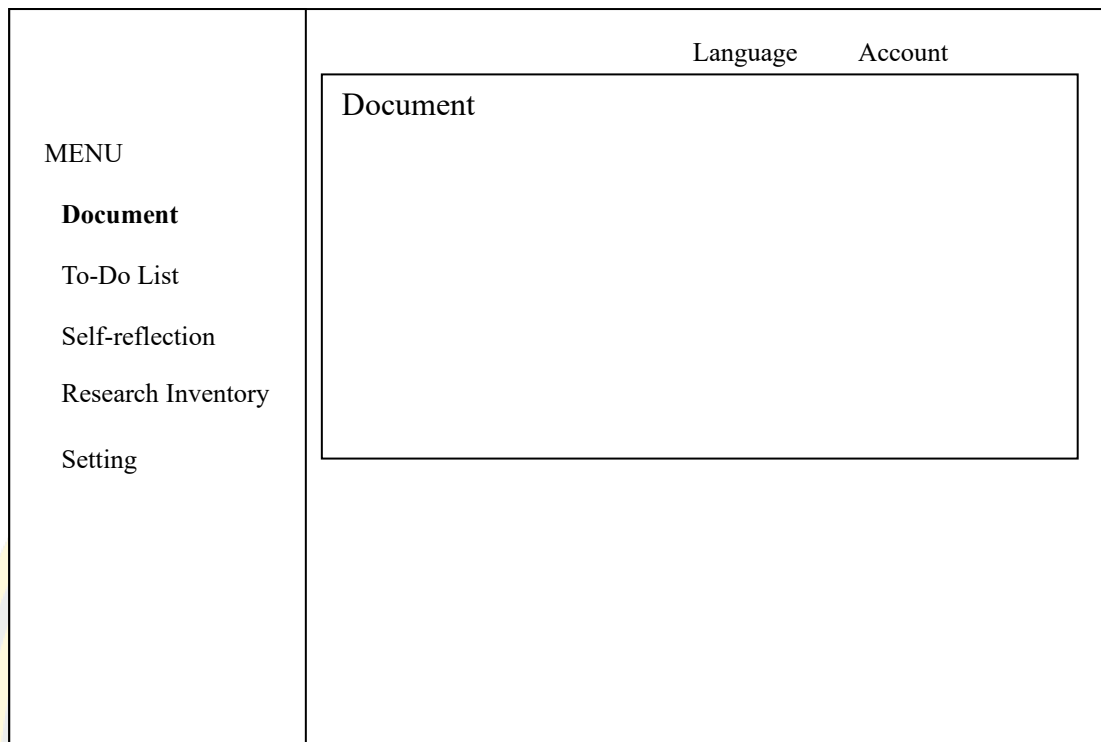


Figure 15 The design of document/Psychoeducation page

5) **To-Do List Module:** The second module is the To-Do List, where users can manage their tasks using a simple drag-and-drop workflow. Tasks are organized into three categories—Upcoming, In Progress, and Completed—enabling users to track their progress and stay visually organized.

	Language	Account
MENU	TO DO LIST	
Document		
To-Do List	Summary	
Self-reflection		
Research Inventory	Upcoming	In Progress
Setting		Completed

Figure 16 The design of To-Do List page

6) **Self-reflection Module:** In this module, users are encouraged to write weekly self-reflections, allowing them to review their progress, identify challenges, and set goals for the upcoming week.

MENU Document To-Do List Self-reflection Research Inventory Setting	Language Account SELF REFLECTION All Reflections Add New Reflection
--	--

Figure 17 The design of self-reflection

7) **Evaluation:** This module contains the evaluation forms used as part of the research to assess participants' performance. It includes both pre-test and post-test assessments to measure changes in users' behavior or understanding before and after using the application.

	Language Account
MENU	EVALUATION
Document	
To-Do List	
Self-reflection	
Evaluation	
Setting	Start Evaluation

Figure 18 The design of research inventories

8) Setting: This module enables users to select the number of days in advance they would like to receive reminders before a task's deadline. The application will then send notifications accordingly to help users stay on track.

	Language Account
MENU	SETTINGS
Document	
To-Do List	Number of day(s) for notification of To-Do List tasks
Self-reflection	
Research Inventory	
Setting	

Figure 19 The design of settings for To-Do List notification

2.3 Development: Determine software for application development.

Python, HTML, CSS, and JavaScript were the programming languages used in the application development.

1) Development Tools and Stack

1.1) Backend Framework: Django (Python)

1.2) Database: SQLite3 (for development and lightweight production)

1.3) Frontend: HTML, CSS, Bootstrap

1.4) Hosting: DigitalOcean Droplet (Ubuntu server)

1.5) Web Server: Gunicorn + Nginx

1.6) Deployment: SSH and Git-based CI/CD (or manual deployment)

1.7) Email SMTP: Sending notification to users

2) Development Methodology:

2.1) Followed a modular design using MVC architecture

2.2) Responsive UI for mobile and desktop

3) System and Architecture in design

3.1) High-level architecture: Django MVC pattern, Nginx as reverse proxy, Gunicorn WSGI server, SQLite for initial deployment.

3.2) Data design: ER diagram showing User, Task, Lesson, NotifyDay, and Self-reflection models.

3.3) Interface design: Wireframes or mockups for the dashboard, task board, reflection page, and article viewer.

3.4) Component design: Define URL routes, views, templates, and REST endpoints if planning future API support.

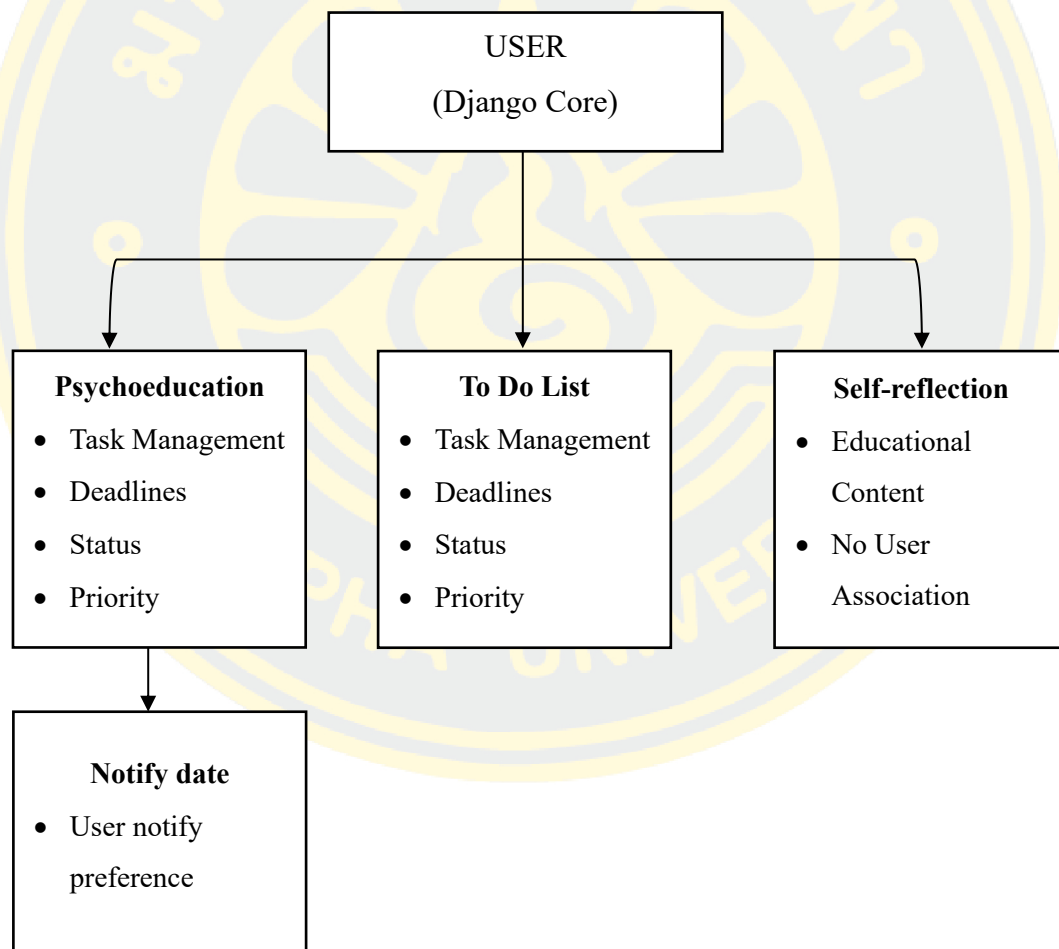


Figure 20 Entity Relationship (ER) Diagram

Table 8 Key elements of an online application for academic procrastination reduction

Sequence	Field name	Type of data	Size	Description	Note
1	id	int	-	Item code	*PK
2	title	varchar	255	Title	
3	description	text	-	Description	
4	date	date	-	Date	
5	text	text	-	Detail	
6	status	varchar	20	Status	
7	priority	varchar	10	Priority	
8	deadline	date	-	Deadline	
9	Completed_at	datetime	-	Complete date	
10	user_id	int	-	User code	**FK

Note: *PK (Primary Key) It is a field or column that cannot store duplicate unique values and cannot contain null values for each row or record in a table. Each table can have only one Primary Key.

**FK (Foreign Key) is a field or column in a table used to establish a relationship between data in two tables. It references the primary key in another table, enabling a one-to-many (1:M) or many-to-one relationship. The table containing the foreign key is often referred to as the child table, while the table with the primary key is known as the parent table.

2.4 Implementation: To evaluate the usability and functionality of the developed application, a pilot study was conducted with five undergraduate students. This initial implementation aimed to identify any technical issues, gather user feedback on the interface and features, and ensure the application operated as intended in a real-world academic setting. The insights gained from this pilot were used to make necessary adjustments before proceeding to the full-scale deployment in the research study.

2.5 Evaluation: As part of the evaluation process, five experts in the fields of educational technology and psychology were invited to review the application.

They assessed the overall appropriateness and effectiveness of its core components, including the psychoeducational content, to-do list functionality, self-reflection activities, training duration, and instructional content. The evaluation focused on clarity, relevance, usability, and alignment with principles of self-regulated learning. Feedback from the experts was used to refine the application, ensuring that it met both pedagogical standards and the practical needs of student users before broader use.

Phase III The examine result of the effectiveness of an application for academic procrastination reduction of undergraduate students.

The study of the result of online application for academic procrastination reduction of undergraduate students was conducted through the following steps:

1. Research participation

Participation in this research is open to undergraduate students aged 18 years old and above with qualifications according to the criteria for selecting sample groups to participate in the study, such as 1) inclusion criteria, 2) exclusion criteria, and 3) withdrawal criteria are as follows:

Inclusion Criteria:

- 1) Voluntarily participate in the research project
- 2) 18 years of age or older
- 3) Undergraduate students

Exclusion Criteria:

- 1) History of severe head injury
- 2) The research participant withdraws from the research project
- 3) Participate in the research project less than 80%

Sample Size

According to the general principles (Rules of Thumb) for estimating sample size, it is adequate for experimental research to have at least 15 subjects per study group. But to make it more reliable and accurate. Therefore, the sample size should be 20 people per study group (McMillan & Schumacher, 2014, p. 272). It is also consistent with sample size consideration criteria for comparing the mean of the two groups, with an effect size (ES) of .80, a Type I error of .05, and a Power of the test of

.80, as revealed by the G*power program, which suggests that the sample size should be 44. To account for potential attrition and ensure the integrity of the study results, this research will include a total of 60 participants, with 30 students in the experimental group and 30 students in the control group.

2. Research design

The research study used the between-subjects approach with a Pretest and Posttest Control Group (Edmonds & Kennedy, 2017, p. 37) as shown in Figure 21.

Group	Pretest	Experiment	Posttest
Experiment group	O ₁	X _A	O ₂
Control group	O ₁	-	O ₂
Time	→		

Figure 21 Pretest and Posttest Control Group

O₁ refers to Pretest of academic procrastination, time-management, anxiety and depression

X_A refers to using Online Application to reduce Academic Procrastination (STOPro)

O₂ refers to Posttest of academic procrastination, time-management, anxiety and depression

3. Research Tools

Research measurement tools in this study will consist of 1) participation screening tools, 2) experimental tools, and 3) dependent variable measurement tools as follows:

Participation screening tools

1) The personal information questionnaire consisted of gender, age, year of study, history of physical illness, history of mental illness, and related information.

2) Have academic procrastination not lower than a moderate level (mean score equal or above 2.61).

3) A score of less than 6 on the General Health Questionnaire (Thai GHQ – 28) of the Department of Mental Health, Ministry of Public Health, developed from Goldberg's GHQ (Nilchaikovit et al., 1996)

Experimental tool

The experimental tool used in this research is an online application designed to reduce academic procrastination among undergraduate students in Thailand.

Dependent variable measurement tools as follows:

- 1) Academic Procrastination Inventory
- 2) Time Management Inventory
- 3) General Health Questionnaire (Thai GHQ – 28) of the Department of Mental Health, Ministry of Public Health, developed from Goldberg's GHQ (Nilchaikovit et al., 1996) (items 8-14 for measuring anxiety and items 22-28 for measuring depression)

4. Data Collection

4.1 The researchers submitted the research protocol for ethical approval to the Burapha University Ethics Committee for Human Research and received approval under code number G-HU 115/2567 with certificate number IRB4-026/2568.

4.2 A volunteer recruitment announcement, including a Google Form for interested participants to provide their contact information and complete a screening measure, the Academic Procrastination Inventory, was disseminated to recruit student participants for the research study. The researcher used the collected data to follow up with potential participants.

4.3 Participants who met the inclusion criteria for this study were contacted to join the research and were randomly assigned to either the experimental group or the control group, with an equal number of participants.

4.4 The research participants of both groups were informed about the study's objectives, procedures, and the specific activities involved in the STOPro

4.4 The pretest was conducted from February 3rd to 7th, 2025, while the posttest was administered exactly one month later, from March 3rd to 7th, 2025.

5. Data analysis

1) Descriptive statistical analysis, including mean, frequency, and standard deviation, was employed to analyze the demographic data of the participants.

2) Analysis of comparative scores of academic procrastination, time management, anxiety, and depression between before and after the experiment using a paired sample t-test in case of normal distribution, and the Wilcoxon test will be employed instead in case of non-normal distribution of data. Effect sizes were also calculated to determine the magnitude of the differences.

3) Comparative analysis of academic procrastination, time management, anxiety, and depression scores between the experimental and control groups was conducted using independent samples t-tests and the Mann-Whitney U test. Effect sizes were also computed. All statistical analyses were performed using the SPSS software program.

Chapter 4

Result

The study of academic procrastination of an online application for academic procrastination reduction of undergraduate students in Thailand using the Mixed method aimed to 1) develop academic procrastination assessment and time management inventory of undergraduate students 2) develop online application for academic procrastination reduction of undergraduate students, and 3) examine the effectiveness of an online application for academic procrastination reduction of undergraduate students in Thailand.

Symbols used in data analysis

M	=	Arithmetic Mean
SD	=	Standard Deviation
r	=	Pearson Product Moment Correlation Coefficient
CV	=	Coefficient of Variation
β	=	Standardized Factor Loading
SE	=	Standard Error
t	=	t-value
R^2	=	Coefficient of Determination of latent variables
r^2	=	Coefficient of Determination of observed variables
χ^2	=	Chi-square
p	=	P-value
df	=	Degree of Freedom
CFI	=	Comparative Fit index
$RMSEA$	=	Root Mean Squared Error of Approximation
$SRMR$	=	Standardized Root Mean Squared Residual
GFI	=	Goodness-of-fit index
NFI	=	Normed Fit Index
Pro1	=	I consistently delay completing necessary tasks.
Pro2	=	I consistently complete all tasks before taking a break

- Pro3 = I often start at the last minute and find it difficult to finish on time.
- Pro4 = I often encounter problems when working against deadlines.
- Pro5 = I wasted a lot of time on unimportant things.
- Pro6 = I have trouble starting work or studying.
- Pro7 = I plan to do homework and projects over the weekend. However, I ultimately decided to either hang out or play on my phone.
- Pro8 = I always say "I will do it tomorrow".
- Pro9 = I avoid starting difficult tasks.
- Pro10 = I feel stressed and can't concentrate when the pressure is too much.
- Pro11 = I often postpone doing things until the next day.
- Pro12 = I have trouble paying attention to a single task.
- Pro13 = I find ways to delay completing tasks that are necessary.
- SGP = Setting goals and Priorities
- MTM = Mechanic of time management
- PO = Preference for Organization
- PCT = Perceived Control of Time
- SGP1 = I estimate how many hours I will need to study each week.
- SGP2 = I prioritize completing high-priority tasks before moving on to lower-priority ones.
- SGP3 = I set deadlines for myself when I intend to complete them.
- SGP4 = I break complex or difficult tasks or projects into smaller tasks to make them easier to do.
- SGP5 = I believe that if short-term goals can be achieved, it will not be difficult to achieve long-term goals.
- SGP6 = Even though I have set priorities for my work, I still choose to complete the easier tasks first.
- MTM1 = Distractions like scrolling through social media often prevent me from doing important work on time.
- MTM2 = I allocate time for learning or working on a consistent basis.

- MTM3 = I keep a journal to remind myself of the things I need to do every day
- MTM4 = Every day, I create a list of tasks to complete and then check them off
- MTM5 = I always carry my work or reading materials along whenever I encounter situations that need waiting for a considerable amount of time
- MTM6 = I always review the tasks I need to do each day in order to not have any work left unfinished
- MTM7 = I keep notes of tasks that need to be done in a place where they can be easily seen.
- PO1 = I always clean up my desk after I finish studying
- PO2 = When I create a to-do list at the start of the day, I often forget it by the end.
- PO3 = I can easily find things I need to study, when my study desk is cluttered.
- PO4 = I think that spending time on scheduling is a waste of time.
- PO5 = My workdays are too unpredictable for me to plan and manage my time to any great extent.
- PO6 = When I am somewhat disorganized, I am better able to adjust to unexpected events.
- PO7 = I am unable to perform effectively if there is no prior planning.
- PCT1 = I underestimate the time that it will take to accomplish tasks.
- PCT2 = I spend a lot of time on unimportant tasks.
- PCT3 = I feel difficult to stay on schedule because others take me away from work.
- PCT4 = I find myself procrastinating on tasks that I do not like but that must be done.
- PCT5 = I often spend time on social media until I am almost unable to complete the work on time.

Part 1: The result of the development of academic procrastination assessment and time management inventory of undergraduate students in Thailand

1. The result of the in-depth study of academic procrastination of undergraduate students in Thailand

The results from an in-depth interview with nine students from three distinct academic disciplines — social sciences and humanities, health sciences, and science and technology — revealed several common themes regarding academic procrastination. All participants identified procrastination, particularly in the form of habitual delays and laziness, as a significant challenge in their academic routines. This behavior was most evident in individual assignments and the review of materials before exams. The students often preferred engaging in less critical activities, such as playing games, using social media, or socializing with friends, instead of completing academic tasks.

Theme 1: Habitual Academic Procrastination

Sub-theme 1.1: Preference for leisure activities over academic tasks
Students frequently delay assignments in favor of non-academic activities such as using social media, gaming, or socializing.

S5: “... *I sometimes do my work, but I struggle to focus and complete it. My phone is usually nearby, which I believe is a major distraction that prevents me from concentrating on my studies. ...*”

Sub-theme 1.2: Group work minimizes procrastination through external accountability: Group assignments had less procrastination due to structured collaboration and peer responsibility.

S2: “.....*Lately, I feel as though I am developing a habit of procrastination. Last term, I delayed one assignment to the point where I forgot about it entirely, and ultimately, I was unable to submit the work. However, I don't face the same issue with group work*

because I know that if I don't participate, my friends will hold me accountable."

S9: *"For group work, all the group members needed to schedule meeting time, so I couldn't avoid or delay it."*

Sub-theme 1.3: Procrastination occurs mainly with individual work due to autonomy: Participants admitted that flexibility in individual assignments often led to delays.

S4: *"This behavior occurs primarily with individual work because I tend to believe I can manage to complete it, even if I procrastinate until the last minute. Despite feeling somewhat fatigued, I am still able to submit the work on time"*

Theme 2: Task Avoidance and Effort Minimization

Sub-theme 2.1: Prioritizing easy tasks over difficult ones: Many students reported beginning with simpler assignments regardless of urgency.

S3: *"I normally work on the easiest tasks first, while the big or difficult task will be kept to work on later."*

S7: *".... Finishing a study task is not much depending on the subject or lecture, but I prefer doing an effortless task first. For a difficult task, I may keep it the last task to work on or until the last minute."*

Sub-theme 2.2: Effort avoidance driven by short-term comfort: Students showed a tendency to delay cognitively demanding tasks.

S1: *"I prefer easy tasks to work on first, but for some subjects with strict lecturers, I need to work on them as well."*

S4: *"My interest in doing assignments does not depend on the subject. However, if the lecturer is very strict or takes individual work seriously, I feel the need to commit myself to completing it."*

Theme 3: Poor Time Estimation and Self-Regulation

Sub-theme 3.1: Inaccurate time estimation leading to rushed work or late submission

S3: *"I once thought that a research task could spend about 2–3 hours to finish, but although I worked more than 4 hours, I still could not finish it."*

S7: *"Some of my study tasks need to spend more time than I thought... my submission works were not good enough."*

S1: *"However, I have encountered issues with estimating the time required to complete assignments. For instance, I might assume that an assignment will only take 2-3 hours to finish, when in reality, it takes much longer."*

S8: *"Besides feeling lazy about doing classwork, I often assume the task will only take a short amount of time. However, I end up needing much more time to complete it."*

S9: *"However, I've encountered problems with underestimating the time required to complete projects. I often find myself spending more time on a project than I initially anticipated. As a result, I sometimes end up sacrificing sleep to finish the project on time."*

Sub-theme 3.2: Distractions and lack of self-control reduce academic focus

S9: *"I occasionally get sidetracked by my phone and find it difficult to concentrate on studying chores. ... I used to swear to myself that I would do the work, but I am unable to do so."*

Theme 4: Underutilization of Time-Management Tools

Sub-theme 4.1: Low and inconsistent use of planners and study tools:

Although students were aware of useful strategies, many did not apply them consistently.

S1: *"Typically, I don't create a daily or weekly study plan. I usually plan in my mind when I will start working on an assignment. Although I don't make formal plans, I think I can handle it. I think that study plan may be able to help, but the problem is I might forget or be lazy to do it."*

S4: *"For some term that have many assignments, I just write down which assignment's name and deadline in my notebook. I'm not really want to do daily planning, because I can do it just short period, then still forget and don't do it anymore."*

Sub-theme 4.2: Reluctance to adopt apps or external tools despite acknowledging their benefits

S2: *"I don't know which application can reduce these behaviors. I think that using google calendar may help because we can write down the deadline of the project task to prevent forgetting to submit the task, but I'm not sure of that as well, because I hardly ever use it."*

S3: *"The methodology that I used is write down something that I need to do today or note about the deadline of the work."*

S9: *"I believe that having a weekly planner is beneficial, but I rarely use because I tend to rely on my memory to keep track of project tasks, and sometime just take a note in my notebook for the deadline of the project task."*

Sub-theme 4.3: Desire for motivating or productivity-enhancing applications

S5: *"... I used to create a weekly study plan to help me stay organized and prepare for my studies. However, I often stick to it for only one or two weeks. Additionally, even though I intend to complete class assignments in advance, I still find myself procrastinating and delaying them..... I think that if there is an application which can motivate me in doing the study plan, it would be good. Since I still struggle with prioritizing multiple tasks, an application that helps me organize and prioritize my study workload would be beneficial. As I have many study task, sometimes, I don't know which task I should do because there are too many tasks."*

S6: *"At the start of each term, I usually feel motivated and make plans for my studies. However, after three or four weeks, I begin to lose that motivation and become lazy about following through. I used to see some application for the improve of productivities on the social media, it looks interested, I able to use that kind of application last long time or not."*

S8: *"If I have any kind of tools that could reduce my laziness, I think I will use them. And it could help many students. Because some of them may be as lazy as me."*

To ensure the trustworthiness and credibility of the qualitative data, triangulation was employed using multiple strategies. Data source triangulation was

achieved by conducting interviews with students from three different academic disciplines, thereby capturing a broader range of perspectives and experiences. This diversity enriched the data and helped reduce potential bias from a single-group viewpoint.

Additionally, member checking was conducted to validate the accuracy of the interpreted data. After the interviews were transcribed and summarized, the results were sent back to the original participants. They were invited to review and confirm whether the interpretations accurately reflected their views and experiences. This process helped strengthen the validity of the findings and ensured that participants' voices were authentically represented in the final analysis.

Summary of results

The qualitative findings from in-depth interviews with nine undergraduate students across three academic disciplines—Social Sciences and Humanities, Health Sciences, and Science and Technology—revealed a consistent pattern of academic procrastination influenced by both behavioral and contextual factors. Students reported a strong tendency to delay individual tasks, often due to distractions such as mobile phones and social media, a low perceived sense of urgency, and overconfidence in their ability to complete assignments at the last minute. In contrast, group work was less affected by procrastination due to the presence of structured schedules and peer accountability.

A recurring behavior across participants was the prioritization of simpler tasks over more demanding ones, indicating difficulties in task prioritization and cognitive load management. Furthermore, many students acknowledged having poor time estimation skills and a lack of consistent use of planning tools, despite being aware of methods such as digital calendars, to-do lists, and study planners. While students recognized the potential benefits of such tools, most admitted to abandoning them after short-term use due to waning motivation or reliance on memory.

Overall, the findings highlight that academic procrastination is not merely a matter of time mismanagement but is also linked to self-regulation, motivation, and environmental cues. These insights underscore the importance

of interventions that not only enhance planning skills but also promote sustained engagement and behavioral accountability among students.

2. The result of the development of procrastination assessment of undergraduate students in Thailand

2.1 Personal information

Table 9 Demographic characteristics of participants ($n = 450$)

Variable	Frequency (people)	Percentage (%)
Gender		
Male	148	32.89
Female	300	66.67
Not specific	2	0.44
Age		
18 years	27	6.00
19 years	140	31.11
20 years	138	30.67
21 years	98	21.78
22 years and above	47	10.44
Year of study		
1 st year	137	30.44
2 nd year	132	29.33
3 rd year	160	35.56
4 th year	19	4.23
5 th year	2	0.44
Field of study		
Social sciences and humanities	334	74.22
Health sciences	13	2.89
Science and technology	103	22.89

According to Table 9, a total of 450 undergraduate students participated in the study. The majority were female ($n = 300$; 66.67%), while male participants accounted for 148 students (32.89%). In terms of age distribution, most students were 19 years old ($n = 140$; 31.11%), followed by those aged 20 ($n = 138$; 30.67%), 21 ($n = 98$; 21.78%), 22 years and above ($n = 47$; 10.44%), and 18 years old ($n = 27$; 6.00%).

Regarding academic year, the largest group of participants were in their third year ($n = 160$; 35.56%), followed by first-year students ($n = 137$; 30.44%), second-year students ($n = 132$; 29.33%), fourth-year students ($n = 19$; 4.23%), and fifth-year students ($n = 2$; 0.44%).

For the field of study, most participants were enrolled in social sciences and humanities ($n = 334$; 74.22%), followed by science and technology ($n = 103$; 22.89%), and health sciences ($n = 13$; 2.89%).

2.2 Descriptive Statistics and Assumption Test of Academic Procrastination

To initiate further analysis, the data must be tested for normality using measures of skewness and kurtosis, followed by calculation of means, standard deviations, and coefficients of variance.

Table 10 Descriptive statistical of academic procrastination

Variable	<i>M</i>	<i>SD</i>	<i>CV%</i>	<i>Z_{skewness}</i>	<i>Z_{kurtosis}</i>
Pro1	2.59	1.30	50.39	3.23	-4.07
Pro2	2.56	1.06	41.48	1.10	-2.55
Pro3	2.71	1.20	44.46	1.30	-3.64
Pro4	3.26	1.07	32.94	-1.77	-1.81
Pro5	3.43	1.13	33.03	-2.07	-2.97
Pro6	2.66	1.09	40.98	2.03	-2.23
Pro7	2.97	1.21	40.64	0.42	-3.62
Pro8	3.11	1.21	38.84	-0.71	-3.55
Pro9	2.81	1.15	41.00	1.30	-2.85

Table 10 Continue

Variable	<i>M</i>	<i>SD</i>	<i>CV%</i>	<i>Z_{skewness}</i>	<i>Z_{kurtosis}</i>
Pro10	3.36	1.26	37.41	-2.44	-4.00
Pro11	2.88	1.12	39.06	1.45	-2.54
Pro12	2.94	1.22	41.36	0.07	-3.80
Pro13	2.62	1.23	47.10	3.26	-3.13
Overall	2.91	.74	25.43	.61	-1.10

According to Table 11, the descriptive statistics for academic procrastination revealed an overall mean score of 2.62, indicating a moderate level of academic procrastination among participants. When examining the 13 individual variables from highest to lowest mean score, the order was as follows: Pro5, Pro4, Pro10, Pro8, Pro7, Pro12, Pro11, Pro9, Pro3, Pro6, Pro13, Pro1, and Pro2. The mean scores were 3.43, 3.36, 3.26, 3.11, 2.97, 2.94, 2.88, 2.81, 2.71, 2.66, 2.62, 2.59, and 2.56, respectively. The standard deviation values were 1.13, 1.26, 1.07, 1.21, 1.21, 1.22, 1.13, 1.15, 1.21, 1.09, 1.23, 1.31, and 1.06, respectively.

According to the Table, the coefficients of variation were quite close to each other, with values ranging from 32.92 to 50.39. The values are indicated as an average level of data distribution. It means that the data was suitable for analyzing the confirmatory factor analysis.

The critical values *Z_{skewness}* were in the range of -2.44 to 3.26 and *Z_{kurtosis}* were in the range of -1.81 to -4.07. According to Kline (2011) *Z_{skewness}* < 3 and *Z_{kurtosis}* < 10 which the reported value is consistent with Kline (2011), except the *Z_{skewness}* of Pro 1 and Pro 13 which are more than 3. However, Hair et al. (2019) stated that normality can have profound effects in small samples (fewer than 50), but the impact effectively diminished when sample sizes reach 200 cases or more. Therefore, this study's sample is 450, and the normality assumption was not dramatically violated.

2.3 The correlation coefficients of observed variables of academic procrastination

Table 11 The correlation coefficients of observed variable of academic procrastination

	Pro1	Pro2	Pro3	Pro4	Pro5	Pro6	Pro7	Pro8	Pro9	Pro10	Pro11	Pro12	Pro13
Pro1	1.00												
Pro2	.19**	1.00											
Pro3	.34**	.31**	1.00										
Pro4	.21**	.10*	.32**	1.00									
Pro5	.16**	.23**	.42**	.35**	1.00								
Pro6	.21**	.17**	.36**	.38**	.43**	1.00							
Pro7	.30**	.24**	.46**	.29**	.44**	.35**	1.00						
Pro8	.23**	.30**	.39**	.27**	.45**	.35**	.57**	1.00					
Pro9	.23**	.30**	.34**	.25**	.38**	.38**	.48**	.50**	1.00				
Pro10	.09*	.14**	.20**	.28**	.29**	.29**	.25**	.27**	.37**	1.00			
Pro11	.30**	.38**	.49**	.32**	.51**	.42**	.58**	.69**	.59**	.40**	1.00		
Pro12	.22**	.16**	.33**	.30**	.39**	.41**	.34**	.40**	.42**	.33**	.47**	1.00	
Pro13	.33**	.31**	.43**	.27**	.42**	.38**	.50**	.55**	.51**	.26**	.65**	.51**	1.00

Table 11 presents the correlation coefficients for academic procrastination among undergraduate students, which were found to be statistically significant at the .01 and .05 levels of significance. The correlation values ranged from .09 to .69, indicating relationships of varying strength and direction. A correlation coefficient of .09, representing the correlation between Pro1 and Pro10, suggests a very weak positive relationship, while a correlation coefficient of .69, representing the correlation between Pro8 and Pro11, indicates a strong positive relationship.

2.4 The result of confirmatory factor analysis of academic procrastination

The results of preliminary factor analysis tests supported the construct validity of the Academic Procrastination Inventory. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .92, indicating excellent suitability of the data for factor analysis. Additionally, Bartlett's Test of Sphericity yielded a value of 2082.03, with $df = 78$ and $p < .01$, confirming that the correlations among items were

sufficiently significant for conducting factor analysis. These results supported the appropriateness of conducting CFA. The detailed results are presented in Table 13.

Table 12 CFA result of academic procrastination assessment

Variables	β	<i>SE</i>	<i>t</i>	r^2
Pro1	.37	.00	-	.14
Pro2	.30	.13	4.96	.09
Pro3	.61	.20	7.54	.37
Pro4	.40	.15	5.84	.16
Pro5	.61	.20	7.00	.37
Pro6	.52	.17	6.60	.27
Pro7	.69	.23	7.26	.47
Pro8	.70	.24	7.27	.50
Pro9	.69	.22	7.27	.48
Pro10	.45	.20	5.71	.21
Pro11	.85	.25	7.62	.72
Pro12	.60	.21	6.97	.36
Pro13	.74	.24	7.74	.55
$\chi^2 = 65.10$, $df = 49$, $\chi^2/df = 1.33$, $RMSEA = .03$, $NFI = .99$, $GFI = .98$, $AGFI = .96$.				

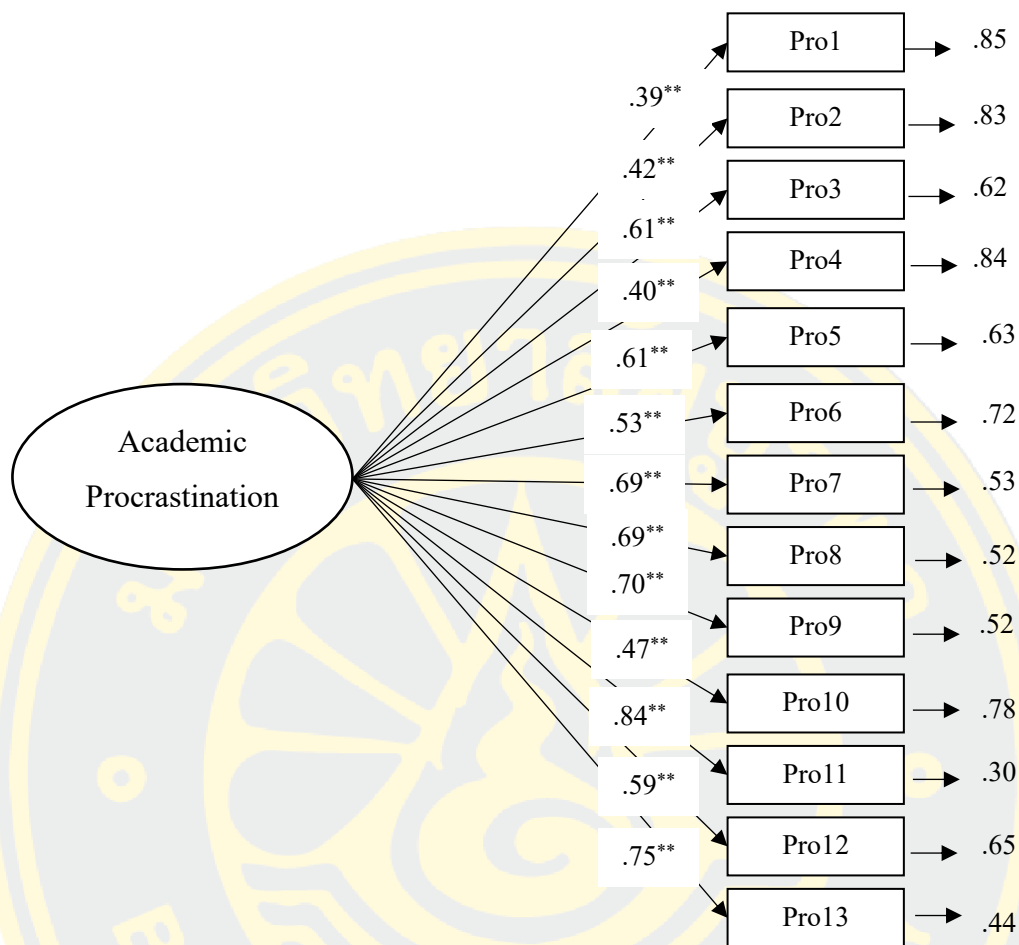


Figure 22 Measurement model of academic procrastination

The result of construction validity of academic procrastination showed that consistent with empirical data $\chi^2 = 65.10$, $df = 49$, $\chi^2/df = 1.33$, $RMSEA = .03$, $NFI = .99$, $GFI = .98$, $AGFI = .96$. This aligns with the findings of Schumacker and Lomax (2016); Hooper et al. (2008), and Hair et al. (2019) which stipulate that the criterion for χ^2/df should be below 2, CFI and TLI indices should approach 1, $RMSEA$ should be under .05, and $SRMR$ should be below .08. The overall components indicate an individual propensity to defer commitments from academic responsibilities to less significant activities, diminish study planning, and exhibit motivation to fulfill educational obligations alone in the presence of substantial urgency.

3. The result of the development of Time Management Inventory

3.1 Descriptive Statistica and Assumption test of Time Management

Inventory

To initiate further analysis, the data must be tested for normality using skewness and kurtosis, followed by the calculation of mean, standard deviation, and coefficient of variance.

Table 13 Descriptive statistical of time management

Variable	<i>M</i>	<i>SD</i>	<i>CV%</i>	<i>Z_{Skewness}</i>	<i>Z_{Kurtosis}</i>
Setting goals and Priorities	3.32	0.78	23.56	0.64	-0.27
1. I estimate how many hours I will need to study each week. (SGP1)	3.06	0.95	31.21	2.38	-1.15
2. I prioritize completing high-priority tasks before moving on to lower-priority ones. (SGP2)	3.46	1.00	28.93	0.43	-3.19
3. I set deadlines for myself when I intend to complete them. (SGP3)	3.46	1.01	29.19	0.62	-3.56
4. I break complex or difficult tasks or projects into smaller tasks to make them easier to do. (SGP4)	3.33	0.99	29.85	1.33	-2.83
5. I believe that if short-term goals can be achieved, it will not be difficult to achieve long-term goals. (SGP5)	3.44	0.96	28.02	1.37	-2.94
6. Even though I have set priorities for my work, I still choose to complete the easier tasks first. (SGP6)	3.15	0.90	28.63	2.98	-0.91

Table 13 Continue

Variable	<i>M</i>	<i>SD</i>	<i>CV%</i>	<i>Z_{Skewness}</i>	<i>Z_{Kurtosis}</i>
Mechanic of time management	3.29	0.65	19.77	3.23	-0.84
1. Distractions like scrolling through social media often prevent me from doing important work on time. (MTM1)	3.18	0.82	25.91	2.59	-0.88
2. I allocate time for learning or working on a consistent basis. (MTM2)	3.30	0.85	25.67	3.34	-1.63
3. I keep a journal to remind myself of the things I need to do every day (MTM3)	3.23	0.88	27.12	2.43	-1.09
4. Every day, I create a list of tasks to complete and then check them off (MTM4)	3.24	0.83	25.52	3.62	-1.10
5. I always carry my work or reading materials along whenever I encounter situations that need waiting for a considerable amount of time (MTM5)	3.30	0.86	26.12	3.10	-1.99
6. I always review the tasks I need to do each day in order to not have any work left unfinished (MTM6)	3.42	0.93	27.16	2.64	-3.36
7. I keep notes of tasks that need to be done in a place where they can be easily seen (MTM7)	3.39	0.93	27.52	3.41	-3.13

Table 13 Continue

Variable	<i>M</i>	<i>SD</i>	<i>CV%</i>	<i>Z_{Skewness}</i>	<i>Z_{Kurtosis}</i>
Preference for Organization	3.31	0.71	21.46	0.22	0.27
1. I always clean up my desk after I finish studying (PO1)	3.05	0.90	29.61	1.74	-0.17
2. When I create a to-do list at the start of the day, I often forget it by the end. (PO2)	3.40	0.99	29.18	0.45	-2.62
3. I can easily find things I need to study, when my study desk is cluttered (PO3)	3.46	1.01	29.42	-0.38	-2.91
4. I think that spending time on scheduling is a waste of time (PO4)	3.36	0.97	28.75	1.14	-2.27
5. My workdays are too unpredictable for me to plan and manage my time to any great extent (PO5)	3.46	0.93	26.94	1.23	-2.40
6. When I am somewhat disorganized, I am better able to adjust to unexpected events. (PO6)	3.07	0.96	31.14	2.46	-1.21
7. I am unable to perform effectively if there is no prior planning. (PO7)	3.35	0.94	27.97	1.03	-1.70
Perceived control of time	3.40	0.79	23.15	0.11	0.16
1. I underestimate the time that it will take to accomplish tasks. (PCT1)	3.42	0.99	29.06	0.98	-3.26
2. I spend a lot of time on unimportant tasks. (PCT2)	3.50	1.02	29.11	-0.49	-3.08
3. I feel difficult to stay on schedule because others take me away from work. (PCT3)	3.36	0.93	27.80	0.80	-1.98

Table 13 Continue

Variable	<i>M</i>	<i>SD</i>	<i>CV%</i>	<i>Z_{Skewness}</i>	<i>Z_{Kurtosis}</i>
4. I find myself procrastinating on tasks that I do not like but that must be done. (PCT4)	3.33	0.92	27.69	1.57	-2.19
5. I often spend time on social media until I am almost unable to complete the work on time. (PCT5)	3.37	0.92	27.36	1.33	-2.18
Total	3.33	0.59	17.72	.16	-0.12

According to Table 13, the results of the deceptive statistics for all 25 observation variables are based on four components: Setting goals and Priorities (SGP), Mechanic of time management (MTM), Preference for Organization (PO), and Perceived control of time (PCT).

Setting goals and Priorities was measure by six observed variables which are ordered from highest to lowest mean scores as following “I prioritize completing high-priority tasks before moving on to lower-priority ones” (SGP2), “I set deadlines for myself when I intend to complete them” (SGP3), “I believe that if short-term goals can be achieved, it will not be difficult to achieve long-term goals” (SGP5), “I break complex or difficult tasks or projects into smaller tasks to make them easier to do” (SGP4), “Even though I have set priorities for my work, I still choose to complete the easier tasks first” (SGP6) and “I estimate how many hours I will need to study each week” (SGP1). The mean scores were 3.46, 3.46, 3.44, 3.33, 3.15, and 3.06, respectively. The standard deviation values were 1.00, 1.01, 0.96, 0.99, 0.90, and 0.95, respectively.

Mechanic of time management was measure by seven observe variables which are ordered from highest to lowest mean scores as following “ I always review the tasks I need to do each day in order to not have any work left unfinished” (MTM6), “I keep notes of tasks that need to be done in a place where they can be easily seen” (MTM7), “I allocate time for learning or working on a consistent basis” (MTM2), “I always carry my work or reading materials along whenever I encounter

situations that need waiting for a considerable amount of time” (MTM5), “Every day, I create a list of tasks to complete and then check them off” (MTM4), “I keep a journal to remind myself of the things I need to do every day” (MTM3), and “Distractions like scrolling through social media often prevent me from doing important work on time” (MTM1). The mean scores were 3.42, 3.39, 3.30, 3.30, 3.24, 3.23, and 3.18, respectively. The standard deviation values were 0.93, 0.93, 0.85, 0.86, 0.83, 0.88, and 0.82, respectively.

Preference for Organization was measure by seven observe variables which are ordered from highest to lowest mean scores as following “I can easily find things I need to study, when my study desk is cluttered” (PO3), “My workdays are too unpredictable for me to plan and manage my time to any great extent” (PO5), “When I create a to-do list at the start of the day, I often forget it by the end” (PO2), “I think that spending time on scheduling is a waste of time” (PO4), “I am unable to perform effectively if there is no prior planning” (PO7), “When I am somewhat disorganized, I am better able to adjust to unexpected events” (PO6) and “I always clean up my desk after I finish studying” (PO1). The mean scores were 3.46, 3.46, 3.40, 3.36, 3.35, 3.07, and 3.05, respectively. The standard deviation values were 1.01, 0.93, 0.99, 0.97, 0.94, 0.96, and 0.90, respectively.

Perceived control of time was measure by five observe variables which are ordered from highest to lowest mean scores as following “I spend a lot of time on unimportant tasks” (PCT2), “I underestimate the time that it will take to accomplish tasks” (PCT1), “I often spend time on social media until I am almost unable to complete the work on time” (PCT5), “I feel difficult to stay on schedule because others take me away from work” (PCT3) and “I find myself procrastinating on tasks that I do not like but that must be done” (PCT4). The mean scores were 3.50, 3.42, 3.37, 3.36, and 3.33, respectively. The standard deviation values were 1.02, 0.99, 0.92, 0.93 and 0.92 respectively.

The coefficients of variation were relatively close in value, ranging from 25.52 to 31.21, which reflects a moderate level of data dispersion. The results suggest that the data were adequately distributed and thus suitable for conducting confirmatory factor analysis (CFA).

Regarding normality, the $Z_{skewness}$ ranged from -0.49 to 3.62, and the $Z_{kurtosis}$ values ranged from -3.56 to -0.17. According to Kline (2011), acceptable thresholds for assessing normality are $Z_{skewness} < 3$ and $Z_{kurtosis} < 10$. Most values in this study fell within those acceptable limits, except for $Z_{skewness}$ for MTM5, MTM2, MTM7, and MTM4, which slightly exceeded 3. However, as noted by Hair et al. (2019), violations of normality assumptions tend to have a substantial impact only in small sample sizes (e.g., fewer than 50 cases). Since this study involved a large sample size ($n = 450$), the effect of non-normality is considered negligible and unlikely to compromise the validity of the CFA results.

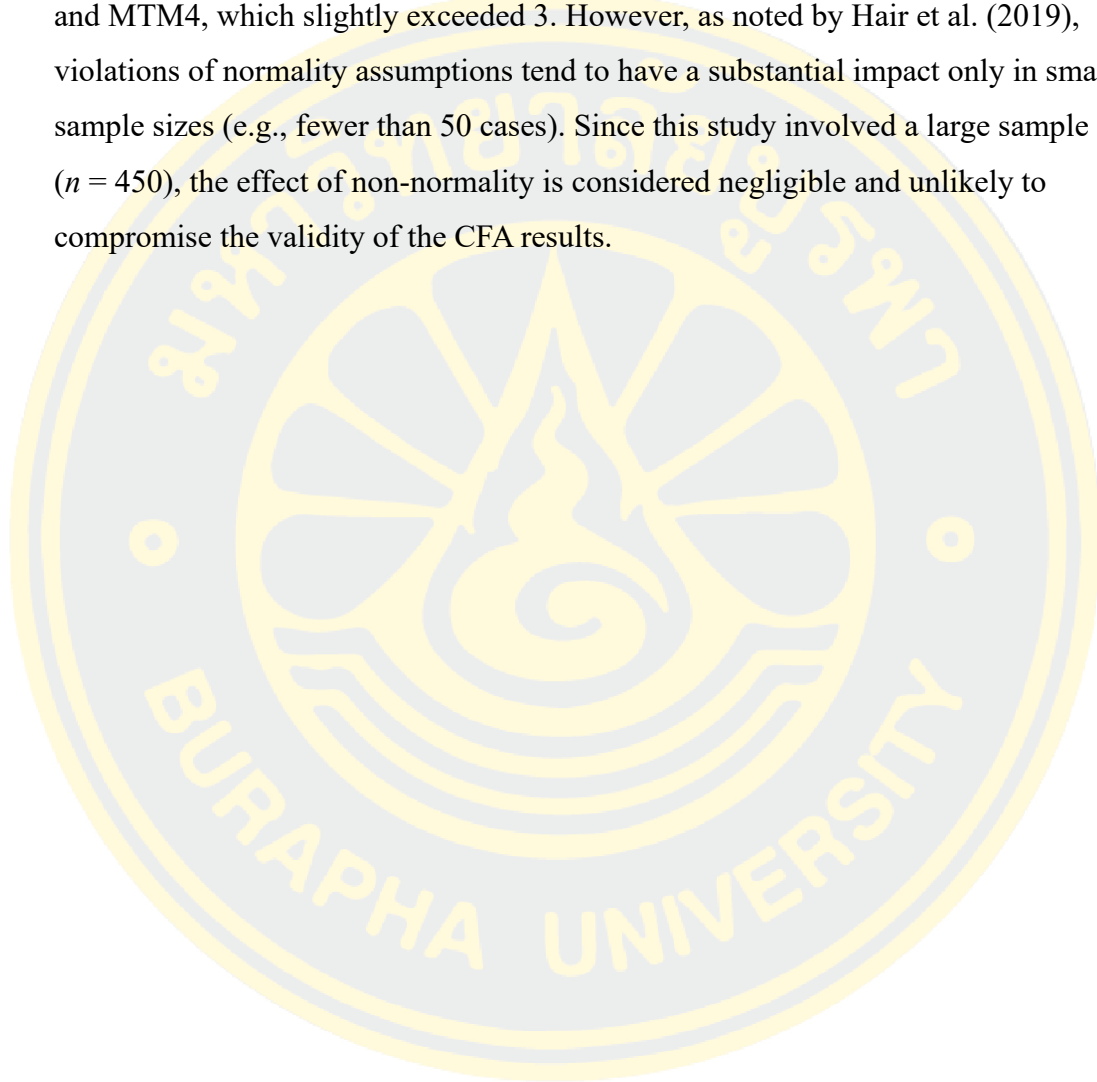


Table 14 Correlation of Observe Variables of Time Management

	SGP1	SGP2	SGP3	SGP4	SGP5	SGP6	MTM1	MTM2	MTM3
SGP1	1.00								
SGP2	.49**	1.00							
SGP3	.49**	.65**	1.00						
SGP4	.56**	.59**	.66**	1.00					
SGP5	.50**	.61**	.64**	.69**	1.00				
SGP6	.78**	.45**	.47**	.54**	.54**	1.00			
MTM1	.54**	.15**	.21**	.25**	.22**	.48**	1.00		
MTM2	.31**	.26**	.24**	.26**	.27**	.25**	.52**	1.00	
MTM3	.21**	.16**	.16**	.26**	.23**	.22**	.40**	.50**	1.00
MTM4	.23**	.19**	.21**	.26**	.25**	.24**	.47**	.71**	.59**
MTM5	.31**	.22**	.27**	.32**	.31**	.30**	.57**	.77**	.61**
MTM6	.27**	.29**	.35**	.37**	.35**	.32**	.31**	.43**	.35**
MTM7	.30**	.26**	.29**	.31**	.28**	.28**	.30**	.39**	.39**
PO1	.65**	.30**	.33**	.39**	.33**	.55**	.37**	.21**	.18**
PO2	.35**	.50**	.49**	.47**	.62**	.36**	.14**	.19**	.12*
PO3	.24**	.35**	.52**	.37**	.42**	.25**	.13**	.17**	.11*
PO4	.35**	.32**	.40**	.66**	.43**	.37**	.25**	.22**	.20**
PO5	.27**	.33**	.40**	.40**	.67**	.36**	.17**	.18**	.15**
PO6	.63**	.35**	.37**	.36**	.35**	.48**	.42**	.22**	.15**
PO7	.46**	.79**	.51**	.49**	.53**	.41**	.15**	.22**	.11*
PCT1	.41**	.58**	.76**	.56**	.64**	.41**	.16**	.21**	.16**
PCT2	.35**	.67**	.45**	.42**	.48**	.34**	.15**	.23**	.16**
PCT3	.30**	.42**	.49**	.39**	.45**	.25**	.14**	.28**	.16**
PCT4	.40**	.41**	.46**	.45**	.49**	.28**	.22**	.27**	.20**
PCT5	.31**	.43**	.45**	.40**	.51**	.31**	.19**	.26**	.18**

Table 14 Continue

	MTM4	MTM5	MTM6	MTM7	PO1	PO2	PO3	PO4	PO5
SGP1									
SGP2									
SGP3									
SGP4									
SGP5									
SGP6									
MTM1									
MTM2									
MTM3									
MTM4	1.00								
MTM5	.79**	1.00							
MTM6	.36**	.48**	1.00						
MTM7	.34**	.46**	.52**	1.00					
PO1	.21**	.21**	.17**	.21**	1.00				
PO2	.16**	.22**	.22**	.22**	.50**	1.00			
PO3	.16**	.27**	.21**	.23**	.36**	.60**	1.00		
PO4	.21**	.35**	.30**	.27**	.45**	.55**	.63**	1.00	
PO5	.15**	.25**	.25**	.24**	.37**	.64**	.60**	.63**	1.00
PO6	.20**	.30**	.25**	.29**	.64**	.50**	.45**	.50**	.44**
PO7	.17**	.22**	.24**	.24**	.32**	.45**	.31**	.30**	.29**
PCT1	.20**	.26**	.36**	.29**	.32**	.50**	.62**	.42**	.44**
PCT2	.18**	.19**	.27**	.26**	.16**	.33**	.29**	.28**	.36**
PCT3	.21**	.24**	.27**	.22**	.13**	.27**	.45**	.29**	.32**
PCT4	.25**	.30**	.28**	.24**	.18**	.29**	.44**	.36**	.36**
PCT5	.23**	.26**	.27**	.20**	.15**	.28**	.40**	.30**	.39**

Table 14 Continue

	PO6	PO7	PCT1	PCT2	PCT3	PCT4	PCT5
SGP1							
SGP2							
SGP3							
SGP4							
SGP5							
SGP6							
MTM1							
MTM2							
MTM3							
MTM4							
MTM5							
MTM6							
MTM7							
PO1							
PO2							
PO3							
PO4							
PO5							
PO6	1.00						
PO7	.38**	1.00					
PCT1	.37**	.54**	1.00				
PCT2	.24**	.58**	.44**	1.00			
PCT3	.16**	.41**	.53**	.58**	1.00		
PCT4	.27**	.39**	.50**	.55**	.79**	1.00	
PCT5	.19**	.41**	.48**	.55**	.78**	.79**	1.00

3.2 The correlation coefficients of observed variable in time management

The correlation coefficients for Setting Goals and Priorities were significant at the $p < .01$, which displayed between .45 and .78. SGP1 with SGP6 had the highest correlation coefficient, while the lowest coefficient was SGP2 with SGP6.

The correlation coefficients of the Mechanics of Time Management were significant at the $p < .01$, ranging from 0.30 to 0.79. MTM4 with MTM5 had the highest correlation coefficient, while the lowest coefficient was observed between MTM1 and MTM6.

The correlation coefficients for Preference for Organization were significant at $p < .01$, ranging from .29 to .64. PO2 with PO5 had the highest correlation coefficient, while the lowest coefficient was observed between PO1 and PO3.

The correlation coefficients of Perceived control of time were significant at $p < .01$, ranging from .44 to .79. PCT4 with PCT5 had the highest correlation coefficient, while the lowest coefficient was observed between PCT1 and PCT2.

Table 15 The correlation coefficients between components of time management

	SGP	MTM	PO	PCT
SGP	1.00			
MTM	.45**	1.00		
PO	.73**	.39**	1.00	
PCT	.68**	.37**	.56**	1.00

Note: ** $p < .01$

The coefficient values for the correlation between the component variables of time management showed a significant correlation at the $p < .01$ level.

According to Table 15, the correlation coefficient between the component variables of time management was the lowest, at .37 (Mechanics of time management and Perceived control of time), and the highest value was .68 (Setting goals and priorities and Perceived control of time). These coefficient correlations indicated that the variables had enough correlations for conducting a statistical analysis.

3.3 The results of confirmatory factor analysis of Time Management

1. The result of confirmatory factor analysis of Setting goals and priorities

Table 16 The result of confirmatory factor analysis of Setting goals and priorities

Variables	β	SE	t	r^2
SGP1	.66**	-	-	.44
SGP2	.73**	.06	12.96	.53
SGP3	.77**	.06	13.59	.59
SGP4	.83**	.06	14.44	.69
SGP5	.84**	.06	13.83	.70
SGP6	.64**	.03	18.91	.40

$\chi^2 = 6.05, df = 6, \chi^2 / df = 1.01, p = .42, RMSEA = .00, NFI = 1.00, NNFI = 1.00, CFI = 1.00, GFI = 1.00$

Note: ** $p < .01$

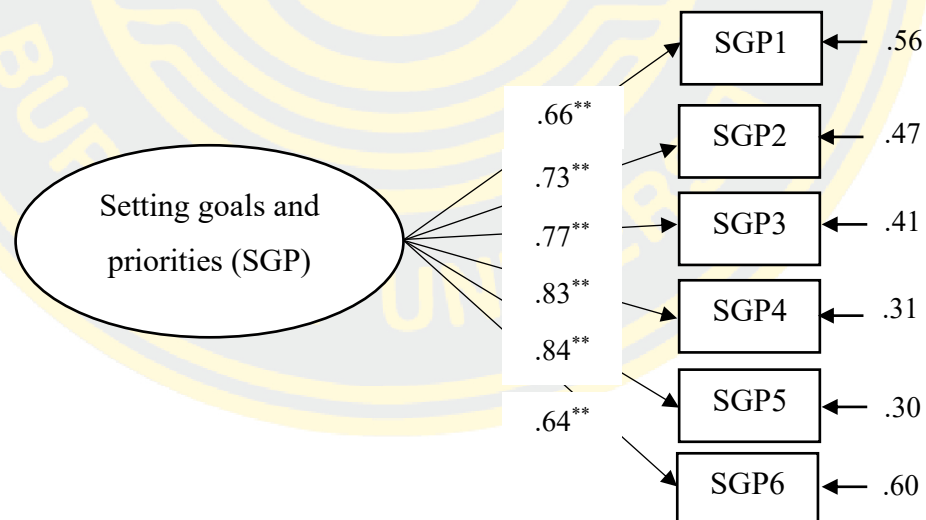


Figure 23 Measurement model of Setting goals and priorities

According to Table 16, the result of construction validity of Setting goals and priorities (SGP) showed that consistent with empirical data $\chi^2 = 6.05, df = 6, \chi^2 / df = 1.01, p = .42, RMSEA = .00, NFI = 1.00, NNFI = 1.00, CFI = 1.00, GFI = 1.00$. This aligns with the findings of Schumacker and Lomax (2016); Hooper

et al. (2008), and Hair et al. (2019) which stipulate that the criterion for χ^2/df should be below 2, *CFI* and *TLI* indices should approach 1, *RMSEA* should be under 0.05, and *SRMR* should be below 0.08.

The confirmatory factor analysis of the measurement model for setting goals and priorities (SGP) showed that the standardized factor loadings of the indicators were positively significant at the statistical level of .01. The factor loading values ranged from .66 to .84, while the coefficient of determination (r^2) values ranged from 40% to 70%. The highest factor loading was SGP5 ($\beta = .84$) following by SGP4 ($\beta = .83$), SGP3 ($\beta = .77$), SGP2 ($\beta = .73$), SGP1 ($\beta = .66$), and SGP6 ($\beta = .64$). The squared multiple correlation (r^2) was .70, .69, .59, .53, .44 and .40 respectively.

2. The results of confirmatory factor analysis of Mechanic of time management

Table 17 The result of confirmatory factor analysis of Mechanic of time management

Variables	β	<i>SE</i>	<i>t</i>	r^2
MTM1	.57**	-	-	.32
MTM2	.89**	.06	12.31	.79
MTM3	.74**	.06	10.97	.55
MTM4	.80**	.05	13.30	.63
MTM5	.99**	.07	13.09	.99
MTM6	.48**	.05	9.41	.24
MTM7	.47**	.05	9.15	.22

$\chi^2 = 7.95$, $df = 10$, $\chi^2/df = 0.79$, $p = .63$, *RMSEA* = .00, *NFI* = 1.00, *NNFI* = 1.00, *CFI* = 1.00, *GFI* = .99

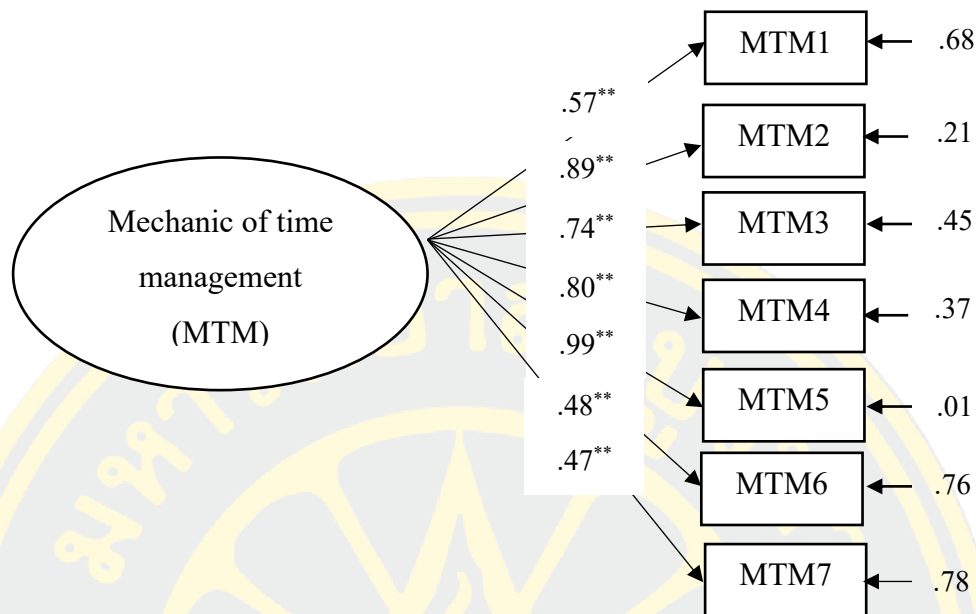


Figure 24 Measurement model of Mechanic of time management

According to Table 17, the result of construction validity of Mechanic of Time (MTM) showed that consistent with empirical data $\chi^2 = 7.95$, $df = 10$, $\chi^2/df = 0.79$, $p = .63$, $RMSEA = .00$, $NFI = 1.00$, $NNFI = 1.00$, $CFI = 1.00$, $GFI = .99$. This aligns with the findings of Schumacker and Lomax (2016); Hooper et al. (2008), and Hair et al. (2019) which stipulate that the criterion for χ^2/df should be below 2, CFI and TLI indices should approach 1, $RMSEA$ should be under 0.05, and $SRMR$ should be below 0.08.

Table 17 Confirmatory factor analysis of measurement model of the Mechanic of time management (MTM) showed standardized factor loading of indicators were positively significant at the statistical level .01. The factor loading values were from .47 to .99, while the coefficient prediction (r^2) values were from 22% to 99%. The highest factor loading was MTM ($\beta = .99$) following by TMT2 ($\beta = .89$), TMT4 ($\beta = .80$), TMT3 ($\beta = .74$), SGP1 ($\beta = .66$), and SGP6 ($\beta = .64$).

3. The results of confirmatory factor analysis of Preference for Organization

Table 18 The result of confirmatory factor analysis of Preference for Organization

Variable	β	SE	t	r^2
PO1	.51**	-	-	.26
PO2	.82**	.07	11.22	.67
PO3	.76**	.07	10.40	.57
PO4	.83**	.08	10.53	.69
PO5	.77**	.07	10.50	.60
PO6	.60**	.05	12.40	.35
PO7	.39**	.05	7.18	.15
$\chi^2 = 7.95, df = 8, \chi^2 / df = 0.99, p = .44, RMSEA = .00, NFI = 1.00, NNFI = 1.00$				
$CFI = 1.00, GFI = .99$				

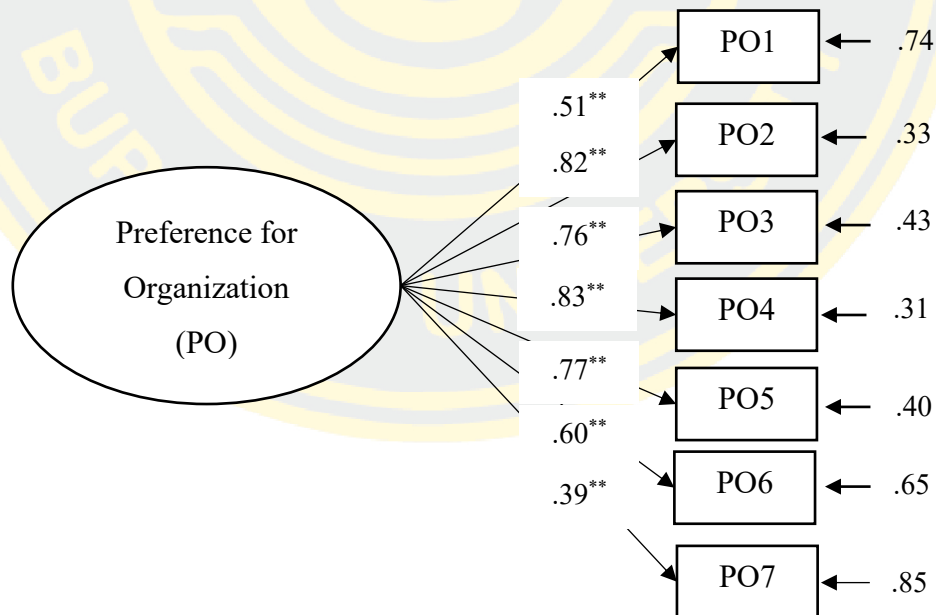


Figure 25 Measurement model of Preference for Organization

According to the Table 18, the result of construction validity of Preference for Organization (PO) showed that consistent with empirical data $\chi^2 = 7.95, df = 8,$

$\chi^2/df = 0.99$, $p = .44$, $RMSEA = .00$, $NFI = 1.00$, $NNFI = 1.00$, $CFI = 1.00$, $GFI = .99$. This aligns with the findings of Schumacker and Lomax (2016); Hooper et al. (2008), and Hair et al. (2019) which stipulate that the criterion for χ^2/df should be below 2, CFI and TLI indices should approach 1, $RMSEA$ should be under 0.05, and $SRMR$ should be below 0.08.

The confirmatory factor analysis of the measurement model for the Preference for Organization (PO) showed that the standardized factor loadings of the indicators were positively significant at the statistical level of .01. The factor loading values ranged from .39 to .83, while the coefficient of determination (r^2) values ranged from 15.00% to 67.00%. The highest factor loading was PO4 ($\beta = .83$) following by PO2 ($\beta = .82$), PO5 ($\beta = .77$), PO3 ($\beta = .76$), PO6 ($\beta = .60$), PO1 ($\beta = .51$), and PO7 ($\beta = .39$).

4. The result of confirmatory factor analysis of Perceived Control of Time

Table 19 The result of confirmatory factor analysis of Perceived control of time

Variables	β	SE	t	r^2
PCT1	.59**	-	-	.34
PCT2	.65**	.06	11.09	.42
PCT3	.91**	.06	13.53	.82
PCT4	.86**	.06	13.09	.73
PCT5	.86**	.06	13.08	.73
$\chi^2 = 6.11$, $df = 8$, $\chi^2/df = 0.99$, $p = .44$, $RMSEA = .00$, $NFI = 1.00$, $NNFI = 1.00$, $CFI = 1.00$, $GFI = .99$				

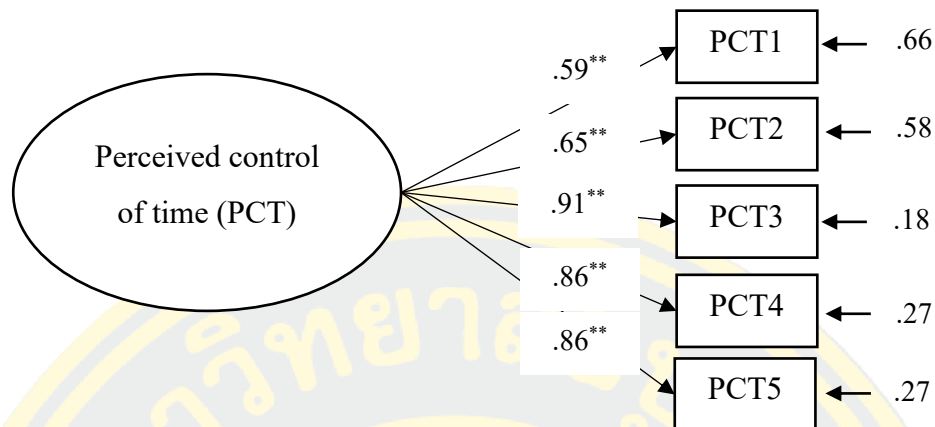


Figure 26 Measurement model of Perceived control of time

According to Table 19, the result of construction validity of Perceived Control of Time (PCT) showed that consistent with empirical data $\chi^2 = 6.11$, $df = 8$, $\chi^2 / df = 0.99$, $p = .44$, $RMSEA = .00$, $NFI = 1.00$, $NNFI = 1.00$, $CFI = 1.00$, $GFI = .99$. This aligns with the findings of Schumacker and Lomax (2016); Hooper et al. (2008), and Hair et al. (2019) which stipulate that the criterion for χ^2 / df should be below 2, CFI and TLI indices should approach 1, $RMSEA$ should be under 0.05, and $SRMR$ should be below 0.08.

The confirmatory factor analysis of the measurement model for the Perceived Control of Time (PCT) showed that the standardized factor loadings of the indicators were positively significant at the statistical level of .01. The factor loading values ranged from .39 to .83, while the coefficient of determination (r^2) values ranged from 34.00% to 82.00%. The highest factor loading was PCT ($\beta = .91$) following by PCT4 ($\beta = .86$), PCT5 ($\beta = .86$), PCT2 ($\beta = .65$) and PCT1 ($\beta = .59$).

Table 20 The result of confirmatory factor analysis of Time management

Variable	β				SE	t	r^2
	SGP	MTM	PO	PCT			
SGP1	.58**				-	-	.34
SGP2	.74**				.05	14.51	.54
SGP3	.81**				.05	15.65	.66
SGP4	.82**				.05	17.07	.67
SGP5	.86**				.05	17.51	.74
SGP6	.58**				.03	18.12	.34
MTM1		.55**			-	-	.30
MTM2		.87**			.06	13.19	.75
MTM3		.62**			.05	11.55	.38
MTM4		.82**			.05	14.11	.67
MTM5		.97**			.06	14.37	.94
MTM6		.49**			.05	9.56	.24
MTM7		.46**			.05	9.09	.21
PO1			.49**		-	-	.24
PO2			.81**		.06	12.60	.66
PO3			.76**		.07	11.61	.58
PO4			.79**		.06	11.97	.63
PO5			.80**		.06	12.05	.63
PO6			.60**		.05	12.28	.36
PO7			.92**		.09	9.20	.84
PCT1				.96**	-	-	.93
PCT2				.72**	.06	11.89	.52
PCT3				.70**	.05	11.89	.49
PCT4				.77**	.05	12.60	.59
PCT5				.75**	.05	12.53	.56

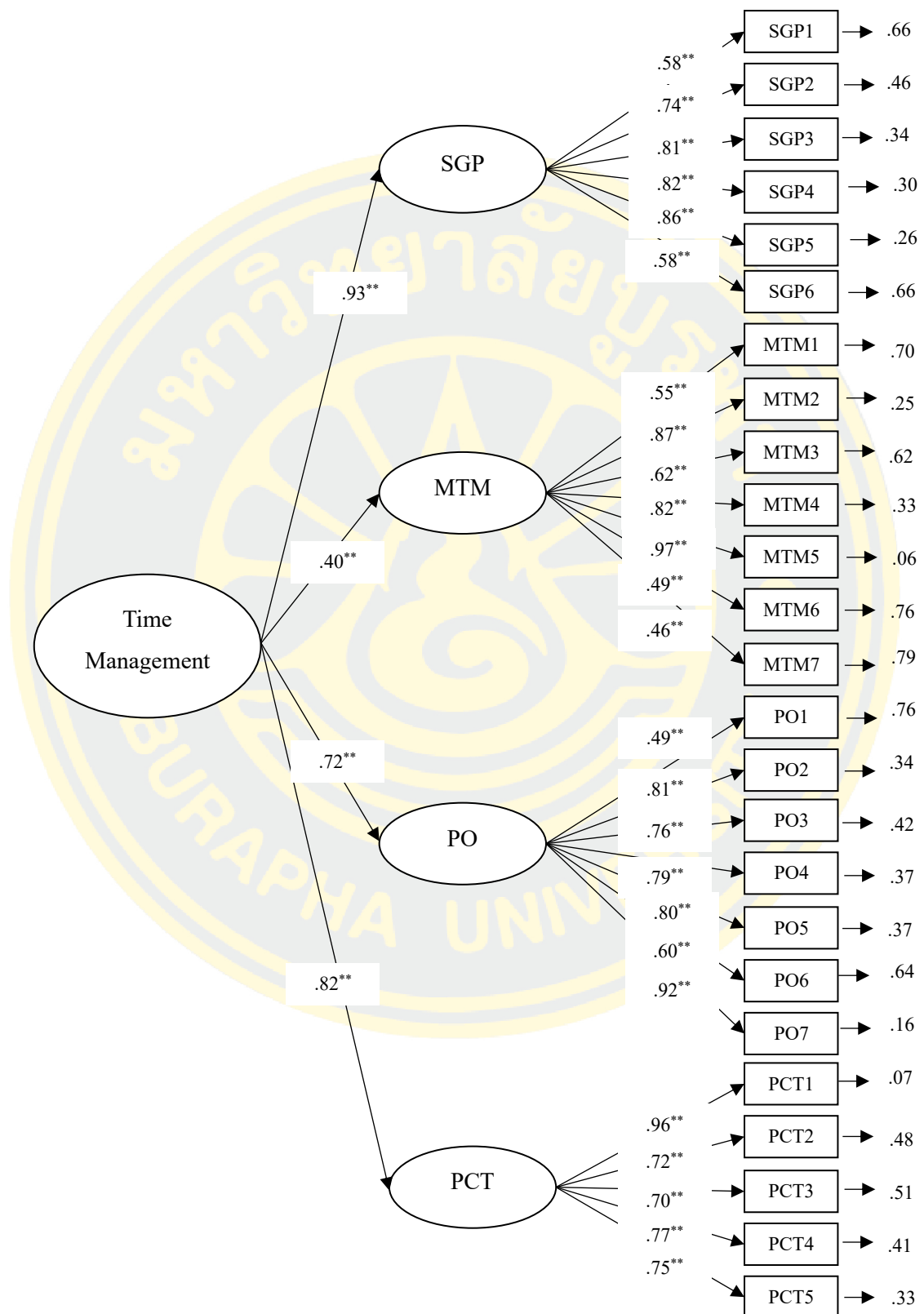


Figure 27 Model of Time Management

According to Table 20 and Figure 27 exhibited the result of confirmatory factor analysis of Time management with the criteria indices with goodness of fit as: $\chi^2 = 395.36$, $df = 214$, $\chi^2/df = 1.85$, $RMSEA = .04$, $NFI = .98$, $NNFI = .99$, $CFI = .99$, $GFI = .95$. From the result, relative Chi-square ($\chi^2/df = 1.85$) was less than 2; $RMSEA$ as less than .05; NFI , $NNFI$, CFI , GFI were more than .95, indicated that the measurement construct had perfect goodness of fit (Schumacker, 2016).

Time management consisted of four components: Setting goals and Priorities, Mechanic of time management, Preference for Organization, and Perceived control of time. The ranking order of factor loading from highest to lowest is as follows: Setting goals and Priorities (SGP), followed by Perceived control of time (PCT), Preference for Organization (PO), and Mechanic of time management (MTM), with factor loadings of .93, .82, .72, and .40, respectively.

When examining the factor loading values of each component, it was found that in Setting Goals and Priorities, the highest factor loading was SGP5, followed by SGP4, SGP3, SGP2, SGP1, and SGP6, with standardized factor loading values of .86, .82, .81, .74, .58, and .58, respectively.

Mechanics of time management consisted of seven items. The highest factor loading was MTM5, MTM2, MTM4, MTM3, MTM1, MTM6 and MTM7 with the standardized factor loading values at .97, .87, .82, .62, .55, .49 and .46 respectively.

Interpretation of qualitative and quantitative data

According to the data from both qualitative and quantitative research, the following is demonstrated: The integration of CFA and qualitative results validates the core components of academic procrastination as a multidimensional construct involving task delay, time misestimation, and insufficient self-regulation. The results also support the contextual understanding that external structure (group work) and accountability mitigate procrastination. The combined methods confirm that although students recognize the importance of time management, a significant gap remains between awareness and consistent behavioral implementation, and most of them still struggle with academic procrastination.

Part 2: The result of the development of academic procrastination application

The Academic Procrastination Application was developed by using the ADDIE Model combined with five steps: 1) Analysis, 2) Design, 3) Development, 4) Implementation, and 4) Evaluation. The results of the development of the academic procrastination application process are as follows:

1. Analyze

1.1 Identify the problem:

Academic procrastination refers to the intentional and voluntary delay in completing academic tasks such as assignments, studying for exams, or preparing projects, despite being aware that such delays may result in adverse outcomes. This behavior is particularly prevalent among undergraduate students and is widely recognized as a significant barrier to academic success. Procrastination often stems from a combination of factors, including ineffective time management, low intrinsic motivation, fear of failure, perfectionism, and poor self-regulation. Students may find it difficult to initiate or persist in tasks due to uncertainty about how to begin, a lack of clear goals, or negative self-beliefs about their abilities. Moreover, environmental distractions, such as excessive use of social media, digital entertainment, or competing social commitments, further reduce their capacity to stay focused and productive.

In some cases, procrastination is linked to underlying emotional or cognitive issues, such as anxiety, low self-esteem, or a rigid desire for flawless performance, which can paralyze students from taking action. The consequences of academic procrastination are far-reaching: it often leads to lower educational achievement, increased levels of stress, anxiety, and depression, as well as diminished overall well-being. Over time, persistent procrastination can hinder students' development of essential skills, such as goal setting, planning, prioritization, and personal accountability, competencies that are critical for both academic and professional success.

Although common and often normalized in academic environments, procrastination remains a persistent and severe challenge that requires targeted

interventions. Approaches that integrate self-regulated learning strategies (Zimmerman, 2000), time management training (Häfner & Stock, 2010), and the use of supportive tools or applications have shown promise in helping students better manage their academic responsibilities, enhance motivation, and reduce procrastination-related behaviors.

1.2 Analyze learners:

According to the findings from the Phase 1 interviews, most participating students exhibited a general indifference toward their procrastination habits, indicating a low level of self-awareness about the potential long-term consequences of such behavior on their academic performance and overall success. Despite acknowledging that procrastination negatively affected their studies, the students did not appear to fully grasp the cumulative impact it could have on their grades, stress levels, or future goals. When asked about potential strategies or tools that might support better academic preparation or help reduce procrastination, only one participant mentioned the possible usefulness of a planner. However, only that same student had any experience using a written planner—and even then, the habit was not sustained, lasting for merely one or two weeks. This pattern suggests that although students may intellectually recognize the value of planning, they often lack the structure, motivation, or self-regulatory skills to maintain such strategies over time.

Moreover, several students expressed a strong interest in having access to an online or mobile application designed to support academic planning and reduce procrastination. They emphasized that such a tool should not only facilitate daily scheduling and task organization but also include features like automatic reminders, progress tracking, and motivational feedback. These elements, they believed, would increase their likelihood of consistent use. This feedback highlights a critical gap between awareness and action, underscoring the potential benefit of designing a digital intervention that integrates principles of self-regulated learning and time management to actively support and guide students in developing better academic habits.

1.3 Define goals: Reduce procrastination, improve time management, and promote self-regulated learning.

Since academic procrastination is strongly associated with poor time management and a lack of self-regulated learning skills, the development of an online application designed to reduce procrastination should specifically target these two underlying issues. Time management difficulties often cause students to delay starting or completing academic tasks. At the same time, insufficient self-regulation limits their ability to set practical goals, maintain attention, and adhere to planned study routines. These challenges are prevalent among undergraduate students, who frequently underestimate task duration or overestimate their motivation levels.

Therefore, one of the primary objectives of the application should be to raise students' awareness of academic procrastination, what it is, why it occurs, and how it negatively impacts academic achievement and overall well-being. While many students acknowledge that delaying academic tasks often leads to last-minute cramming, sleep deprivation, and stress before deadlines, they usually normalize or underestimate the seriousness of this behavior. The result highlights the need for psychoeducational content within the app that helps students recognize the long-term academic and emotional consequences of procrastination.

To address these issues practically, the application should include features that promote both effective time management and self-regulated learning. Tools such as personalized schedules, task prioritization functions (e.g., based on the Eisenhower Matrix), deadline reminders, and visual progress trackers can help users organize their academic responsibilities. Moreover, to foster self-regulation, the app should support users in setting realistic short- and long-term educational goals, tracking their progress, reflecting on their learning behaviors, and receiving motivational feedback. By integrating these elements, the application can serve as a proactive tool to help students plan, execute, and reflect on their academic activities more effectively, ultimately reducing procrastination and improving academic outcomes.

2. Design

The development of the online application aimed at reducing academic procrastination was grounded in the principles of time management and self-regulated learning (SRL). The core design framework ensures that users are first introduced to a foundational understanding of academic procrastination, including its definition, psychological causes, and detrimental effects on academic performance, emotional

well-being, and long-term achievement. This educational component is deliberately positioned at the beginning of the user journey to enhance self-awareness, a critical precursor to behavioral change.

By helping students identify the cognitive distortions (e.g., overestimating available time or underestimating task complexity) and behavioral patterns (e.g., avoidance, distraction-seeking) that underlie procrastination, the application encourages reflective thinking. Before interacting with any practical tools or engaging in time management and SRL-based exercises, students complete modules or prompts designed to confront and analyze their habits. This initial psychoeducational phase is essential for reducing the common tendency among students to minimize the seriousness of procrastination or to rationalize last-minute efforts.

The application's user flow is intentionally designed to be simple, intuitive, and motivational, ensuring ease of use while promoting continuous engagement. Upon registration or first-time access, students are prompted to complete a brief self-assessment questionnaire, which includes personal information, academic procrastination, time management, anxiety, and depression, serving as a pre-test. The activities included in the application are as follows:

2.1 Psychoeducation:

The psychoeducational component of the application serves as a foundational element designed to enhance students' awareness, knowledge, and understanding of academic procrastination. This section provides evidence-based content explaining what academic procrastination is, its cognitive and behavioral causes, and the adverse effects it can have on academic performance, mental health, and overall well-being. The goal is to shift students from passive recognition of procrastination to active engagement in behavioral change.

In addition to theory-based insights, this section equips students with practical, actionable strategies for managing procrastination. These include structured time management techniques such as time-blocking, task prioritization using tools like the Eisenhower Matrix, and goal setting based on the SMART framework. The psychoeducation modules also highlight the importance of self-monitoring, reflection, and breaking down large tasks into smaller, manageable steps.

By combining theoretical knowledge with applicable tools and techniques, the psychoeducational content encourages students to take ownership of their learning behavior. This increased awareness and practical guidance form a critical first step in empowering students to adopt more effective study habits and reduce procrastination in a meaningful, sustainable way.

2.2 To do list:

The to-do list feature enables students to actively manage their academic workload by recording all tasks assigned by their instructors, including research projects, homework, presentations, and group assignments. In addition to coursework, students are encouraged to include personal academic goals, such as scheduled book readings or study sessions in preparation for upcoming exams. By documenting their tasks in a structured list, students reduce the likelihood of forgetting essential responsibilities and improve their ability to prioritize. The act of consistently writing down tasks also reinforces time awareness and can help establish a routine of planning ahead, which supports the development of effective study habits. This feature serves as both a memory aid and a behavioral prompt, helping students stay organized, focused, and accountable.

To enhance this feature, the to-do list includes a dashboard summary that visually presents the status of completed and pending tasks. This dashboard not only displays the quantity and types of functions logged but also provides a performance score based on task completion rates and whether tasks were finished on time. This gamified feedback motivates students to stay consistent and strive for higher completion scores.

Additionally, notification alerts are integrated into the feature to remind students of upcoming deadlines. These reminders are designed to nudge students before the due date, encouraging them to begin tasks promptly and avoid last-minute cramming. By combining task management, progress tracking, and automated reminders, the to-do list feature functions as both a productivity tool and a behavioral support system, helping students stay organized, focused, and accountable throughout their academic journey.

2.3 Self-reflection:

Self-reflection is a critical component of the self-regulated learning (SRL) process, empowering students to become more aware of their learning behaviors and outcomes. It involves two key processes: self-judgment, where students evaluate their performance, and self-reaction, where they respond emotionally or behaviorally to that evaluation. These processes are closely tied to self-observation, which refers to monitoring one's actions and progress over time. Together, they help students identify their academic strengths and weaknesses, recognize patterns in their behavior, and make informed adjustments to improve learning outcomes. Within the application, students are required to complete a weekly self-reflection report. This report encourages them to think critically about their learning experiences—what they did well, what challenges they faced, and what habits may have hindered their progress. For example, a student might reflect on issues such as not paying attention in class, forgetting to submit assignments, or wasting too much time on distractions like social media.

Table 21 Conceptual activities for the development of an online application for academic procrastination reduction

Modules	Purpose	Activities	Duration
Psychoeducation	Enhance awareness of academic procrastination, including its definition, impact, and strategies for mitigating it.	Provide or guide information: 1. What is academic procrastination? 2. Reason for academic procrastination 3. Academic procrastination reduction technique	The training for psychoeducati on took place on the 1st day, and the supported reading document was provided.

Table 21 Continue

Tasks	Purpose	Activities	Duration
2. To Do List	A to-do list is more than just a productivity tool; it serves as a practical cognitive and behavioral strategy that helps students manage their time, tasks, and motivation more effectively. 1. Improve task organization 2. Enhancing time awareness 3. Encourage goal setting and prioritization 4. reduces forgetfulness, 5. builds productive study habits Use a visualization graph to show the score of the summary of tasks. The students will indicate when they can complete the task on time.	The students plan their tasks related to critical daily activities or academic tasks and record them in a To-Do List with a specific deadline.	For four weeks, Participants write down their daily or academic tasks anytime they have new tasks.

Table 21 Continue

Tasks	Purpose	Activities	Duration
Self-reflection	Encourages behavior change and improves motivation in learning. This self-assessment helps increase students' awareness of what works well and what needs improvement. Alongside recognizing these areas, students are encouraged to develop practical solutions to overcome ineffective habits. These solutions include adopting better time management techniques, minimizing distractions, setting clearer goals, and seeking academic support. By systematically reflecting on their actions and planning targeted improvements, students can gradually enhance their learning efficiency, reduce procrastination, and improve overall academic performance.	Students engage in a reflective process by evaluating their previous study habits, carefully identifying both their strengths—such as effective strategies they employed—and weaknesses, including behaviors or patterns that hindered their academic progress.	Week 1- 4: Once per week

3. Develop

To support undergraduate students in overcoming academic procrastination, the development of this online application incorporates a thoughtfully chosen technology stack that strikes a balance between efficiency, scalability, and ease of use. The application is designed with a focus on supporting time management and self-regulated learning strategies. The technology stack is aligned to enable key functionalities, including user interaction, real-time task tracking, performance feedback, and notification services.

3.1 Frontend Development of the application: In the development of this application, languages and frameworks included 1) HTML, CSS, JavaScript, 2) Python (Django Template Engine), 3) Styling Framework: Bootstrap CSS were used as the main for application code writing. This frontend is responsible for rendering the user interface that students interact with, such as dashboards, to-do lists, planners, and reflection forms. Django's template engine is used to dynamically generate HTML content based on user-specific data, ensuring personalized and real-time interaction. Bootstrap CSS ensures a fully responsive design, providing an optimal user experience across various devices, including smartphones, tablets, and desktops. JavaScript enhances interactivity through features like modal popups, client-side form validation, dynamic task updates, and live notifications.

3.2 Backend Development:

3.2.1 Language: Python

3.2.2 Framework: Django (using the MVT – Model-View-Template architecture)

3.2.3 Key Functional Components:

1) Models (models.py) define and manage the structure of key data entities such as tasks, reflections, deadlines, and user profiles.

2) Views (views.py) handle HTTP requests, interact with models, and pass data to templates for rendering dynamic web pages.

3) Forms (forms.py) are used for managing structured user input, such as adding tasks, submitting reflections, and goal setting.

4) Django's built-in features support session management, user authentication, and role-based access control, which are essential for personalizing the experience.

3.2.4 Purpose:

The backend handles the application logic, task processing, and data management that drive core features like task tracking, performance scoring, and student self-assessments.

3.3 Database Layer

3.3.1 Database Engine: SQLite

3.3.2 Interaction Method: Django ORM (Object-Relational Mapping)

3.3.3 Why SQLite?

1) Lightweight and built-in with Django, SQLite is ideal for educational, research, and prototype-level applications without requiring external server configuration.

2) It is fast, file-based, and suitable for small to medium-sized user bases, making it perfect for the initial deployment of an academic support app.

3.3.4 Purpose:

The database stores all persistent data, including user accounts, task lists, goal histories, reflection logs, and performance records. The Django ORM abstracts direct SQL queries, simplifying development and maintenance.

3.4 Deployment and Hosting

3.4.1 Cloud Platform: DigitalOcean

3.4.2 Web Server: Nginx

3.4.3 Security Layer: SSL/TLS Encryption

3.4.4 Deployment Details:

1) The application is hosted on DigitalOcean, providing scalable cloud infrastructure and reliable uptime.

2) Nginx is configured as a reverse proxy server, efficiently handling incoming requests, serving static files, and forwarding dynamic content requests to the Django backend.

3) SSL certificates are implemented to ensure secure, encrypted communication between the user's device and the application, protecting sensitive academic and personal data.

The application is named STOPPro, which stands for the key concepts it promotes: S for Self-regulation, T for Time Management, O for Organize, and Pro for Procrastination. Together, the name reflects the app's core purpose to help students develop better self-management skills and reduce academic procrastination.

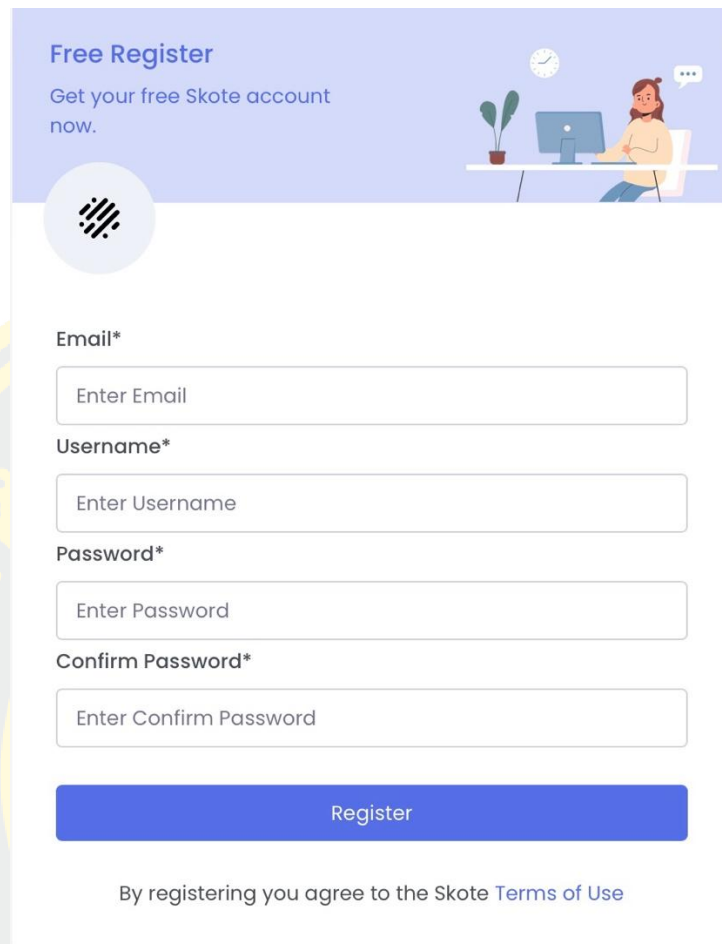
3.5 Access to the Online Application for Reducing Academic Procrastination

The STOPPro online application can be accessed through <https://stopro.site> on various devices, including computers, smartphones, and tablets, providing users with flexible and convenient access anytime, anywhere. Below is an overview of the main pages and features of the web application:

1) When visiting the website for the first time, students are required to create an account.

1.1) To register, first-time users should click "Sign Up Now." For the second time, entering a username and password is sufficient to log in.

1.2) After completing the sign-up process, a confirmation email will be sent to the registered email address. Users must follow the instructions in that email to verify their account and complete the registration.



The image shows a 'Free Register' form for a Skote account. The header is light blue with the text 'Free Register' and 'Get your free Skote account now.' An illustration of a person at a desk is in the top right. The form has a light blue header bar with a circular logo on the left. Below the header, there are four input fields: 'Email*', 'Username*', 'Password*', and 'Confirm Password*'. Each field has a placeholder text 'Enter [field name]'. A blue 'Register' button is at the bottom. Below the button, it says 'By registering you agree to the Skote [Terms of Use](#)'.

Free Register
Get your free Skote account now.



Email*

Username*

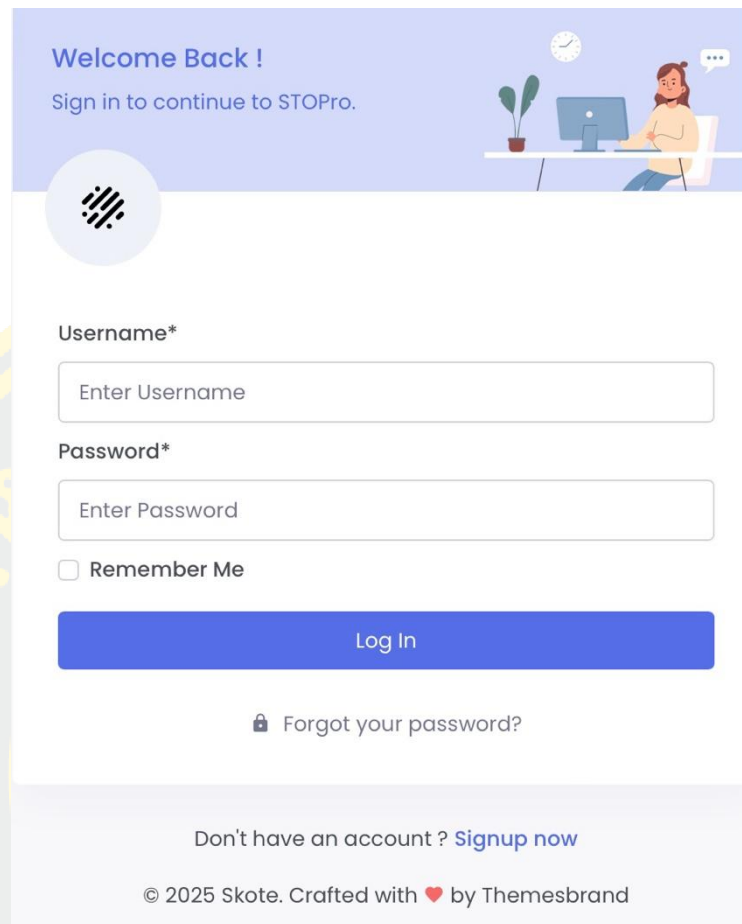
Password*

Confirm Password*

Register

By registering you agree to the Skote [Terms of Use](#)

Figure 28 Sign up or Register page



The login window features a light blue header with the text "Welcome Back !" and "Sign in to continue to STOPPro." An illustration of a person at a desk with a clock and a plant is in the top right. Below the header is a circular logo with a grid pattern. The main form area contains fields for "Username*" and "Password*", a "Remember Me" checkbox, and a blue "Log In" button. Below the button is a link for "Forgot your password?". At the bottom, there is a link for "Don't have an account ? Signup now" and a copyright notice: "© 2025 Skote. Crafted with ❤ by Themesbrand".

Welcome Back !
Sign in to continue to STOPPro.

Enter Username

Enter Password

☐ Remember Me

Log In

 Forgot your password?

Don't have an account ? [Signup now](#)

© 2025 Skote. Crafted with ❤ by Themesbrand

Figure 29 Login window

2) The home page of the application displays the name STOPPro and provides direct access to the Psychoeducation section. In this section, students can either read or download documents related to academic procrastination. The aim is to raise awareness and help students better understand the causes, consequences, and strategies for managing procrastination in their academic lives.

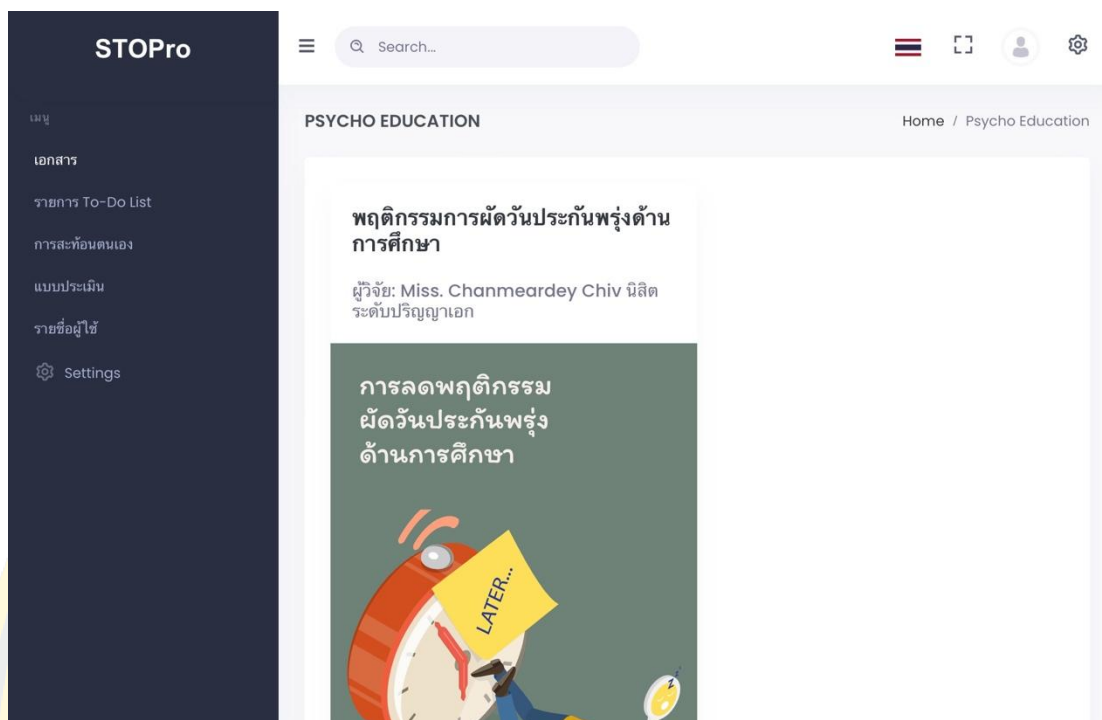


Figure 30 Psychoeducation page

3) To-Do List module: This module enables students to add as many tasks as needed, along with essential details such as task descriptions, due dates, and priority levels (e.g., low, medium, or high). It helps students stay organized and manage their academic responsibilities more effectively. Tasks can be easily moved using a drag-and-drop workflow across three categories: Upcoming, In Progress, and Completed, allowing users to visually track their progress and stay on top of their responsibilities.

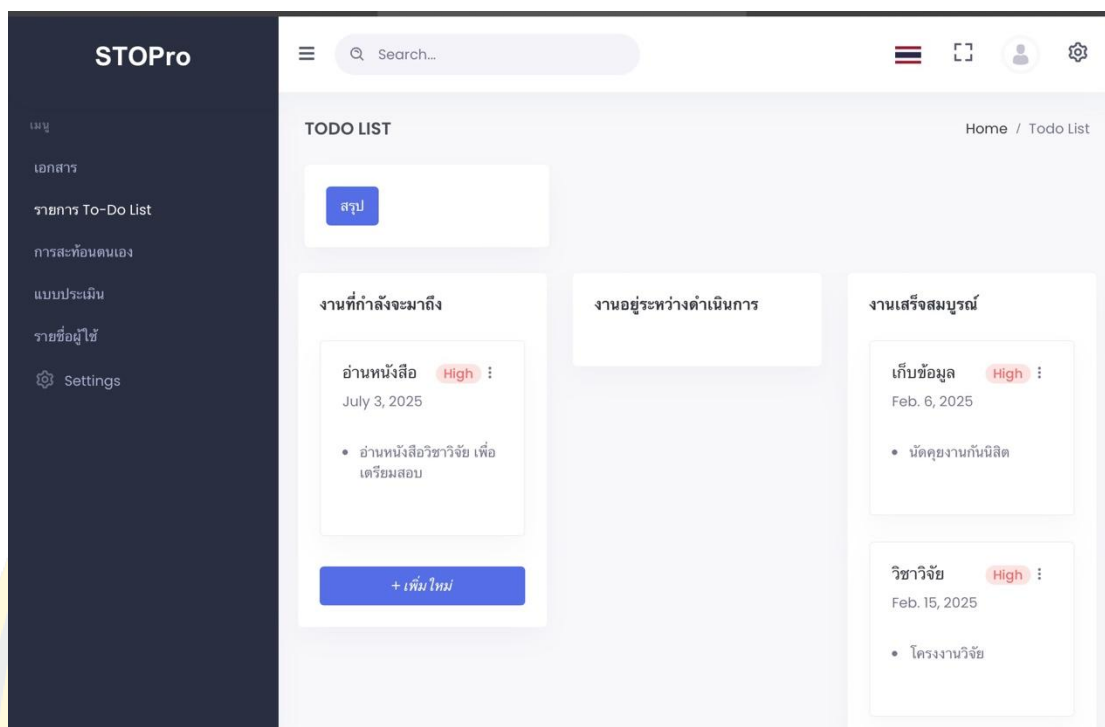
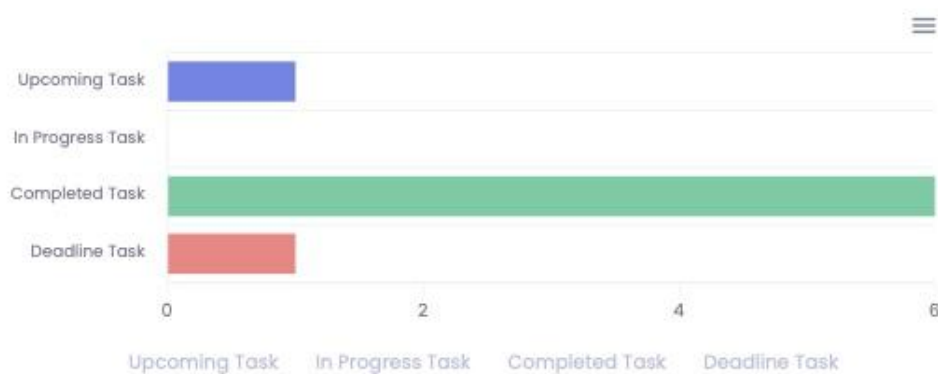


Figure 31 Dashboard of To-Do List module

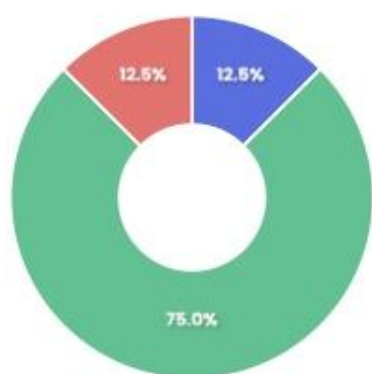
สรุป

ภาพรวมงานและการวิเคราะห์

Bar Chart



Donut Chart



Upcoming Task
In Progress Task
Completed Task
Deadline Task

● งานที่กำลังจะมาถึง

1

● งานอยู่ระหว่างดำเนินการ

0

● งานเสร็จสมบูรณ์

6

● งานที่เกินกำหนด

1

Figure 32 Summary result from To Do List

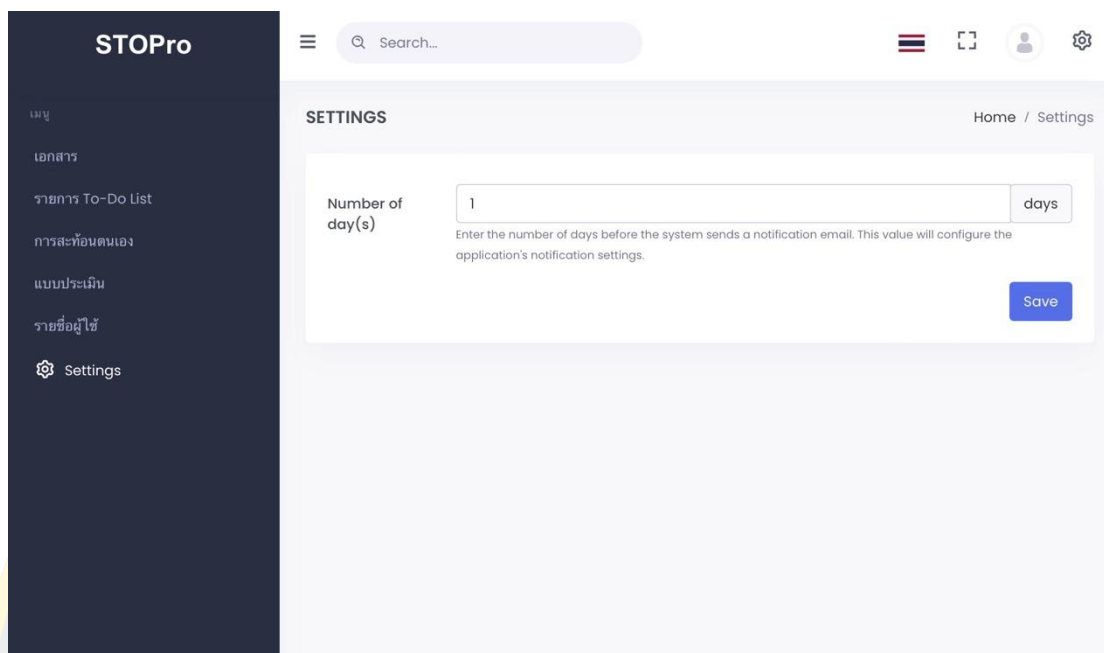


Figure 33 Notification Settings Page for configuring reminder days before due date

4) The Self-Regulated Learning (SRL)

This page offers students a dedicated space to reflect on their learning habits and experiences each week. It encourages them to thoughtfully evaluate their academic progress by identifying both their strengths and the challenges they faced over the past week. By regularly engaging in this self-reflection process, students can develop greater self-awareness and take proactive steps to improve their academic performance. In addition to written reflections, students are also asked to complete a weekly self-rating, allowing them to evaluate their performance and track changes over time.

Figure 34 Self-reflection page

5) Evaluate this page: It is designed for students to complete both the pretest and posttest assessments. It includes the Academic Procrastination Inventory, the Time Management Inventory, and the General Health Questionnaire (GHQ-28). These tools were used as research instruments to measure changes in procrastination behavior, time management skills, anxiety, and depression throughout the intervention.

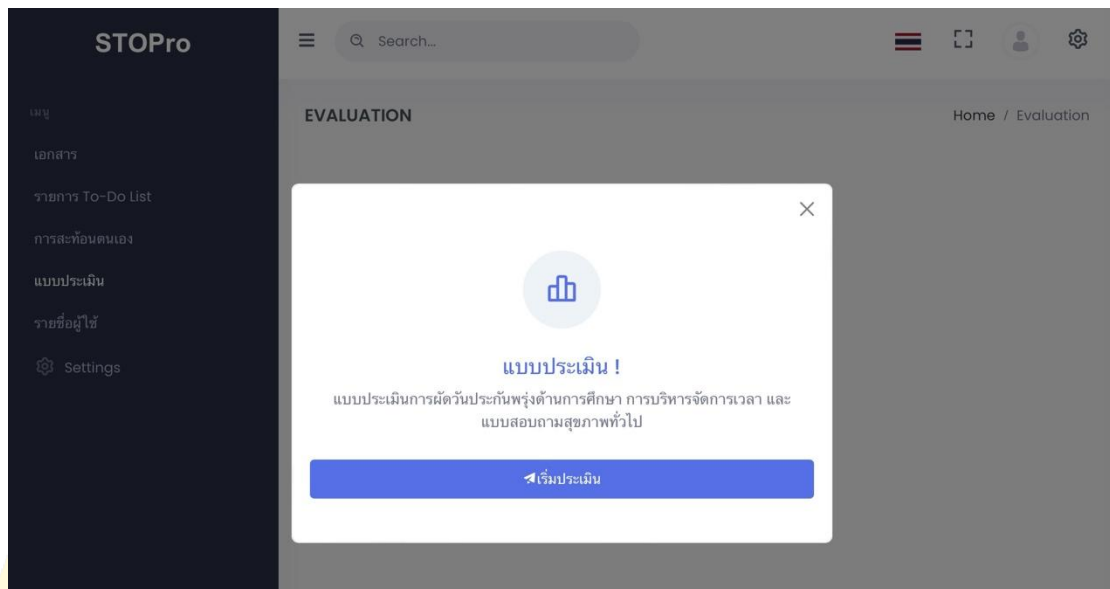
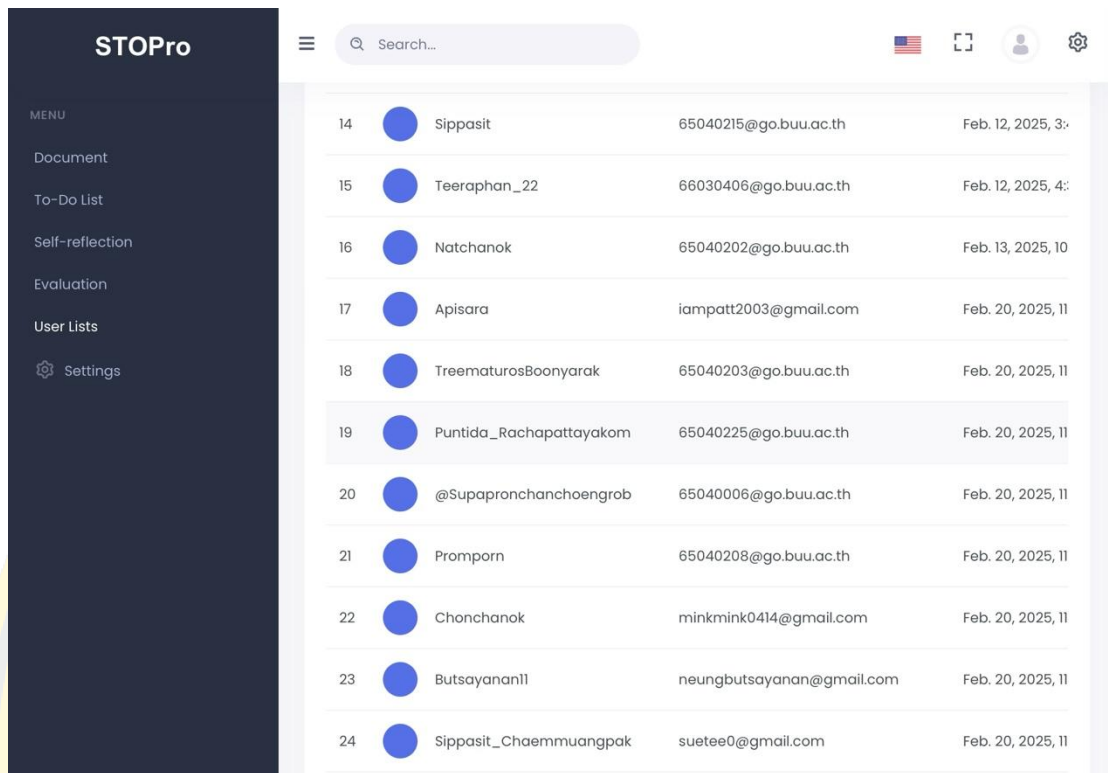


Figure 35 Pretest and Posttest evaluate page

5) User Lists Page (Admin Access Only):

This page is designed exclusively for researchers or administrators. It provides an overview of student activity within the application, including login timestamps and summary data related to their use of the to-do list. The primary purpose of this page is to monitor student engagement and ensure that participants complete the required activities as outlined in the research project.



Id	Profile Picture	Name	Email	Date
14		Sippasit	65040215@go.buu.ac.th	Feb. 12, 2025, 3:00
15		Teeraphan_22	66030406@go.buu.ac.th	Feb. 12, 2025, 4:00
16		Natchanok	65040202@go.buu.ac.th	Feb. 13, 2025, 10:00
17		Apisara	iampatt2003@gmail.com	Feb. 20, 2025, 11:00
18		TreematurossBoonyarak	65040203@go.buu.ac.th	Feb. 20, 2025, 11:00
19		Puntida_Rachapattayakom	65040225@go.buu.ac.th	Feb. 20, 2025, 11:00
20		@Supapronchanchaengrob	65040006@go.buu.ac.th	Feb. 20, 2025, 11:00
21		Promporn	65040208@go.buu.ac.th	Feb. 20, 2025, 11:00
22		Chonchanok	minkmink0414@gmail.com	Feb. 20, 2025, 11:00
23		Butsayanan11	neungbutsayanan@gmail.com	Feb. 20, 2025, 11:00
24		Sippasit_Chaemmuangpak	suetee0@gmail.com	Feb. 20, 2025, 11:00

Figure 36 User Lists Page

4. Implement

This online application was used with five non-target participants to pilot and test its use. The researcher is responsible for explaining the process of using this application and the essential information about academic procrastination. Participants were instructed to engage with the psychoeducation feature to gain knowledge about academic procrastination and its impact on academic performance. In addition, they were asked to use the to-do list and self-reflection features at least once per week during the pilot period.

The results of the pilot study indicated that the students were interested in using the online application and were able to navigate and utilize its features effectively. Additionally, the evaluation of user satisfaction with the Online Application for Academic Procrastination Reduction (STOPPro) revealed a high level of satisfaction among participants. The users reported that the application was both valuable and easy to use, and that it supported their efforts in managing academic

tasks and reducing procrastination. The detailed results of the user satisfaction assessment are presented below:

Table 22 The result of pilot test satisfaction assessment

Items	<i>M</i>	<i>SD</i>
1. Have a proper web app design	4.00	.00
2. The learning and training process is designed to be appropriate and easy to use.	4.20	.45
3. The web app is attractive and modern	4.40	.55
4. The activity format is clear	5.00	.00
5. The font size and font style are beautiful and easy to read.	5.00	.00
6. The web app's responsiveness is appropriate.	4.60	.55
7. The web app's usability is stable	5.00	.00
8. Benefits gains from web app	4.20	.45
9. Overall satisfaction of the web app	4.80	.45

5. Evaluation

The effectiveness and suitability of the online application were evaluated through both expert review and a pilot study. The evaluation focused on the online application's content validity, assessing the suitability of the application, the appropriateness of the learning activities, the appropriateness of the time frame, and the suitability of the content. The results yielded a Content Validity Index (CVI) of 1.00, indicating unanimous agreement among experts that all items were highly relevant and appropriate for the intended objectives.

Part 3: The examine result of the effectiveness of an of online application for academic procrastination reduction of undergraduate students in Thailand.

The total number of students in this part's study consists of 60, divided into two groups: 30 for the experimental group and the other 30 for the control group.

Table 23 Demographic data of the sample group

Variable	Group		Chi-square (df)	<i>p</i>
	Experiment Number (%)	Control Number (%)		
Gender			1.01(1)	.30
Male	3 (10.00)	1 (3.33)		
Female	27 (90.00)	29 (96.67)		
Age			22.70 (5)	.01
Mean	21.07	20.17		
SD	0.83	0.91		
Min	20	19		
Max	23	24		
Year of study			27.98 (2)	.01
2 nd year	8 (26.70)	27 (90.00)		
3 rd year	22 (73.30)	2 (6.67)		
5 th year	-	1 (3.33)		
Field of study			17.54 (2)	.01
social sciences and humanities	24 (80.00)	8 (26.70)		
science and technology	6 (20.00)	22 (73.30)		

According to Table 23 for the experimental group, the majority were female ($n = 27$; 90.00%), while male participants were ($n = 3$; 10.00%). The mean age of the participants is 21.07 ($SD = 0.83$). Regarding the academic year, most participants were in their third year ($n=22$; 73.30%) and second year ($n=8$; 26.70%). For the field of study, most of them were enrolled in social sciences and humanities ($n=24$; 80.00%), followed by science and technology ($n=6$; 20.00%)

For the control group, the majority were female ($n=29$; 96.67%), while male participants were ($n=1$; 3.33%). The mean age of the participants is 20.17 ($SD = 0.91$). Regarding the academic year, most participants were in their second year ($n=27$; 90.00%), third year ($n=2$; 6.67%), and fifth year ($n=1$; 3.33%). For the field of study, most were enrolled in science and technology ($n=24$; 80.00%), followed by social sciences and humanities ($n=6$; 20.00%).

Regarding the detailed information and the difference between groups, it was shown that only the genders of the experimental and control groups do not differ ($p = .30$). In contrast, age, year of study, and field of study are different between the two groups ($p = .01$).

Table 24 Descriptive statistics and the comparison between group of number of academic tasks

Tasks	Experiment		Control		Between group difference (Experiment)	Between group difference (Control)
	Pretest (%)	Posttest (%)	Pretest (%)	Posttest (%)		
Don't have	11 (36.67)	14 (46.67)	17 (56.67)	19 (63.33)	1.01	1.76
1-2 tasks	17 (56.67)	13 (43.33)	10 (33.33)	11 (36.67)		
3-4 tasks	2 (6.67)	3 (10.00)	3 (10.00)			

Table 24 shows that there were no significant differences between the experimental and control groups in both the pretest and posttest scores.

Table 25 Descriptive statistics and the comparison number of planning time per week

Planning per week	Pretest (%)	Posttest (%)	<i>df</i>	<i>t</i>	<i>p</i>	<i>d</i>
Experiment			29	5.06**	< .01	1.23
Don't do	10 (33.33)	5 (16.67)				
1-2 days	11 (36.67)	8 (26.67)				
3-4 days	4 (13.33)	4 (13.33)				
4-5 days	1 (3.33)	9 (30.00)				
Every day	4 (13.33)	4 (13.33)				
Control			29	1.10	.28	.23
Don't do	6 (20.00)	2 (6.67)				
1-2 days	16 (53.33)	16 (53.33)				
3-4 days	7 (23.33)	12 (40.00)				
4-5 days	-	-				
Every day	1 (3.33)	-				

Note: ** $p < .01$

Table 25 shows a significant increase in task planning in the experimental group ($t = 5.06, p < .01$) with a large effect size, while no significant difference was found in the control group.

The result of the Normality test

Before conducting comparisons, the normality of the study variables was assessed using the Kolmogorov-Smirnov test. The results indicated that there was normal distribution ($p > .05$) for academic procrastination and time management score, while anxiety and depression weren't normally distributed ($p < .05$). This supports that paired sample t-test and independent sample t-test were used to compare pretest and posttest and between groups for academic procrastination and time

management. In contrast, the Wilcoxon test and the Mann-Whitney U test were used with anxiety and depression. Since there were differences in age, year of study, and field of study between the experimental and control groups, tests for covariates were conducted. However, the results showed no significant effects, indicating that these variables did not act as covariates in this study.

The result of the comparison of the dependent variables pretest and posttest

Table 26 The comparison result of academic procrastination between pretest and posttest

Academic procrastination	Pretest	Posttest	<i>df</i>	<i>t</i>	<i>p</i>	<i>d</i>
Experiment Group (<i>n</i> =30)			29	-4.38**	< .01	.80
Mean	3.28	2.66				
SD	0.67	0.58				
Control Group (<i>n</i> =30)			29	-.12	.91	.02
Mean	3.05	3.07				
SD	0.69	0.46				

Note: ** $p < .01$

Table 26 shows that the academic procrastination scores of the experimental group differed significantly between the pretest and posttest ($t = -4.38, p < .01$) with a large effect size ($d = .80$). In contrast, the control group showed no statistically significant difference between pretest and posttest scores ($t = -0.12, p > .05$).

Table 27 The comparison result of time management between pretest and posttest

Variables	Groups							
	Experiment (n=30)				Control (n=30)			
	Pre	Post	<i>t</i> (<i>df</i>)	<i>d</i>	Pre	Post	<i>t</i> (<i>df</i>)	<i>d</i>
Setting goals and Priorities (SGP)								
Mean	3.41	3.95	3.80**	.69	3.69	3.55	-.95	.17
SD	0.37	0.39	(29)		0.41	0.60	(29)	
Mechanic of time management (MTM)								
Mean	2.76	3.69	4.84**	.88	3.11	3.10	-.10	.02
SD	0.82	.56	(29)		0.69	0.61	(29)	
Preference for Organization (PO)								
Mean	2.91	3.24	2.74**	.50	2.91	2.86	-.39	.07
SD	0.52	0.41	(29)		0.41	0.54	(29)	
Perceived Control of Time (PCT)								
Mean	3.07	3.67	3.77**	.69	2.95	2.98	.18	.03
SD	0.73	.52	(29)		0.78	0.71	(29)	
Time management (over all)								
Mean	3.04	3.52	5.77**	1.05	3.16	3.12	-.44	.09
SD	0.41	0.26	(29)		0.34	0.32	(29)	

Note: ** $p < .01$

Table 27 shows that the time management scores of the experimental group differed significantly between the pretest and posttest ($t = 5.77$ (29), $p < .01$) with a large effect size ($d = 1.05$). Conversely, the control group did not exhibit a meaningful change between pretest and posttest scores, with results showing no statistical significance ($t = -.44$ (29), $p > .05$).

When examining the sub-components of time management, the results are as follows:

For Setting goals and Priorities (SGP) scores of the experimental group differed significantly between the pretest and posttest ($t = 3.80$ (29), $p < .01$) with

moderate effect size ($d = .69$). However, for the control group, the difference between pretest and posttest scores was not statistically significant ($t = -.95$ (29), $p > .05$).

For Mechanic of time management (MTM) scores of the experimental group differed significantly between the pretest and posttest ($t = 4.84$ (29), $p < .01$) with large effect size ($d = .88$). In contrast, the control group showed no statistically significant difference between pretest and posttest scores ($t = -.10$ (29), $p > .05$).

For Preference for Organization (PO) scores of the experimental group differed significantly between the pretest and posttest ($t = 2.74$ (29), $p < .01$) with moderate effect size ($d = .50$). In contrast, the control group showed no statistically significant difference between pretest and posttest scores ($t = -.39$ (29), $p > .05$).

For Perceived Control of Time (PCT) scores of the experimental group differed significantly between the pretest and posttest ($t = 3.77$ (29), $p < .01$) with moderate effect size ($d = .69$). Conversely, the control group did not exhibit a meaningful change between pretest and posttest scores, with results showing no statistical significance ($t = .18$ (29), $p > .05$).

Table 28 The comparison result of anxiety between pretest and posttest

Group		<i>n</i>	Mean Rank	Sum of Ranks	<i>Z</i>	η^2
Experiment	Negative Ranks	15	16.13	242.00	-.53	.01
	Positive Ranks	14	13.79	193.00		
	Ties	1				
Control	Negative Ranks	10	16.70	167.00	-.22	.00
	Positive Ranks	16	11.50	187.00		
	Tie	7				

Table 28 shows that the anxiety scores of the experimental group did not show a significant difference between the pretest and posttest ($Z = -.53$, $p > .05$).

Similarly to the control group, the difference between pretest and posttest scores was not statistically significant ($Z = -.22, p > .05$).

Table 29 The comparison result of depression between pretest and posttest

Group		<i>n</i>	Mean Rank	Sum of Ranks	<i>Z</i>	η^2
Experiment	Negative Ranks	13	11.73	152.50	-.44	.01
	Positive Ranks	10	12.35	123.50		
	Ties	7				
Control	Negative Ranks	8	15.19	121.50	-.50	.01
	Positive Ranks	15	10.30	154.50		
	Tie	7				

Table 29 shows that the depression scores of the experimental group did not show a significant difference between the pretest and posttest ($Z = -.44, p > .05$). Similarly to the control group, the difference between pretest and posttest scores was not statistically significant ($Z = -.50, p > .05$).

The result of the comparison of dependent variables between groups

Table 30 The comparison result of Academic Procrastination between experiment and control group

Group	<i>M</i>	<i>SD</i>	<i>df</i>	<i>t</i>	<i>p</i>	<i>d</i>
Pretest			58	1.31	.19	.34
Experiment group	3.28	.67				
Control group	3.05	.69				
Posttest			58	-3.00**	< .01	.77
Experiment group	2.66	.58				
Control group	3.07	.46				

Note: ** $p < .01$

Table 30 shows that there was no significant difference in academic procrastination scores between the experimental and control groups at the pretest stage ($t = 1.13$ (58), $p > .05$). However, at the posttest stage, the difference between the two groups was statistically significant ($t = -3.00$ (58), $p < .01$) with moderate effect size ($d = .77$).

Table 31 The comparison result of Time Management between experiment and control group

Variables	Groups							
	Pretest				Posttest			
	<i>M</i>	<i>SD</i>	<i>t (df)</i>	<i>d</i>	<i>M</i>	<i>SD</i>	<i>t (df)</i>	<i>d</i>
Setting goals and Priorities (SGP)								
Experiment	3.41	.68	-1.90	.49	3.95	.39	3.08**	.80
Control	3.69	.41	(47.66)		3.55	.60	(58)	
Mechanic of time management (MTM)								
Experiment	2.76	.82	-1.80	.46	3.69	.56	3.92**	1.01
Control	3.11	.69	(58)		3.10	.61	(58)	
Preference for Organization (PO)								
Experiment	2.91	.52	.01	.00	3.25	.41	3.01**	.78
Control	2.91	.41	(58)		2.86	.54	(58)	
Perceived Control of Time (PCT)								
Experiment	3.07	.73	.65	.17	3.67	.65	3.90**	1.01
Control	2.95	.78	(58)		2.98	.71	(58)	
Time management (over all)								
Experiment	3.04	.41	-1.31	.34	3.52	.26	5.09**	1.31
Control	3.16	.32	(58)		3.12	.34	(58)	

Note: ** $p < .01$

Table 31 shows that there was no significant difference in time management scores between the experimental and control groups at the pretest stage ($t = -1.31$ (47.66), $p > .05$). However, at the posttest stage, the difference between the two groups was statistically significant ($t = 5.09$ (58), $p < .01$) with large effect size ($d = 1.31$).

When examining the sub-components of time management, the results are as follows:

Setting goals and Priorities (SGP), there was no significant difference between the experimental and control groups at the pretest stage ($t = -1.90$ (58), $p >$

.05). However, at the posttest stage, the difference between the two groups was statistically significant ($t = 3.08$ (58), $p < .01$) with large effect size ($d = .80$).

Mechanic of time management (MTM), there was no significant difference between the experimental and control groups at the pretest stage ($t = -1.80$ (58), $p > .05$). However, at the posttest stage, the difference between the two groups was statistically significant ($t = 3.92$ (58), $p < .01$) with large effect size ($d = 1.01$).

Preference for Organization (PO), there was no significant difference between the experimental and control groups at the pretest stage ($t = .01$ (58), $p > .05$). However, at the posttest stage, the difference between the two groups was statistically significant ($t = 3.01$ (58), $p < .01$) with moderate effect size ($d = .78$).

Perceived Control of Time (PCT), there was no significant difference between the experimental and control groups at the pretest stage ($t = .65$, $p > .05$). However, at the posttest stage, the difference between the two groups was statistically significant ($t = 3.90$, $p < .01$) with large effect size ($d = 1.01$).

Table 32 The comparison result of anxiety between experiment and control group

Group	Pretest				Posttest			
	Mean Rank	Sum of Ranks	Z	η^2	Mean Rank	Sum of Ranks	Z	η^2
Experiment	31.60	948.00	-.49	.01	31.85	955.50	-.60	.01
Control	29.40	882.00			29.15	874.50		

Table 32 shows that there was no significant difference in anxiety scores between the experimental and control groups at the pretest stage ($Z = -.49$, $p > .05$). Similarly, at the posttest stage, the difference in anxiety scores between the two groups was also not statistically significant ($Z = -.60$, $p > .05$).

Table 33 The comparison result of depression between experiment and control group

Group	Pretest				Posttest			
	Mean Rank	Sum of Ranks	Z	η^2	Mean Rank	Sum of Ranks	Z	η^2
Experiment	28.67	860.00	-.85	.01	30.73	922.00	-.11	.00
Control	32.33	970.00			30.27	908.00		

Table 33 shows that there was no significant difference in depression scores between the experimental and control groups at the pretest stage ($Z = -.85, p > .05$). Similarly, at the posttest stage, the difference in anxiety scores between the two groups was also not statistically significant ($Z = -.11, p > .05$).

Chapter 5

Conclusion and Discussion

The development of an online application to reduce academic procrastination among undergraduate students in Thailand involved several steps to achieve the result. The objectives of this study were to 1) develop an academic procrastination assessment and time management inventory, 2) develop an online application for academic procrastination reduction, and 3) examine the effectiveness of an online application for academic procrastination reduction of undergraduate students in Thailand. This research employed a research and development design, collecting data from in-depth interviews with nine undergraduate students from three different disciplines and survey data from 450 students from three other universities in Thailand for Phase 1 of the research. In Phase 3, 60 students were divided into two groups: an experimental group and a control group, each with 30 members. Research analysis includes content analysis for qualitative data, confirmatory factor analysis, paired sample t-tests, and independent sample t-tests in cases of normal distribution, Wilcoxon tests, and Mann-Whitney U tests, and effect sizes.

Conclusion of the research finding

The result from the study could summary as following:

Phase 1: The result of the development of academic procrastination assessment and time management inventory of undergraduate students in Thailand

1. The results from in-depth interviews with nine undergraduate students revealed that all participants had experienced academic procrastination to some degree. Notably, one student reported being unable to submit an assignment due to excessive delay. This pattern of procrastination was most associated with individual assignments, rather than group work. Students explained that group tasks typically involve scheduled meetings and clearly defined deadlines, which create a sense of shared responsibility and time pressure that discourages procrastination. In contrast,

individual assignments were perceived as more flexible, allowing students to modify their study schedules freely, often leading to delays in starting or completing tasks.

Furthermore, most students admitted to struggling with task prioritization. They tended to begin with the easiest or least demanding tasks first, regardless of the actual deadlines. This behavior suggests a preference for short-term comfort over strategic planning, which ultimately increases the likelihood of postponing more complex or time-consuming assignments. Such habits not only heighten academic stress but can also compromise the quality of student work in the long term.

2. The result of the development of academic procrastination inventory showed that it consistent with empirical data $\chi^2 = 65.10$, $df = 49$, $\chi^2/df = 1.33$, $RMSEA = .03$, $NFI = .99$, $GFI = .98$, $AGFI = .96$. While time management inventory consistent with empirical data $\chi^2 = 395.36$, $df = 214$, $\chi^2/df = 1.85$, $RMSEA = .04$, $NFI = .98$, $NNFI = .99$, $CFI = .99$, $GFI = .95$. Time management consisted of four components such as Setting goals and Priorities, Mechanic of time management, Preference for Organization, and Perceived control of time. The ranking of factor loading from highest to lowest is as follows: Setting goals and Priorities (SGP), followed by Perceived control of time (PCT), Preference for Organization (PO), and Mechanic of time management (MTM), with factor loadings of .93, .82, .72, and .40, respectively.

Phase 2. The result of the development of academic procrastination application

The development of an online application for procrastination reduction consists of three main activities: 1) Psychoeducation, which is designed to increase students' awareness and understanding of academic procrastination. It provides evidence-based information about procrastination behavior, its negative impact on academic performance, and some recommended tools that may help reduce academic procrastination. This section also introduces students to practical strategies and tools, such as time blocking, task prioritization, and goal setting, which can help them develop more productive habits and reduce procrastination. 2) To-do list feature, which allows students to actively manage their academic workload by writing down all tasks assigned by their instructors, such as research projects, homework,

presentations, and group assignments. To enhance this feature, the to-do list includes a dashboard summary that visually presents the status of completed and pending tasks. This dashboard not only displays the quantity and types of tasks logged but also provides a performance score based on task completion rates and whether tasks were finished on time. This gamified feedback motivates students to stay consistent and strive for higher completion scores. 3) Self-reflection is a critical component of the self-regulated learning (SRL) process, empowering students to become more aware of their learning behaviors and outcomes. It involves two key processes: self-judgment, where students evaluate their performance, and self-reaction, where they respond emotionally or behaviorally to that evaluation. These processes are closely tied to self-observation, which refers to monitoring one's actions and progress over time. Together, they help students identify their academic strengths and weaknesses, recognize patterns in their behavior, and make informed adjustments to improve learning outcomes. The results from five expert evaluations yielded a Content Validity Index (CVI) of 1.00, indicating unanimous agreement among experts that all items were highly relevant and appropriate for the intended objectives. A pilot study involving five students demonstrated that they were delighted with this web application.

Phase 3. The result of online application for academic procrastination reduction of undergraduate students

The demographic analysis revealed no significant gender difference between the experimental and control groups ($p = 0.30$). However, the groups differed significantly in age, year of study, and field of study ($p = 0.01$).

A comparison of pre-test scores confirmed that the two groups did not differ significantly on any dependent variables—academic procrastination, time management, anxiety, or depression—despite their demographic disparities. This baseline equivalence allowed valid assessment of the intervention effects.

The comparison of academic procrastination scores in the experimental group revealed a significant decrease from pre-test to post-test after using the STOPro application. This finding supports Hypothesis 1 of the study, indicating that the application effectively reduced academic procrastination among students.

The comparison of time management scores in the experimental group revealed that both the overall time management score and all its components were higher in the post-test than in the pre-test after using the STOPro application. This result supports Hypothesis 2 of the study.

The comparison of depression and anxiety scores before and after the STOPro training showed no significant differences in the experimental group. This result does not support Hypothesis 3 of the study.

The comparison of academic procrastination scores after the training showed that the experimental group had significantly lower scores than the control group. This result supports Hypothesis 4 of the study.

The comparison of time management scores after the training showed that the experimental group scored significantly higher than the control group. This result supports Hypothesis 5 of the study.

The comparison of depression and anxiety scores after the training revealed no significant differences between the experimental and control groups. This result does not support Hypothesis 6 of the study.

Discussion

1. The result of the interview and construct validity of academic procrastination and time management are demonstrated as follows:

1.1 A focused qualitative study involving nine university students revealed a consistent pattern of academic procrastination, characterized by behaviors that significantly impacted their academic performance and well-being. A comprehensive survey of academic procrastination, involving nine students, revealed that procrastination behaviors were common among them. These behaviors included delaying academic assignments and exam preparations until the last minute, with one student frequently postponing work to the point of forgetting to submit it entirely. This extreme avoidance underscores the debilitating nature of procrastination, where the fear of the task itself overrides the consequences of inaction (Ferrari et al., 1995). These actions are consistent with the concept of procrastination as described by Sabri et al. (2016) and Steel (2007), which is a common behavior among procrastinators.

Additionally, four students reported sacrificing sleep to meet deadlines and complete their projects on time. This sleep deprivation, while seemingly a temporary solution, can lead to decreased cognitive function and long-term health problems, further compounding the adverse effects of procrastination (Pilcher et al., 1997).

Interestingly, despite experiencing these detrimental behaviors, a majority of the students perceived their actions as having minimal impact on their overall academic performance. This dissonance between observed behavior and perceived consequence suggests a lack of awareness regarding the cumulative effects of procrastination. It also highlights the possibility that students might normalize these behaviors, viewing them as a common, albeit undesirable, aspect of university life. This normalization could hinder their motivation to seek support or develop effective time management strategies, thus perpetuating the cycle of procrastination. Further research is necessary to explore the underlying cognitive biases and coping mechanisms that contribute to this disconnect between behavior and perceived impact, and to develop targeted interventions that address these specific challenges (Steel, 2007).

The procrastination habit was primarily observed during independent study activities, which presented a significantly higher risk for delayed task completion. Students demonstrated a marked tendency to procrastinate when managing their learning schedules, highlighting the challenges associated with self-regulated learning (Zimmerman, 2002). According to Steel (2007), procrastination is often linked to task aversiveness and the postponement of immediate rewards, particularly when individuals are working alone. In independent study, students are less likely to experience external pressure or deadlines, which increases the likelihood of procrastination and task delays. The absence of immediate accountability allows procrastination to persist, as individuals may avoid tasks that induce stress or discomfort.

Furthermore, Sirois and Pychyl (2013) suggest that without the framework of group work, students are more inclined to procrastinate as a means of coping with the negative emotions associated with the task, such as anxiety, frustration, or a lack of motivation. Supporting these findings, Koppenborg and Klingsieck (2022) demonstrated that students exhibited significantly lower levels of procrastination when engaged in group work, especially when the task required interdependence and

collaboration. In group settings, the presence of shared responsibilities, external deadlines, and peer accountability mitigates the tendency to procrastinate. This behavior contrasts with individual work, where students often work at their own pace and lack the same external motivations, making procrastination more likely. These results highlight the important role of social and external factors in reducing procrastination, suggesting that structured group environments can effectively combat the tendency to delay tasks.

Furthermore, many students demonstrate poor time management, particularly in task prioritization, as they tend to focus solely on simpler tasks without considering or prioritizing their work responsibilities. As a result, more significant tasks are often inadequately executed due to insufficient time allocated for their completion. Task prioritization is crucial for effective time management, yet procrastinators often struggle to distinguish between tasks that require immediate attention and those that can be postponed. Students who fail to prioritize assignments based on urgency and importance frequently delay critical responsibilities in favor of less demanding, more immediately rewarding activities. This tendency is supported by Eerde (2003) and Steel (2007), who note that procrastinators tend to prioritize short-term gratification over more substantial, long-term tasks.

The strong correlation between procrastination and inadequate time management observed in this study aligns with recent research by Rozental and Carlbring (2014), which indicates that procrastination is closely linked to deficiencies in planning, prioritizing, and effectively managing time. Procrastinators often gravitate toward activities that provide immediate gratification, such as watching television or engaging with social media, rather than focusing on tasks that offer long-term benefits. This preference for instant rewards over meaningful accomplishments contributes to the perpetuation of procrastination, as it reinforces a cycle of delay and avoidance. By recognizing the importance of task prioritization and improving time management skills, students may reduce procrastination tendencies and enhance their academic performance.

1.2 The result of construction validity of academic procrastination showed that consistent with empirical data $\chi^2 = 65.10$, $df = 49$, $\chi^2/df = 1.33$, $RMSEA = .03$, $NFI = .99$, $GFI = .98$, $AGFI = .96$. This aligns with the findings of Hair et al. (2019),

Hooper et al. (2008), and Schumacker and Lomax (2016); which stipulate that the criterion for χ^2/df should be below 2, *CFI* and *TLI* indices should approach 1, *RMSEA* should be under 0.05, and *SRMR* should be below 0.08. The overall components suggest an individual's propensity to defer commitments from academic responsibilities to less significant activities, diminish study planning, and exhibit a motivation to fulfill academic obligations alone in the face of substantial urgency.

The concept validation results of academic procrastination in this study demonstrate a significant alignment with established empirical evidence, affirming the robustness of the academic procrastination construct. This finding is consistent with Steel's (2007) meta-analysis, which identified procrastination as a failure of self-regulation, particularly in the domains of time management and task avoidance. The validation of these constructs further underscores that procrastination is not merely a result of laziness but rather involves complex emotional and cognitive processes that hinder task completion. Procrastinators often experience negative emotions such as anxiety, fear of failure, and low self-efficacy, which exacerbate task avoidance behaviors (Sirois & Pychyl, 2013). Additionally, the tendency to delay tasks may stem from a perceived lack of control or the inability to effectively manage competing priorities, making it difficult for individuals to engage with tasks promptly. The findings suggest that mitigating procrastination requires a comprehensive strategy that encompasses enhancements in self-regulation, emotional regulation, and time management skills.

The qualitative data analysis indicated that the participants showed a moderate level of academic procrastination. Although it reveals the average level, it suggests a common or normative experience, concealing the intricate ways in which procrastination appears and affects individual students. Recent studies have highlighted that even moderate procrastination can result in significant academic and psychological repercussions. Procrastination, primarily when not viewed as severe, is associated with diminished academic achievement, increased stress, and reduced overall well-being (Grunschel et al., 2018). Moreover, the 'average' level may obscure discrepancies in the types and catalysts of procrastination encountered by participants. For example, some individuals may primarily procrastinate on writing assignments, while others struggle with studying for exams, reflecting varying underlying causes,

such as task aversion or a fear of failure (Sirois & Pychyl, 2013). Furthermore, the subjective aspect of 'average' necessitates examination; students' self-assessments of their procrastination levels may not correspond with quantitative metrics. The prevalence of procrastination in academic culture may lead students to underestimate its harmful consequences. Research has shown that even seemingly "normal" levels of procrastination are associated with long-term detrimental effects (Kim & Seo, 2015).

1.3 The result of the construction validity of time management showed that consistent KMO = .88, Bartlett's Test of Sphericity = 8599.73, $p < .01$. This indicates that there is a sufficient relationship between the studied variables to proceed with the analysis of confirmatory factor analysis (Hair et al., 2019). Moreover, it also consistent with empirical data $\chi^2 = 395.36$, $df = 214$, $\chi^2/df = 1.85$, $RMSEA = .04$, $NFI = .98$, $NNFI = .99$, $CFI = .99$, $GFI = .95$. This aligns with the findings of Hair et al. (2019); Hooper et al. (2008), and Schumacker and Lomax (2016); which stipulate that the criterion for χ^2/df should be below 2, CFI and TLI indices should approach 1, $RMSEA$ should be under 0.05, and $SRMR$ should be below 0.08.

This result is consistent with the original concept of Macan et al. (1990), who identified the division of time management into four dimensions as follows: 1) goal setting and prioritization, 2) time management mechanisms, 3) preference for order, and 4) perceived time control.

2. The result of the development of online application for academic procrastination reduction

The development of the online application to reduce academic procrastination among undergraduate students followed the ADDIE model, comprising Analysis, Design, Development, Implementation, and Evaluation, as a systematic framework to ensure instructional quality and learner-centered design (Molenda, 2003). By applying the ADDIE model, the application was tailored to meet the specific learning and behavioral needs of undergraduate students who struggle with academic procrastination.

During the Analysis phase, interviews and needs assessments revealed that most students were unaware of the long-term consequences of procrastination and

lacked structured strategies to manage their academic responsibilities. This informed the Design and Development of the application to integrate two foundational frameworks: Self-Regulated Learning (SRL) (Zimmerman, 2000) and Time Management strategies (Macan et al., 1990; Aeon & Aguinis, 2017), which are believed to help in improving the use of time for their study or complete the academic tasks effectively. The self-regulated learning model offers a structured framework for learners to manage their behavior, thoughts, and emotions, thereby achieving academic success (Zimmerman, 2000).

The application featured three main components: psychoeducation, to-do list planning, and self-reflection. The psychoeducational content was critical in building students' awareness of procrastination and its impact. The to-do list and time management tools supported students in the performance phase of SRL by facilitating self-monitoring and time control. Tools such as task prioritization, daily planning, and scheduling mirror strategies shown in prior research to reduce procrastination and improve academic performance (Häfner & Stock, 2010; Cirillo, 2018). By structuring their time and visualizing their responsibilities, students were more likely to initiate and complete tasks proactively rather than reactively.

The self-reflection activities, aligned with the self-reflection phase of SRL, allowed students to evaluate their weekly study behaviors, recognize successes, and identify areas needing improvement. According to Zimmerman & Schunk (2011), self-evaluation is crucial in helping learners internalize motivation and sustain academic effort over time. Encouraging students to track their progress also increases their sense of agency and reduces reliance on external reminders or deadlines.

The online delivery format provided additional benefits such as accessibility, personalization, and timely reminders—elements found to enhance learner engagement and reduce procrastination (Rozental & Carlbring, 2014). The digital interface also allowed students to receive immediate feedback and adjust their behaviors accordingly, fostering a continuous self-regulated learning cycle.

In summary, the development of this application demonstrates that combining SRL principles with time management strategies through a well-structured instructional design model, such as ADDIE, can effectively address the core causes of academic procrastination. The structured yet flexible nature of the app promotes

behavioral change by improving awareness, planning, and self-reflection. Future evaluations should examine the long-term effects of the application on academic outcomes and psychological well-being.

3. The result of online application for academic procrastination reduction of undergraduate students.

The result of the online training application for academic procrastination reduction (STOPro) is that, after the training, the experimental group has improved in academic procrastination, time management, anxiety, and depression. Moreover, the results of the experiment and the control group after training show that the experimental group has a better score than the control group. The results showed that the developed online application (STOPro) yielded effective outcomes for the experimental group.

3.1 The improve of academic procrastination

The findings of this study support the effectiveness of integrating self-regulated learning (SRL) strategies into digital interventions designed to reduce academic procrastination. Specifically, the results align with the study by Loeffler et al. (2019), which demonstrated that fostering self-regulation through Interactive Ambulatory Assessment (IAA)—a smartphone-based approach that delivers daily prompts and personalized feedback—can significantly reduce procrastination behaviors among students. Their intervention enabled students to monitor their academic tasks more effectively and adjust their behaviors in real-time, illustrating the decisive role of real-time, technology-facilitated self-regulation in managing procrastination.

Similarly, the online application developed in this study incorporated SRL components such as goal setting, time management tools, self-monitoring (via to-do lists), and weekly self-reflection activities, which collectively promoted students' metacognitive awareness and helped them develop more productive academic habits. The psychoeducational content within the app also played a key role in raising awareness about the consequences of procrastination, echoing the self-awareness-enhancing effect observed in the IAA study.

In addition, the importance of SRL in improving not just time use but overall academic engagement is supported by Atmojo et al. (2023), who found that enhancing

self-regulation in learning motivates students to invest greater effort in their academic activities. This increased effort leads to improved learning quality, a reduction in academic procrastination, and stronger critical thinking abilities.

Further supporting evidence comes from Lukas and Berking (2018), who evaluated the impact of a smartphone-based treatment program specifically designed to reduce procrastination. Their study found that participants in the treatment group experienced a significantly greater reduction in procrastination than those in the control condition ($\eta^2 = .15$). This result reinforces the efficacy of mobile and web-based interventions as scalable, practical tools for supporting students' behavioral change. The comparable outcomes between their study and the present research suggest that integrating structured, theory-based activities into digital platforms can have measurable impacts on procrastination-related outcomes.

3.2 The improve of time management skills

The significant improvement in time management among students in the experimental group following the use of the STOPPro application highlights the effectiveness of digital interventions grounded in educational psychology. This result confirms that targeted support through structured digital tools can have a positive influence on students' planning and organizational behaviors. The STOPPro application incorporated evidence-based strategies, such as goal setting, task prioritization, scheduling, and self-monitoring—all essential components of effective time management (Macan et al., 1990; Britton & Tesser, 1991).

The application's interactive features, such as personalized to-do lists, daily planners, and weekly self-reflection prompts, encouraged students to regularly evaluate their time use and adjust their habits to better align with academic priorities. These features are consistent with the time management strategies highlighted in Filomeno et al. (2023), who emphasized that successful time management involves not only planning and prioritizing tasks but also integrating digital tools to help streamline decision-making and manage competing responsibilities. The use of STOPPro helped to externalize and structure these practices, making them more accessible and actionable for students.

Moreover, this improvement aligns with the guidance presented in Ten Tips for Efficient Academic Time Management (Efron, 2023), which advocates for techniques such as task prioritization and setting deadlines. The STOPro application enabled students to operationalize these recommendations in a real-world context through its intuitive user interface and timely reminders. By encouraging users to reflect on their academic behaviors and adjust accordingly consistently, the application fostered both awareness and accountability, two key dimensions of self-regulated learning (Zimmerman, 2000).

These findings also align with the results reported by Zhang et al. (2020), who demonstrated that time management training programs significantly improved time-related behaviors among nursing undergraduates. Like Zhang's study, STOPro provided structured guidance and reflection opportunities, which likely contributed to the observed behavioral changes. Similarly, research by Aeon and Aguinis (2017) suggests that time management interventions have the most substantial impact when they target not only cognitive planning skills but also motivational and behavioral regulation—elements that were embedded into STOPro through its integration of self-reflection and progress tracking features.

In summary, the STOPro application's design, informed by both time management and self-regulated learning theory, effectively supported undergraduate students in developing more effective time-use habits. These improvements are well supported by previous studies and best practice guidelines in time management, reinforcing the importance of accessible, well-structured digital tools for promoting effective learning behaviors in higher education settings.

3.3 Decreased Anxiety and depression

The results of this study showed no significant difference in levels of anxiety and depression among participants in the experimental group after using the STOPro application. This finding contrasts with several previous studies, which have reported that improved time management skills can contribute to reductions in psychological distress, including anxiety and depression (Misra & McKean, 2000; Macan et al., 1990). However, Govindan et al. (2014) and Hameed et al. (2025) revealed that procrastination has a weak but positive relationship with anxiety. Thus, one possible explanation for this discrepancy may lie in the duration of the intervention. The

STOPro training was implemented over a relatively short period of one month, which may not have been sufficient to produce measurable changes in deeper emotional or psychological outcomes.

While short-term improvements in behavioral aspects such as task planning and time use are often observable within weeks, changes in affective domains like anxiety and depression typically require more sustained intervention and reinforcement over time (Rabin et al., 2011). Furthermore, anxiety and depression are multifactorial and may not be significantly impacted by time management training alone unless accompanied by other forms of emotional or cognitive support, such as counseling or mindfulness-based interventions (Beiter et al., 2015).

While participants experienced some improvements in daily organization and planning, these changes did not translate into a sufficient reduction in perceived academic stress or emotional burden to influence their overall mental health status within the limited timeframe. Future studies may benefit from extending the duration of training or integrating psychological support components alongside time management interventions to enhance emotional well-being further.

Limitation of Study

This research result shows the effectiveness of using online applications to reduce academic procrastination, which helps improve academic procrastination and time management skills for the experimental group. However, this research still has some limitations as follows:

First, although the study employed a randomized control design, the sample size was relatively small, and demographic differences existed between the experimental and control groups. Although covariate analysis was conducted to assess whether these demographic differences influenced the outcomes, and no significant covariates were found, the imbalance still presents a potential threat to internal validity. Future studies should aim for larger and more demographically diverse samples to enhance the robustness of group comparisons and increase statistical power.

Secondly, the satisfaction evaluation of the developed application was conducted only during the pilot study phase. It was not included after the full-scale implementation involving the 30 participants in the experimental group. As a result, the user experience and overall satisfaction of participants who completed the intervention were not formally assessed. To gain a more comprehensive understanding of the application's effectiveness and usability, future research should incorporate a satisfaction evaluation following the intervention. This would provide valuable insights into how users perceive the application's design, content, and overall impact on their learning and behavior.

Thirdly, the intervention period was limited to four weeks, with outcomes measured only through an immediate post-test. While this short-term follow-up was sufficient to detect changes in behavioral variables such as procrastination and time management, it may not have allowed enough time to observe meaningful changes in more stable psychological outcomes like anxiety and depression. These variables often require more extended intervention periods or delayed follow-up assessments to detect significant effects. Future research should include long-term follow-up measures to assess the sustained impact of the intervention, especially on emotional and psychological well-being.

Finally, the study relied on self-reported measures, which may introduce bias related to social desirability or participants' perceptions of their behaviors. Incorporating objective behavioral data, such as app usage logs or academic performance indicators, could strengthen the validity of future findings.

Suggestion of the study

Suggestion of use of the research result

1. Based on the positive outcomes observed in reducing academic procrastination and improving time management, universities and academic institutions should consider incorporating digital tools like STOPro into student support services. These tools can complement existing academic advising and counseling programs by offering students real-time, self-regulated learning support that promotes planning, task execution, and reflection.

2. Although time management significantly improved, anxiety and depression levels did not show measurable changes, possibly due to the short intervention period. Future implementations of STOPPro or similar programs should extend the training duration beyond one month to allow for more profound behavioral change and potential improvements in emotional well-being. Incorporating more stress-reduction or mental health support components could also enhance outcomes.

3. The STOPPro application can be effectively used as a preventive strategy for students identified as at-risk for poor academic performance due to procrastination. Academic advisors can utilize self-assessment tools within STOPPro to identify procrastination patterns early and provide targeted interventions aimed at enhancing students' executive functioning, motivation, and study habits.

Suggestion of future research

1. Future research should explore the long-term impact of the application by extending the intervention period beyond one month and conducting a follow-up study after three or six months. A more extended training period may provide a better understanding of how sustained use influences not only time management and procrastination but also emotional outcomes like anxiety and depression.

2. Future research should test the effectiveness of the application across different student populations, such as students from various majors, education levels (e.g., high school, graduate students), and cultural backgrounds. This would help determine the generalizability of the intervention across diverse educational and sociocultural settings.

3. Future iterations of the intervention might include personalized or adaptive content, where the app adjusts recommendations and strategies based on user behavior, preferences, or progress. Research could investigate whether such adaptive features lead to better outcomes than a one-size-fits-all design.

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Appendix



Appendix A
Research Instrument's Expert

Research Instrument's Expert Checking name list:

1. Asst. Prof. Parinya Ruangtip Department of Research and Applied
Psychology, Faculty of Education, Burapha
University, Thailand.
2. Dr. Patchana Suwannasaen Faculty of Science and Technology, Nakhon
Ratchasiman Rajabhat University, Thailand.
3. Dr. Withawat Penphu Faculty of Technical Education, Rajamangala
University of Technology Thayaburi, Thailand.
4. Dr. Weera Sinraparattanaporn Faculty of Management, Rajabhat
Rajanagarindra University, Chachoengsao,
Thailand.
5. Dr. Putthichada Janthakun Head of Quality and Academic Development,
Khon Kaen Rajanagarindra Psychiatric Hospital



Appendix B

The result of CVI for research Instrument

The result of CVI

1. Academic Procrastination Inventory

Item	Result of the evaluation						
	Ex.1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	CVI	Try out
1	1	1	1	1	1	1	.47
2	1	1	1	1	1	1	.61
3	1	1	1	1	1	1	.70
4	1	1	1	1	1	1	Remove
5	1	1	1	1	1	1	.56
6	1	1	1	1	1	1	.71
7	1	1	1	1	1	1	.45
8	1	1	1	1	1	1	.75
9	1	1	1	0	0	0.6 (Remove)	-
10	1	1	1	1	1	1	.81
11	1	1	1	0	0	0.6 (Remove)	-
12	1	1	1	1	1	1	.73
13	1	1	1	1	1	1	.73
14	1	1	1	1	1	1	.60
15	1	1	1	1	1	1	.82
16	1	1	1	1	1	1	.71

2. Time Management Inventory

Item	Result of the evaluation						
	Ex.1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	CVI	Try out
Setting goals and Priorities							
1	1	1	1	1	1	1	Remove
2	1	1	1	1	1	1	.47
3	1	1	1	1	1	1	Remove
4	1	1	1	1	1	1	.48
5	1	1	1	1	1	1	.39
6	1	1	1	1	1	1	.40
7	1	1	1	1	1	1	.53
8	1	1	1	1	1	1	.39
Mechanic of time management							
1	1	1	1	1	1	1	.56
2	1	1	1	1	1	1	Remove
3	1	1	1	1	1	1	.47
4	1	1	1	1	1	1	.27
5	1	1	1	1	1	1	.48
6	1	1	1	1	1	1	.59
7	1	1	1	1	1	1	.63
8	1	1	1	1	1	1	.66
Preference for Organization							
1	1	1	1	1	1	1	.64
2	1	1	1	1	1	1	.59
3	1	1	1	1	1	1	.26
4	1	1	1	1	1	1	.49
5	1	1	1	1	1	1	.62
6	1	1	1	1	1	1	.63
7	1	1	1	1	1	1	.67
Perceived control of time							
1	1	1	1	1	1	1	.64

Item	Result of the evaluation						
	Ex.1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	CVI	Try out
2	1	1	1	1	1	1	Remove
3	1	1	1	1	1	1	.59
4	1	1	1	1	1	1	.49
5	1	1	1	1	1	1	.62
6	1	1	1	1	1	1	Remove
7	1	1	1	1	1	1	.46



3. Academic Procrastination Interview questionnaire

Items	Result of the evaluation					
	Ex.1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	CVI
1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	1	1	1	1	1	1
4	1	1	1	1	1	1
5	1	1	1	1	1	1
6	1	1	1	1	1	1

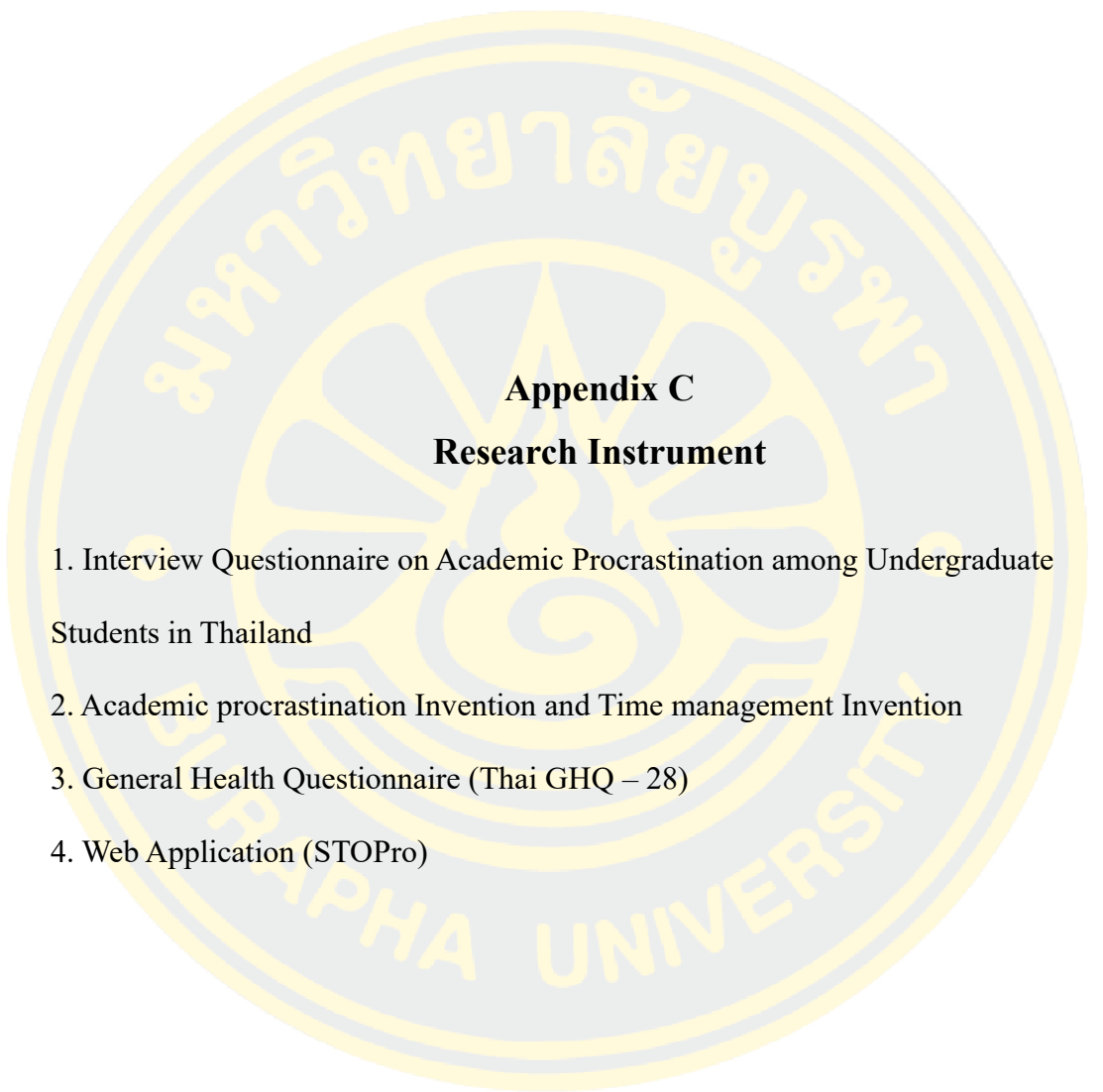


4. The assessment of Online Web application to reduce academic procrastination among undergraduate students

Items	Result of the evaluation					
	Ex.1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	CVI
The suitability of the app						
1. The factor of activities	1	1	1	1	1	1
2. Use of color, interested	1	1	1	1	1	1
The appropriateness of learning activities in web app						
1. The activities are varied, offering both knowledge and practical training aimed at changing students' behavior.	1	1	1	1	1	1
2. The activities are appropriately challenging for the students' grade level.	1	1	1	1	1	1
3. The activities encourage students to reflect on their own behavior.	1	1	1	1	1	1
Appropriateness of the Timeframe						
1. The duration of the learning period is appropriate.	1	1	1	1	1	1
Appropriateness of the Content						
1. The content of the activities is suitable for the students.	1	1	1	1	1	1
2. It aligns with the students' interests.	1	1	1	1	1	1
3. It is appropriate for the process of reducing students' procrastination behavior.	1	1	1	1	1	1

5. Satisfaction questionnaire on using the web application to reduce procrastination among undergraduate students

Items	Result of the evaluation					
	Ex.1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	CVI
1. Have a proper web app design.	1	1	1	1	1	1
2. The learning and training process is designed to be appropriate and easy to use.	1	1	1	1	1	1
3. The web app is attractive and modern.	1	1	1	1	1	1
4. The activity format is clear.	1	1	1	1	1	1
5. The font size and font style are beautiful and easy to read.	1	1	1	1	1	1
6. The web app's responsiveness is appropriate.	1	1	1	1	1	1
7. The web app's usability is stable.	1	1	1	1	1	1
8. Benefits gains from web app.	1	1	1	1	1	1
9. Overall satisfaction of the web app.	1	1	1	1	1	1

The logo of Srinakharinwirot University is a circular emblem. It features a central five-petaled flower-like symbol. The Thai text 'มหาวิทยาลัยบูรพา' (Mahavithayalai Burapha) is written in a circular path around the top, and 'SRINAKHARINWIROT UNIVERSITY' is written around the bottom. The logo is rendered in a light yellow/gold color.

Appendix C

Research Instrument

1. Interview Questionnaire on Academic Procrastination among Undergraduate Students in Thailand
2. Academic procrastination Invention and Time management Invention
3. General Health Questionnaire (Thai GHQ – 28)
4. Web Application (STOPPro)

1. Interview Questionnaire on Academic Procrastination among Undergraduate Students in Thailand

แบบสัมภาษณ์การผัดวันประกันพรุ่งด้านการศึกษา ของนักศึกษาระดับปริญญาตรีในประเทศไทย

ชื่อ

อายุ ปี (เกิน 6 เดือนนับเป็น 1 ปี)

ชั้นปี

กลุ่มสาขาวิชา

1. ในปัจจุบันท่านมีปัญหาเกี่ยวกับการผัดวันประกันพรุ่งไหม (พฤติกรรมที่มักชอบชะลองานที่ต้องทำ หรือเรียน อย่างเช่น ไม่อยากทบทวนการเรียน หรือชะลอการทำการบ้านหรือโครงการไปก่อน หรือจน เกือบถึงกำหนดส่ง ถึงลงมือในการทำ) หากว่ามีบ่อยแค่ไหน และมีลักษณะอย่างไรบ้าง

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2. เวลาที่มีการบ้าน หรืองานกลุ่มต่าง ๆ ที่ได้จากอาจารย์ ท่านมักจะรีบทำเลยไหม หรือรอจนกว่าจะ ใกล้ถึงกำหนดส่งค่อยทำ ทำไหมเลือกทำแบบนั้น

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3. ท่านคิดว่ามีสาเหตุอะไรที่ทำให้ท่านมีพฤติกรรมผัดวันประกันพรุ่ง (ชอบชะลองานที่ต้องทำ หรือจนเกือบถึงกำหนดส่ง ถึงลงมือในการทำ) เฉพาะบางวิชาเรียนหรือไม่

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4. เมื่อท่านมีปัญหาผัดวันประกันพรุ่ง (ชอบชะลองานที่ต้องทำ หรือจนเกือบถึงกำหนดส่ง ถึงลงมือในการทำเฉพาะบางวิชาเรียนหรือไม่) ท่านได้หาวิธีแก้ปัญหาแบบนี้ได้อย่างไร

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5. ท่านมักมีพฤติกรรมชอบชะลองานที่ต้องทำ หรือจนเกือบถึงกำหนดส่ง ถึงลงมือในการทำเฉพาะบางวิชาเรียนหรือไม่ หากเป็นคิดว่าเพราะสาเหตุอะไร

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6. ท่านมักมีความรู้สึกเครียดกับการต้องทำงานแข่งกับเวลาหรือไม่ เพราะสาเหตุอะไร (เช่น ไม่รีบทำงาน รอจนถึงใกล้กำหนดส่งค่อยทำ)

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6. ท่านคิดว่าควรจะทำอย่างไรเพื่อให้ลดพฤติกรรมผัดวันประกันพรุ่งนี้ได้

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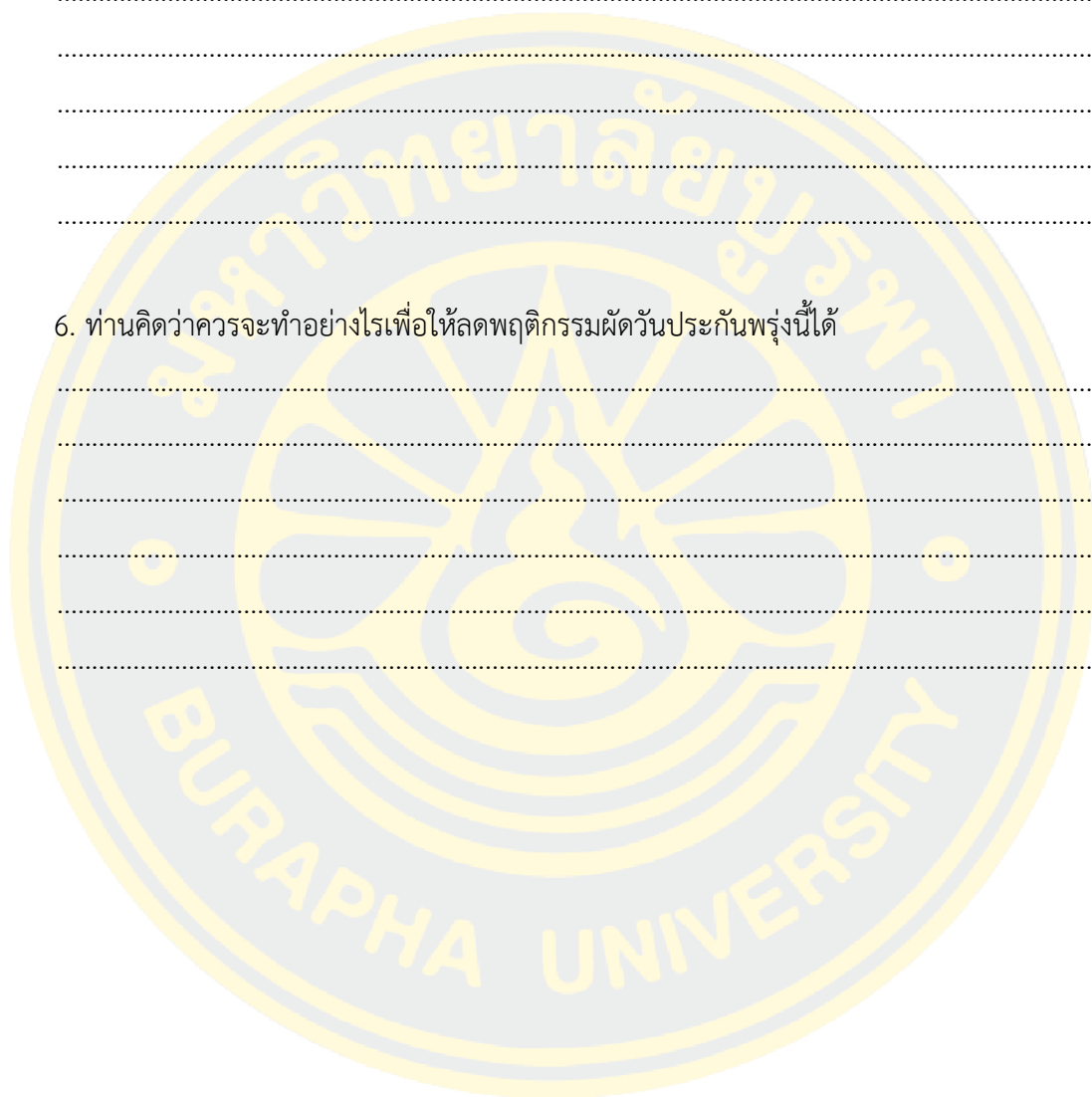
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2. Academic Procrastination Invention and Time Management Invention



แบบประเมินการผัดวันประกันพรุ่งด้านการศึกษานักศึกษา ระดับปริญญาตรีในประเทศไทย

แบบประเมินนี้เป็นส่วนหนึ่งของดัชนีชี้วัดเรื่อง “The development of an online application for academic procrastination reduction of undergraduate students in Thailand”

คำชี้แจง: แบบประเมินการผัดวันประกันพรุ่งด้านการศึกษ แบ่งออกเป็น 2 ส่วน ดังนี้

ส่วนที่ 1 ข้อมูลทั่วไป

คำชี้แจง: กรุณาตอบคำถามต่อไปนี้ตามความเป็นจริงของท่าน โดยทำเครื่องหมาย ☒ ในช่อง ☐ หรือเติมคำในช่องว่างให้สมบูรณ์

1. เพศ

☐ ชาย

☐ หญิง

☐ เพศทางเลือก

2. อายุ กรุณาระบุ (เกิน 6 เดือนนับเป็น 1 ปี)

3. ชั้นปี

☐ ปี 1

☐ ปี 2

☐ ปี 3

☐ ปี 4

☐ ปี 5

☐ ปี 6

4. สาขาวิชา กรุณาระบุ

5. คณะ กรุณาระบุ

ส่วนที่ 2 แบบประเมินการผัดวันประกันพรุ่งด้านการศึกษา

ข้อความเกี่ยวกับการผัดวันประกันพรุ่งด้านการศึกษานักศึกษาปริญญาตรี เป็นแบบมาตร
ประมาณค่า (Rating Scale) แบบ 5 ระดับ ขอความกรุณาท่านตรวจสอบความสอดคล้องของ
เครื่องมือข้อความกับนิยามเชิงปฏิบัติการ โดยทำเครื่องหมายถูก (✓) ลงในช่องที่ตรงกับความคิดเห็น
ของท่าน

เกณฑ์การประเมินความคิดเห็นมีดังนี้

- | | | |
|---|---------|--------------------|
| 5 | หมายถึง | เห็นด้วยมากที่สุด |
| 4 | หมายถึง | เห็นด้วยมาก |
| 3 | หมายถึง | เห็นด้วยปานกลาง |
| 2 | หมายถึง | เห็นด้วยน้อย |
| 1 | หมายถึง | เห็นด้วยน้อยที่สุด |

ข้อ	รายการ	ระดับความคิดเห็น				
		5	4	3	2	1
1.	ฉันมักจะเลื่อนงานที่ต้องทำไปก่อนตลอด					
2.	ฉันมักจะจัดการงานทั้งหมดที่ต้องทำก่อนที่จะนั่งลงและ พักผ่อนในตอนเย็น					
3.	ฉันมักจะเริ่มทำในนาที่สุดท้ายและพบว่ามันยากที่จะทำ ให้เสร็จทันเวลา					
4.	ฉันมักประสบกับปัญหาเมื่อต้องทำงานแข่งกับเวลาที่ กำหนด					
5.	ฉันเสียเวลาไปมากกับสิ่งที่ไม่สำคัญ					
6.	ฉันมีปัญหาในการเริ่มต้นทำงานหรือเรียน					
7.	ในวันหยุดสุดสัปดาห์ ฉันวางแผนทำการบ้านและทำ โครงการ แต่ฉันฟุ้งซ่านและออกไปเที่ยวกับเพื่อน					
8.	ฉันมักพูดอยู่เสมอว่า “ฉันจะทำมันในวันพรุ่งนี้”					
9.	ฉันหลีกเลี่ยงการเริ่มงานที่ยากลำบาก					
10.	ฉันรู้สึกเครียดและไม่มีสมาธิเมื่อมีเวลาคดคิดมากเกินไป					
11.	ฉันมักจะเลื่อนสิ่งต่าง ๆ ออกไปในวันถัดไป					

ข้อ	รายการ	ระดับความคิดเห็น				
		5	4	3	2	1
12.	ฉันมีปัญหาในการใช้สมาธิจดจ่ออยู่กับสิ่งใดสิ่งหนึ่ง					
13.	ฉันหาข้ออ้างเพื่อชะลอการทำให้สิ่งที่ต้องทำให้เสร็จ					

ส่วนที่ 3 แบบประเมินการจัดการเวลา

ข้อความเกี่ยวกับการบริหารจัดการเวลาของนักศึกษาระดับปริญญาตรี เป็นแบบมาตรประมาณค่า (Rating Scale) แบบ 5 ระดับ ขอความกรุณาท่านตรวจสอบความสอดคล้องของเครื่องมือข้อความกับนิยามเชิงปฏิบัติการ โดยทำเครื่องหมายถูก (✓) ลงในช่องที่ตรงกับความคิดเห็นของท่าน

เกณฑ์การประเมินความคิดเห็นมีดังนี้

5	หมายถึง	เห็นด้วยมากที่สุด
4	หมายถึง	เห็นด้วยมาก
3	หมายถึง	เห็นด้วยปานกลาง
2	หมายถึง	เห็นด้วยน้อย
1	หมายถึง	เห็นด้วยน้อยที่สุด

ข้อ	รายการ	ระดับความคิดเห็น				
		5	4	3	2	1
การตั้งเป้าหมายและการจัดลำดับความสำคัญ (Setting goals and Priorities)						
1.	ฉันกำหนดเวลาว่าต้องใช้เวลาในการเรียนกี่ชั่วโมงต่อสัปดาห์					
2.	ฉันทำงานที่มีลำดับความสำคัญมากที่สุดให้เสร็จก่อนที่จะไปทำงานที่สำคัญน้อยกว่า					
3.	ฉันกำหนดเส้นตายวันส่งงานของตัวเอง เมื่อฉันตั้งใจจะทำงานให้สำเร็จ					
4.	ฉันแบ่งงาน/โครงการที่ซับซ้อนและยากออกเป็นงานชิ้นเล็ก ๆ เพื่อให้สามารถทำได้ง่ายขึ้น					

ข้อ	รายการ	ระดับความคิดเห็น				
		5	4	3	2	1
5.	ฉันเชื่อว่าถ้าสามารถบรรลุเป้าหมายระยะสั้นได้ ก็ สามารถบรรลุเป้าหมายระยะยาวได้ไม่ยากเช่นกัน					
6.	แม้ว่าฉันได้กำหนดลำดับความสำคัญของงาน แต่ฉันก็ยัง เลือกทำงานที่ง่ายกว่าให้เสร็จก่อน					
กลไกของการบริหารเวลา (Mechanic of time management)						
1.	สิ่งรบกวนสมาธิ อย่างเช่น การเล่นโซเชียลมีเดียมัก ขัดขวางไม่给我ทำงานสำคัญ ๆ ได้ทันเวลา					
2.	ฉันแบ่งเวลาที่ต้องเรียนหรือทำงานที่กำหนดไว้เป็น ประจำ					
3.	ฉันเขียนบันทึกเพื่อเตือนตัวเองถึงสิ่งที่ฉันต้องทำทุกวัน					
4.	ฉันเขียนรายการงานที่ต้องทำในแต่ละวัน และขีดเส้นทับ ข้อความที่ทำให้เสร็จทั้ง					
5.	ฉันมักเอางานหรือหนังสือติดตัวไว้ เมื่อต้องใช้เวลาในการ รอทำอะไรบางอย่าง					
6.	ฉันมักจะพบทวนงานที่ต้องทำในแต่ละวันตลอด เพื่อ ไม่ให้มีงานตกค้าง					
7.	ฉันทำการจัดบันทึกงานที่ต้องทำในที่ ๆ สามารถมองเห็น ได้ง่าย					
ความชอบในการมีระเบียบ(Preference for organization)						
1.	ฉันมักเก็บโต๊ะเรียนให้สะอาดเรียบร้อยเสมอ หลังจากที่ เลิกเรียน					
2.	ฉันมักลืมหรือไม่ได้ทำตามงานที่ฉันได้จัดไว้สำหรับทำ เมื่อตอนเช้าเสมอ					
3.	ฉันไม่สามารถหาสิ่งของจำเป็นสำหรับการเรียนได้ หาก ว่าโต๊ะจัดของไม่เป็นระเบียบ					
4.	ฉันคิดว่าการจัดตารางเรียนหรือตารางทำงาน เป็นเรื่องที่ เสียเวลา					

ข้อ	รายการ	ระดับความคิดเห็น				
		5	4	3	2	1
5.	ทุกวันนี้ฉันไม่สามารถคาดการณ์เวลาสำหรับวางแผนหรือจัดการการเรียนรู้ได้เลย					
6.	เมื่อฉันไม่มีระเบียบ ฉันสามารถปรับตัวให้เข้ากับสถานการณ์ที่คาดไม่ถึงให้ขึ้นได้					
7.	ฉันไม่สามารถทำงานออกมาได้ดี หากว่าไม่ได้มีการวางแผนงานก่อน					
การรับรู้การควบคุมเวลา (Perceived control of time)						
1.	ฉันคาดการณ์เวลาที่ต้องใช้ในการทำงานให้แล้วเสร็จน้อยเกินไป					
2.	ฉันใช้เวลานานกับงานที่ไม่สำคัญ					
3.	ฉันรู้สึกยากลำบากในการทำตามตารางที่กำหนด เพราะคนอื่นมักพาฉันไม่ทำงาน					
4.	ฉันพบว่าตัวเองผัดวันประกันพรุ่งกับงานที่ฉันไม่ชอบ แม้ว่าเป็นงานก็ต้องทำให้สำเร็จก็ตาม					
5.	ฉันมักใช้เวลากับการเล่นโซเชียลมีเดีย จนเกือบไม่สามารถทำงานให้เสร็จทันกำหนดส่ง					

ขอบคุณสำหรับการให้ความร่วมมือตอบแบบประเมิน

3. General Health Questionnaire (Thai GHQ – 28)

แบบสอบถามสุขภาพทั่วไป

(Thai GHQ – 28)

คำชี้แจง

แบบสอบถามนี้มีวัตถุประสงค์เพื่อต้องการทราบถึงสภาวะสุขภาพของท่านในระยะสองถึงสามสัปดาห์ที่ผ่านมาว่าเป็นอย่างไร กรุณาตอบคำถามต่อไปนี้ โดยขีดเครื่องหมายวงกลมรอบคำตอบที่ใกล้เคียงกับสภาพของท่านในปัจจุบัน หรือในช่วงสองถึงสามสัปดาห์ที่ผ่านมามากที่สุด โดยไม่รวมถึงปัญหาที่ท่านเคยมีในอดีต และกรุณาตอบคำถามทุกข้อ

ในระยะสองถึงสามสัปดาห์ที่ผ่านมาท่าน

1. รู้สึกสบายและมีสุขภาพดี

ก. ดีกว่าปกติ	ข. เหมือนปกติ	ค. แย่กว่าปกติ	ง. แย่กว่าปกติมาก
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2. รู้สึกต้องการยาบำรุงให้มีกำลังวังชา

ก. ไม่เลย	ข. ไม่มากกว่าปกติ	ค. ค่อนข้างมากกว่าปกติ	ง. มากกว่าปกติมาก
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3. รู้สึกทรุดโทรมและสุขภาพไม่ดี

ก. ไม่เลย	ข. ไม่มากกว่าปกติ	ค. ค่อนข้างมากกว่าปกติ	ง. มากกว่าปกติมาก
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4. รู้สึกไม่สบาย

ก. ไม่เลย	ข. ไม่มากกว่าปกติ	ค. ค่อนข้างมากกว่าปกติ	ง. มากกว่าปกติมาก
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5. เจ็บหรือปวดบริเวณศีรษะ

ก. ไม่เลย	ข. ไม่มากกว่าปกติ	ค. ค่อนข้างมากกว่าปกติ	ง. มากกว่าปกติมาก
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6. รู้สึกตึงหรือคล้ายมีแรงกดที่ศีรษะ

ก. ไม่เลย	ข. ไม่มากกว่าปกติ	ค. ค่อนข้างมากกว่าปกติ	ง. มากกว่าปกติมาก
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7. มีอาการรบกวนหรือหนาว

ก. ไม่เลย	ข. ไม่มากกว่าปกติ	ค. ค่อนข้างมากกว่าปกติ	ง. มากกว่าปกติมาก
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8. นอนไม่หลับเพราะกังวลใจ

ก. ไม่เลย	ข. ไม่มากกว่าปกติ	ค. ค่อนข้างมากกว่าปกติ	ง. มากกว่าปกติมาก
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9. ไม่สามารถหลับได้สนิทหลังจากหลับแล้ว

ก. ไม่เลย	ข. ไม่มากกว่าปกติ	ค. ค่อนข้างมากกว่าปกติ	ง. มากกว่าปกติมาก
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10. รู้สึกตึงเครียดอยู่ตลอดเวลา

- ก. ไม่เลย ข. ไม่มากกว่าปกติ ค. ค่อนข้างมากกว่าปกติ ง. มากกว่าปกติมาก
11. รู้สึกหงุดหงิด อารมณ์ไม่ดี
- ก. ไม่เลย ข. ไม่มากกว่าปกติ ค. ค่อนข้างมากกว่าปกติ ง. มากกว่าปกติมาก
12. รู้สึกกลัวหรือตกใจโดยไม่มีเหตุผลสมควร
- ก. ไม่เลย ข. ไม่มากกว่าปกติ ค. ค่อนข้างมากกว่าปกติ ง. มากกว่าปกติมาก
13. รู้สึกเรื่องต่าง ๆ ทั้บถมจนรับไม่ไหว
- ก. ไม่เลย ข. ไม่มากกว่าปกติ ค. ค่อนข้างมากกว่าปกติ ง. มากกว่าปกติมาก
14. รู้สึกกังวล กระวนกระวาย และเครียดอยู่ตลอดเวลา
- ก. ไม่เลย ข. ไม่มากกว่าปกติ ค. ค่อนข้างมากกว่าปกติ ง. มากกว่าปกติมาก
15. หาอะไรทำให้ตัวเองไม่มีเวลาว่างได้
- ก. มากกว่าปกติ ข. เหมือนปกติ ค. ค่อนข้างมากกว่าปกติ ง. น้อยกว่าปกติมาก
16. ทำอะไรช้ากว่าปกติ
- ก. เร็วกว่าปกติ ข. เหมือนปกติ ค. ช้ากว่าปกติ ง. ช้ากว่าปกติมาก
17. รู้สึกว่าโดยทั่วไปแล้วทำอะไร ๆ ได้ดี
- ก. ดีกว่าปกติ ข. เหมือนปกติ ค. ดีน้อยกว่าปกติ ง. ดีน้อยกว่าปกติมาก
18. พอใจกับการทำงานลุล่วงไป
- ก. มากกว่าปกติ ข. พอ ๆ กับตามปกติ ค. น้อยกว่าปกติ ง. มากกว่าปกติมาก
19. รู้สึกว่าได้ทำตัวให้เป็นประโยชน์ในเรื่องต่าง ๆ
- ก. มากกว่าปกติ ข. เหมือนปกติ ค. ค่อนข้างมากกว่าปกติ ง. มากกว่าปกติมาก
20. รู้สึกว่าสามารถตัดสินใจในเรื่องต่าง ๆ ได้
- ก. มากกว่าปกติ ข. เหมือนปกติ ค. น้อยกว่าปกติ ง. น้อยกว่าปกติมาก
21. สามารถมีความสุขกับกิจกรรมในชีวิตประจำวันตามปกติได้
- ก. มากกว่าปกติ ข. เหมือนปกติ ค. น้อยกว่าปกติ ง. น้อยกว่าปกติมาก
22. คิดว่าตัวเองเป็นคนไร้ค่า
- ก. ไม่เลย ข. ไม่มากกว่าปกติ ค. ค่อนข้างมากกว่าปกติ ง. มากกว่าปกติมาก
23. รู้สึกว่าชีวิตนี้หมดหวังโดยสิ้นเชิง
- ก. ไม่เลย ข. ไม่มากกว่าปกติ ค. ค่อนข้างมากกว่าปกติ ง. มากกว่าปกติมาก
24. รู้สึกไม่คุ้มค่าที่จะมีชีวิตอยู่ต่อไป
- ก. ไม่เลย ข. ไม่มากกว่าปกติ ค. ค่อนข้างมากกว่าปกติ ง. มากกว่าปกติมาก
25. คิดว่ามีความเป็นไปได้ที่จะอยากจบชีวิตตัวเอง

ก. ไม่อย่างแน่นอน ข. ไม่คิดว่าเป็นอย่าง ค. มีอยู่บ้างเหมือนกัน ง. มีแน่ ๆ
นั้น

26. รู้สึกว่าบางครั้งทำอะไรไม่ได้เลยเพราะประสาทตึงเครียดมาก

ก. ไม่เลย ข. ไม่มากกว่าปกติ ค. ค่อนข้างมากกว่าปกติ ง. มากกว่าปกติมาก

27. พบว่าตัวเองรู้สึกอยากตามไปให้พ้น ๆ

ก. ไม่เลย ข. ไม่มากกว่าปกติ ค. ค่อนข้างมากกว่าปกติ ง. มากกว่าปกติมาก

28. พบว่ามีความรู้สึกที่อยากจะทำลายชีวิตตัวเองเข้ามาอยู่ในความคิดเสมอ ๆ

ก. ไม่อย่างแน่นอน ข. ไม่คิดว่าเป็นอย่าง ค. มีอยู่บ้างเหมือนกัน ง. มีแน่ ๆ
นั้น





Appendix D
Research Ethical Approval



Certificate Number IRB4-224/2567

Certificate of Human Research Approval
Burapha University

BUJ Ethics Committee for Human Research has considered the following research protocol:

Protocol Code: G-HU 115/2567

Protocol Title: The development of an online application for academic procrastination reduction of undergraduate students in Thailand.

Principal Investigator: Miss CHANNEARDEY CHIV

Affiliation: College of Research Methodology and Cognitive Science

Principal Advisor (Independent Study/ Thesis/ Dissertation):

Associate Professor Dr. Pattrawadee Makmee

Affiliation: College of Research Methodology and Cognitive Science

Co-advisor (Independent Study/ Thesis/ Dissertation):

Assistant Professor Dr. Peera Wongupparaj

Affiliation: College of Research Methodology and Cognitive Science

Review Method: ☐ Exemption ☐ Expedited ☒ Full board

BUJ Ethics Committee for Human Research has considered the following research protocol according to the ethical principles of human research in which the researchers respect human's right and honor, do not violate right and safety, and do no harms to the research participants.

Therefore, the research protocol is approved (See attached)

- | | |
|---|---------------------------|
| 1. Form of Human Research Protocol Submission | Version 2: 27 August 2024 |
| 2. Research Protocol | Version 1: 20 June 2024 |
| 3. Participant Information Sheet | Version 2: 19 August 2024 |
| 4. Informed Consent Form | Version 1: 20 June 2024 |
| 5. Research Instruments | Version 2: 19 August 2024 |
| 6. Others (if any) | |
| 6.1 Example : Online application | Version 1: 20 June 2024 |

Approval Date: 3 September 2024

Valid Date: 3 September 2025

Sign

(Pinonpan Lertiam)

Chair of The Burapha University Institutional Review Board
Panel 4 (Humanities and Social Sciences)

****Remark: This approval has the following details****



Certificate Number IRB4-026/2568
Amendment 1st

Certificate of Human Research Approval
Burapha University

BUJ Ethics Committee for Human Research has considered the following research protocol:

Protocol Code: G-HU 115/2567

Protocol Title: The development of an online application for academic procrastination reduction of undergraduate students in Thailand

Principal Investigator: MISS CHANMEARDEY CHIV

Affiliation: College of Research Methodology and Cognitive Science

Principal Advisor (Independent Study/ Thesis/ Dissertation):

Associate Professor Dr. Pattravadee Makmee

Affiliation: College of Research Methodology and Cognitive Science

Co-advisor (Independent Study/ Thesis/ Dissertation):

Assistant Professor Dr. Peera Wongupparaj

Affiliation: College of Research Methodology and Cognitive Science

Review Method: ☒ Exemption ☐ Expedited ☐ Full board

BUJ Ethics Committee for Human Research has considered the following research protocol according to the ethical principles of human research in which the researchers respect human's right and honor, do not violate right and safety, and do no harms to the research participants.

Therefore, the research protocol is approved (See attached)

- | | |
|---|----------------------------|
| 1. Form of Human Research Protocol Submission | Version 2: 27 August 2024 |
| 2. Research Protocol | Version 1: 20 June 2024 |
| 3. Participant Information Sheet | Version 3: 16 January 2025 |
| 4. Informed Consent Form | Version 2: 16 January 2025 |
| 5. Research Instruments | Version 3: 16 January 2025 |
| 6. Others (if any) | |
| 6.1 Example : Online application | Version 2: 16 January 2025 |
| 6.2 Announcement of recruitment | Version 1: 20 June 2024 |

Approval Date: 28 January 2025

Valid Date: 3 September 2025

Sign

(Pimonpan Lertlam)

Chair of The Burapha University Institutional Review Board
Panel 4 (Humanities and Social Sciences)

****Remark: This approval has the following details****



Appendix E

Data collection permission document



บันทึกข้อความ

ส่วนงาน บัณฑิตวิทยาลัย มหาวิทยาลัยบูรพา

ที่ อว ๘๐๓๗/๒๐๖๖

เรื่อง ขออนุญาตเก็บข้อมูลเพื่อดำเนินการวิจัย

โทร. ๒๗๐๐ ต่อ ๗๐๕, ๗๐๗

วันที่ ๒๐ กันยายน พ.ศ. ๒๕๖๗

เรียน อธิการบดีมหาวิทยาลัยบูรพา

ด้วย Miss Chanmeadey Chiv รหัสประจำตัวนิสิต ๖๒๔๑๐๐๕๗ หลักสูตรปริญญาตรีบัณฑิต สาขาวิชาการวิจัยและสถิติทางวิทยาการปัญญา วิทยาลัยวิทยาการวิจัยและวิทยาการปัญญา ได้รับอนุมัติจากคณาจารย์ เรื่อง “The Development of an Online Application for Academic Procrastination Reduction of Undergraduate Students in Thailand” โดยมี รองศาสตราจารย์ ดร.กัณหาทิพย์ มากมี เป็นประธานกรรมการควบคุม คณาจารย์ และเสนอกลุ่มตัวอย่างคือ นิสิตระดับปริญญาตรีทุกคณะในมหาวิทยาลัยบูรพา ในการเก็บข้อมูลเพื่อ ดำเนินการวิจัยนั้น

ในการนี้ บัณฑิตวิทยาลัย มหาวิทยาลัยบูรพา จึงขออนุญาตให้นิสิตส่งรายงานข้างต้นดำเนินการเก็บ รวบรวมข้อมูลจากนิสิตระดับปริญญาตรีที่มีอายุ ๑๘ ปีขึ้นไป ที่เคยมีปัญหาเกี่ยวกับการผัดวันประกันพรุ่ง โดยตอบ แบบประเมิน จำนวน ๑๕๐ คน และแบบสัมภาษณ์ จำนวน ๔ คน โดยรายละเอียดผู้วิจัยจะดำเนินการติดต่ออาจารย์ ผู้ประสานงานแต่ละคณะในการเก็บรวบรวมข้อมูลด้วยตัวผู้วิจัยเอง โดยจะขอเก็บข้อมูลในระหว่างวันที่ ๒๕ กันยายน พ.ศ. ๒๕๖๗ ถึงวันที่ ๒๕ ตุลาคม พ.ศ. ๒๕๖๗ ทั้งนี้ สามารถติดต่อผู้วิจัยส่งรายงานข้างต้นได้ที่หมายเลขโทรศัพท์ ๐๖๓-๔๔๕-๗๐๕๕ หรือที่ E-mail: chivchanmeadey@gmail.com

จึงเรียนมาเพื่อโปรดพิจารณา

มัทนา รังสิโยภัส

(ผู้ช่วยศาสตราจารย์ ดร.มัทนา รังสิโยภัส)

รองคณบดีฝ่ายวิชาการ ปฏิบัติการแทน

คณบดีบัณฑิตวิทยาลัย

ที่ ๒/ ๔๐๓๓๓/๒๕๖๕



บัณฑิตวิทยาลัย มหาวิทยาลัยบูรพา
๑๖๙ ถนนพลาบวงเสน คมแสนสุข
อ.เมือง จ.ชลบุรี ๒๐๑๓๓

๒๖๐ กันยายน ๒๕๖๕

เรื่อง ขออนุญาตเก็บข้อมูลเพื่อดำเนินการวิจัย

เรียน อธิการบดีมหาวิทยาลัยเทคโนโลยีราชมงคลธัญบุรี

สิ่งที่ส่งมาด้วย ๑. เอกสารรับรองจริยธรรมการวิจัยรณมหาวิทยาลัยบูรพา
๒. เครื่องมือที่ใช้ในการวิจัย

ด้วย Miss Chanmeadey Chiv รหัสประจำตัวนิสิต ๖๒๔๑๐๐๕๙ หลักสูตรปริญญาตรีบัณฑิต สาขาวิชาการวิจัยและสถิติทางวิทยาการปัญญา วิทยาลัยวิทยาการวิจัยและวิทยาการปัญญา ได้รับอนุมัติเค้าโครง
คหุฎุฎุฎุฎุ เรื่อง "The Development of an Online Application for Academic Procrastination Reduction of Undergraduate Students in Thailand" โดยมี รองศาสตราจารย์ ดร.กัทรารักษ์ มากมี เป็นประธานกรรมการควบคุม
คหุฎุฎุฎุฎุ และเสนอกลุ่มตัวอย่างคือ นิสิตระดับปริญญาตรีทุกคณะในมหาวิทยาลัยเทคโนโลยีราชมงคลธัญบุรี ในการ
เก็บข้อมูลเพื่อดำเนินการวิจัย

ในการนี้ บัณฑิตวิทยาลัย มหาวิทยาลัยบูรพา จึงขออนุญาตให้นิสิตส่งรายงานข้างต้นดำเนินการเก็บ
รวบรวมข้อมูลจากนิสิตระดับปริญญาตรีที่มีอายุ ๑๘ ปีขึ้นไป ที่เคยมีปัญหาเกี่ยวกับการลัดวันประกันพรุ่ง โดยตอบ
แบบประเมิน จำนวน ๑๕๐ คน โดยรายละเอียดผู้วิจัยจะดำเนินการติดต่ออาจารย์ผู้ประสานงานแต่ละคณะในการเก็บ
รวบรวมข้อมูลด้วยตัวผู้วิจัยเอง โดยจะขอเก็บข้อมูลในระหว่างวันที่ ๒๕ กันยายน พ.ศ. ๒๕๖๕ ถึงวันที่ ๒๕ ตุลาคม
พ.ศ. ๒๕๖๕ ทั้งนี้ สามารถติดคหุฎุฎุฎุฎุรายงานข้างต้นได้ที่หมายเลขโทรศัพท์ ๐๖๓-๔๓๙๙-๙๐๔๕ หรือที่ E-mail:
chivchanmeadey@gmail.com

จึงเรียนมาเพื่อทราบและโปรดพิจารณา

ขอแสดงความนับถือ

มัทนาหา วังวิโยภส

(ผู้ช่วยศาสตราจารย์ ดร.มัทนาหา วังวิโยภส)
รองคณบดีฝ่ายวิชาการ ปฏิบัติการแทน
คณบดีบัณฑิตวิทยาลัย ปฏิบัติการแทน
อธิการบดีมหาวิทยาลัยบูรพา

บัณฑิตวิทยาลัย มหาวิทยาลัยบูรพา
โทร ๐๓๙ ๑๐๒ ๙๐๐ ต่อ ๙๐๕, ๙๐๙
E-mail: grd.buu@go.buu.ac.th



ที่ ๒๖ เมษายน ๒๕๖๓

บัณฑิตวิทยาลัย มหาวิทยาลัยบูรพา
๓๖๓ อ.สองหาดบางแสน ต.แสนสุข
อ.เมือง จ.ชลบุรี ๒๐๑๓๑

๒๖ กันยายน ๒๕๖๓

เรื่อง ขออนุญาตเก็บข้อมูลเพื่อดำเนินการวิจัย

เรียน อธิการบดีมหาวิทยาลัยราชภัฏนครราชสีมา

สิ่งที่ส่งมาด้วย ๑. เอกสารรับรองจริยธรรมการวิจัยของมหาวิทยาลัยบูรพา
๒. เครื่องมือที่ใช้ในการวิจัย

ด้วย Miss Chanmeadey Chiv รหัสประจำตัวนิสิต ๒๒๔๑๐๐๕๗ หลักสูตรปริญญาตรีบัณฑิต สาขาวิชาการวิจัยและสถิติทางวิทยาการปัญญา วิทยาลัยวิทยาการวิจัยและวิทยาการปัญญา ได้รับอนุมัติค่าโครงการ
ดุชนิพนธ์ เรื่อง "The Development of an Online Application for Academic Procrastination Reduction of Undergraduate Students in Thailand" โดยมี รองศาสตราจารย์ ดร.ภัทราวี มาทมิ เป็นประธานกรรมการควบคุม
ดุชนิพนธ์ และเสนอกลุ่มตัวอย่างคือ นิสิตระดับปริญญาตรีทุกคนในมหาวิทยาลัยราชภัฏนครราชสีมา ในการเก็บ
ข้อมูลเพื่อดำเนินการวิจัยนั้น

ในการนี้ บัณฑิตวิทยาลัย มหาวิทยาลัยบูรพา จึงขออนุญาตให้นิสิตดังกล่าวข้างต้นดำเนินการเก็บ
รวบรวมข้อมูลจากนิสิตระดับปริญญาตรีที่มีอายุ ๑๘ ปีขึ้นไป ที่เคยมีปัญหากับการผัดวันประกันพรุ่ง โดยขอบ
แบบประเมิน จำนวน ๑๕๐ คน โดยรายละเอียดผู้วิจัยจะดำเนินการติดต่ออาจารย์ผู้ประสานงานแต่ละคณะในการเก็บ
รวบรวมข้อมูลด้วยตัวผู้วิจัยเอง โดยจะขอเก็บข้อมูลในระหว่างวันที่ ๒๕ กันยายน พ.ศ. ๒๕๖๓ ถึงวันที่ ๒๕ ตุลาคม
พ.ศ. ๒๕๖๓ ทั้งนี้ สามารถติดต่อให้นิสิตดังกล่าวข้างต้นได้ที่หมายเลขโทรศัพท์ ๐๖๑-๔๑๙๙-๙๐๔๕ หรือที่ E-mail:
chivchanmeadey@gmail.com

จึงเรียนมาเพื่อทราบและโปรดพิจารณา

ขอแสดงความนับถือ

มณฑนา วังสีโยภัส

(ผู้ช่วยศาสตราจารย์ ดร.มณฑนา วังสีโยภัส)
รองคณบดีฝ่ายวิชาการ ปฏิบัติการแทน
คณบดีบัณฑิตวิทยาลัย ปฏิบัติการแทน
อธิการบดีมหาวิทยาลัยบูรพา

บัณฑิตวิทยาลัย มหาวิทยาลัยบูรพา
โทร ๐๓๑ ๕๐๒ ๙๐๐ ต่อ ๙๐๕, ๙๐๙
E-mail: gradbuu@buu.ac.th



Appendix F
Online Application for Academic Procreation Reduction (STOPro)
Using Guideline

คู่มือการใช้งาน

ออนไลน์แอปพลิเคชันเพื่อลดพฤติกรรม
พัตวันประกันพรั่งทางการศึกษาของ
นักศึกษาระดับปริญญาตรี (STOPPro)

จัดทำโดย

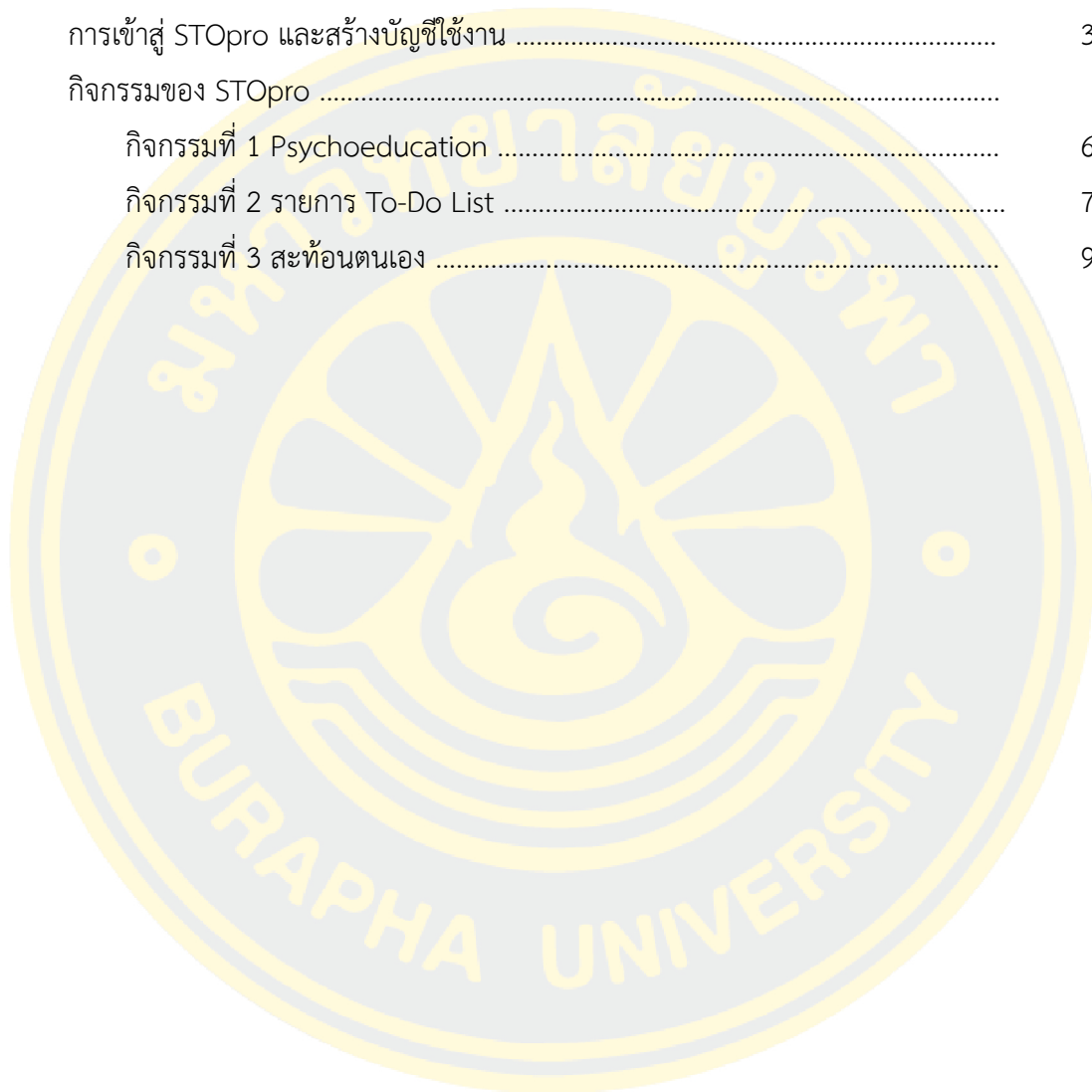
Ms. CHANMEARDEY CHIV

นิสิตปริญญาเอก

สาขาการวิจัยและสถิติทางวิทยาการปัญญา
คณะศึกษาศาสตร์ มหาวิทยาลัยบูรพา

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คำชี้แจง

แอปพลิเคชันออนไลน์เพื่อลดพฤติกรรมผัดวันประกันพรุ่งทางการศึกษา นี้จัดทำขึ้นเป็นส่วนหนึ่งของการวิจัยในระดับปริญญาเอก ตามหลักสูตรปรัชญาดุษฎีบัณฑิต สาขาวิชาการวิจัยและสถิติทางวิทยาการปัญญา มหาวิทยาลัยบูรพา โดยมีวัตถุประสงค์เพื่อส่งเสริมการเรียนรู้เกี่ยวกับพฤติกรรมผัดวันประกันพรุ่งทางการศึกษา (Academic Procrastination) และเพื่อเป็นเครื่องมือในการช่วยลดพฤติกรรมดังกล่าวในกลุ่มนักศึกษาระดับปริญญาตรี

แอปพลิเคชันนี้ถูกออกแบบให้มีเนื้อหาทางจิตวิทยาการศึกษา ประกอบด้วย

1. การให้ความรู้เกี่ยวกับพฤติกรรมผัดวันประกันพรุ่ง
2. การสะท้อนผลกระทบที่เกิดขึ้นจากพฤติกรรมดังกล่าว
3. การฝึกฝนทักษะการบริหารเวลา
4. การตั้งเป้าหมายและการวางแผนงานประจำวัน
5. การบันทึกสะท้อนความคิดเพื่อเพิ่มการกำกับตนเองในการเรียนรู้

เอกสารฉบับนี้จัดทำขึ้นเพื่อเป็นคู่มือในการใช้งานแอปพลิเคชันอย่างถูกต้องและมีประสิทธิภาพ เพื่อให้นักศึกษาเข้าใจวิธีการใช้เครื่องมือนี้ในการปรับเปลี่ยนพฤติกรรม และสามารถนำไปประยุกต์ใช้ในการเรียนรู้ของตนเองอย่างเหมาะสม

ผู้เขียน

Miss Chanmeardey Chiv

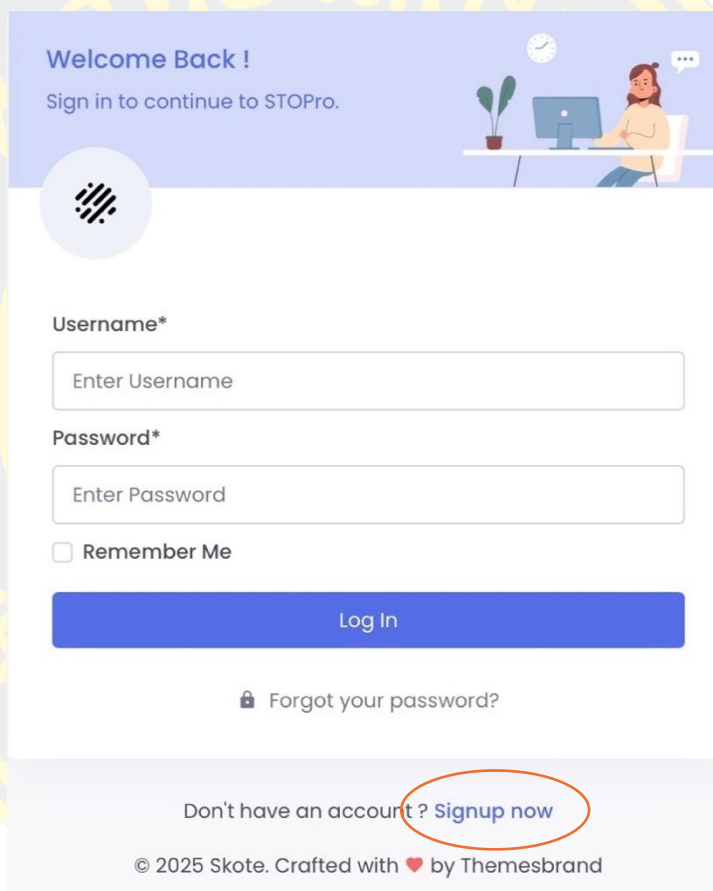
นักศึกษาระดับปริญญาเอก

สาขาวิชาการวิจัยและสถิติทางวิทยาการปัญญา

การเข้าสู่แอปพลิเคชัน และสร้างบัญชีใช้งาน

ขั้นตอนในการใช้ออนไลน์แอปพลิเคชันสำหรับลดพฤติกรรมผิดวันประกันพ่วงทางการศึกษา

1. นักศึกษา ทำการเข้า <https://stopro.site> โดยสามารถเข้าถึงได้ทุกอุปกรณ์ computer, mobile phone, tables
2. ทำ Sign Up เพื่อสมัครบัญชีใช้งาน โดยทำการ



Welcome Back !
Sign in to continue to STOPro.

Username*

Enter Username

Password*

Enter Password

☐ Remember Me

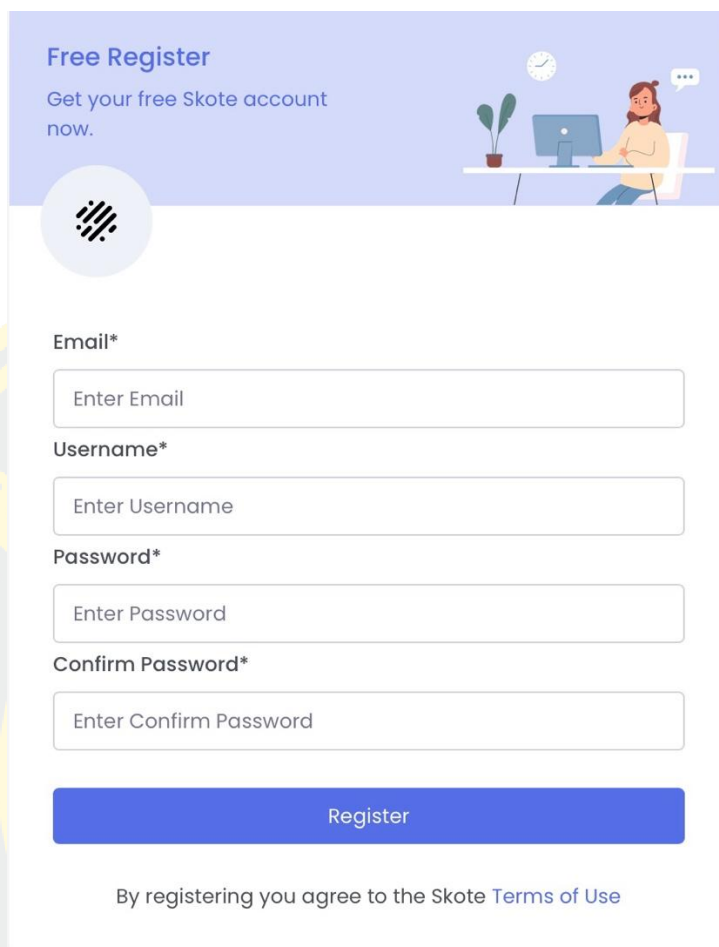
Log In

Forgot your password?

Don't have an account ? [Signup now](#)

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2.1 กด signup now สำหรับการเข้าใช้งานครั้งแรก



The image shows a 'Free Register' form for a Skote account. The header is purple with the text 'Free Register' and 'Get your free Skote account now.' An illustration of a person at a desk is in the top right. The form has a light blue header with a logo. It contains five input fields: Email*, Username*, Password*, Confirm Password*, and a Register button. Below the button is a link to the Terms of Use.

Free Register
Get your free Skote account now.

Email*
Enter Email

Username*
Enter Username

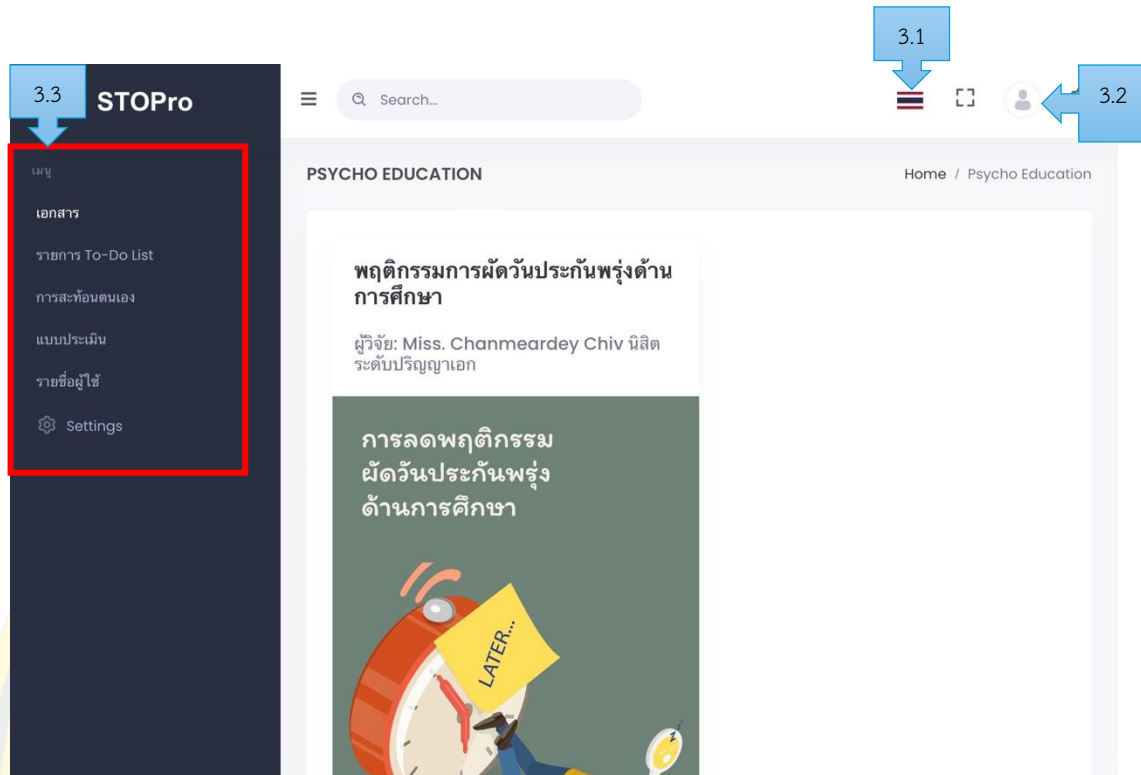
Password*
Enter Password

Confirm Password*
Enter Confirm Password

Register

By registering you agree to the Skote [Terms of Use](#)

- 2.2 กรอกข้อมูล เช่น Email ที่ใช้ในการสมัคร Username และรหัสผ่าน
 - 2.3 รอรับ Email สำหรับยืนยันการสมัครบัญชี
 - 2.4 เมื่อทำการยืนยันการสมัครบัญชีเรียบร้อยแล้ว ให้กด สามารถ Sign in เข้าใช้งานได้
3. การเข้าถึงหน้าจอแรกของแอปพลิเคชัน



3.1 ใช้สำหรับกดเพื่อเปลี่ยนภาษา (ภาษาไทย กับอังกฤษ)

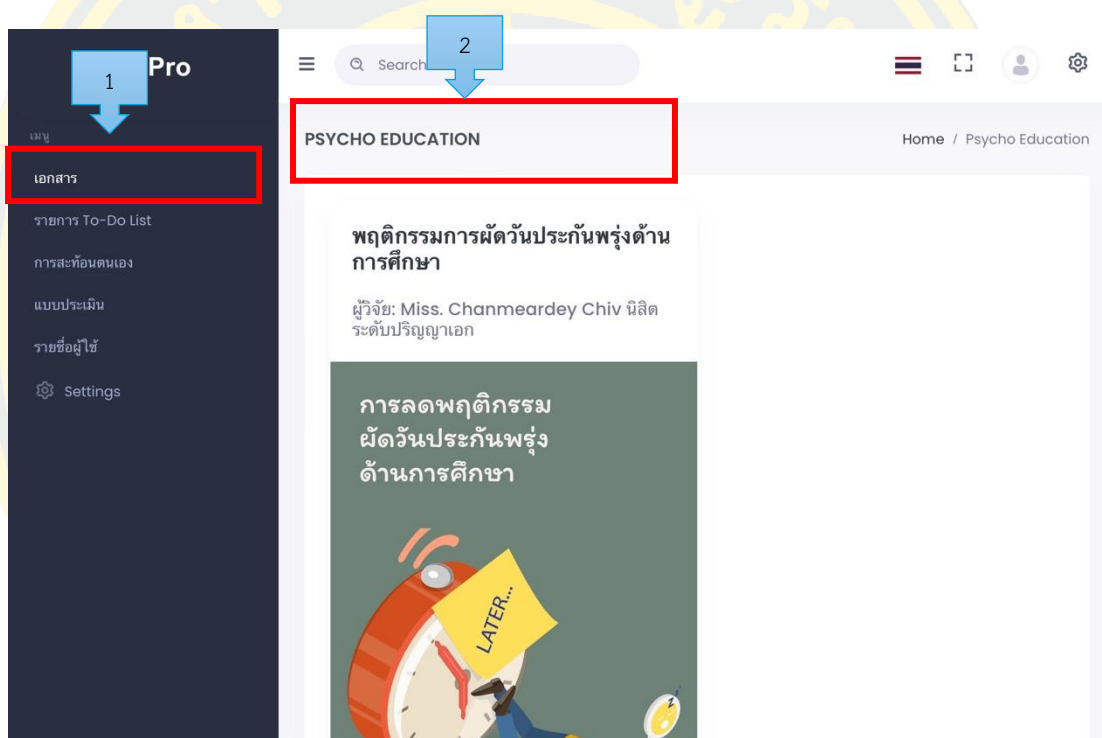
3.2 ชื่อบัญชีของผู้ใช้งาน สามารถกดเพื่อทำการเปลี่ยนรหัสผ่าน หรือทำออกจากระบบ

3.3 เมนูกิจกรรม ที่ประกอบด้วย 1) เอกสารสำหรับอ่าน (Psychoeducation) 2) รายการ To-Do List และ 3) การเขียนสะท้อนตนเอง

กิจกรรมที่ 1 Psychoeducation

1. กดที่เมนู เอกสาร

2. กดเพื่อเปิดเอกสาร Psychoeducation สำหรับอ่านเพิ่มเติม โดยผู้ใช้งานสามารถทำการ Download เอกสาร หรือแค่ทำการเปิดอ่านผ่าน Web browser ก็ได้ ขอให้ผู้ใช้งานทำการอ่านเอกสาร Psychoeducation เพื่อทำความเข้าใจเกี่ยวกับพฤติกรรมผัดวันประกันพรุ่งทางการศึกษา ผลกระทบจากพฤติกรรมผัดวันประกันพรุ่งทางการศึกษา วิธีช่วยลดพฤติกรรมผัดวันประกันพรุ่งทางการศึกษา เพื่อให้การใช้งานกิจกรรมอื่น ๆ ได้อย่างมีประสิทธิภาพมากขึ้น



กิจกรรมที่ 2 To-Do List

1. กดเมนู รายการ To-Do List

ผู้ใช้งานสามารถกด “เพิ่มใหม่” เพื่อทำการจัดบันทึกงานต่าง ๆ พร้อมกันทำการกำหนดวัน เวลาของกำหนดการส่งงาน (Deadline)

2. ในรายการ To-Do List ประกอบด้วย 3 ช่องหลัก ได้แก่

- 2.1 งานที่กำลังมาถึง
- 2.2 งานอยู่ระหว่างดำเนินการ และ
- 2.3 งานเสร็จสมบูรณ์

3. ผู้ใช้งานสามารถทำการกดเคลื่อนย้ายงานที่ได้ทำการจัดบันทึก เมื่อมีการเปลี่ยนสถานะของการ เช่น ย้ายจากงานที่กำลังมาถึงไปเป็นงานอยู่ระหว่างดำเนินการ (ผู้ใช้งานได้เริ่มทำงานที่ระบุแล้ว) หรือย้ายจากงานที่อยู่ระหว่างดำเนินการ ไปเป็นงานเสร็จสมบูรณ์ (ผู้ใช้งานได้ทำงานเสร็จสิ้น)

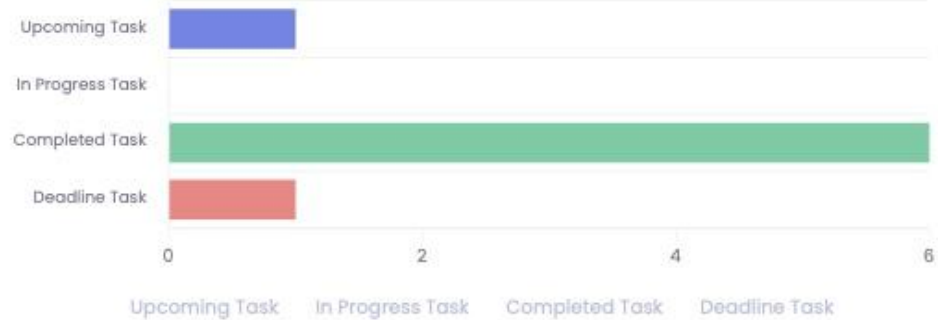
4. ผู้ใช้งานสามารถทำการกำหนดจำนวนวันในการแจ้งเตือนกำหนดเวลาส่งงาน (Deadline)

5. กดเมนู “สรุป” เพื่อเป็นการดูผลการสรุป

สรุป

ภาพรวมงานและการวิเคราะห์

Bar Chart



Donut Chart



● งานที่กำลังจะมาถึง

1

● งานอยู่ระหว่างดำเนินการ

0

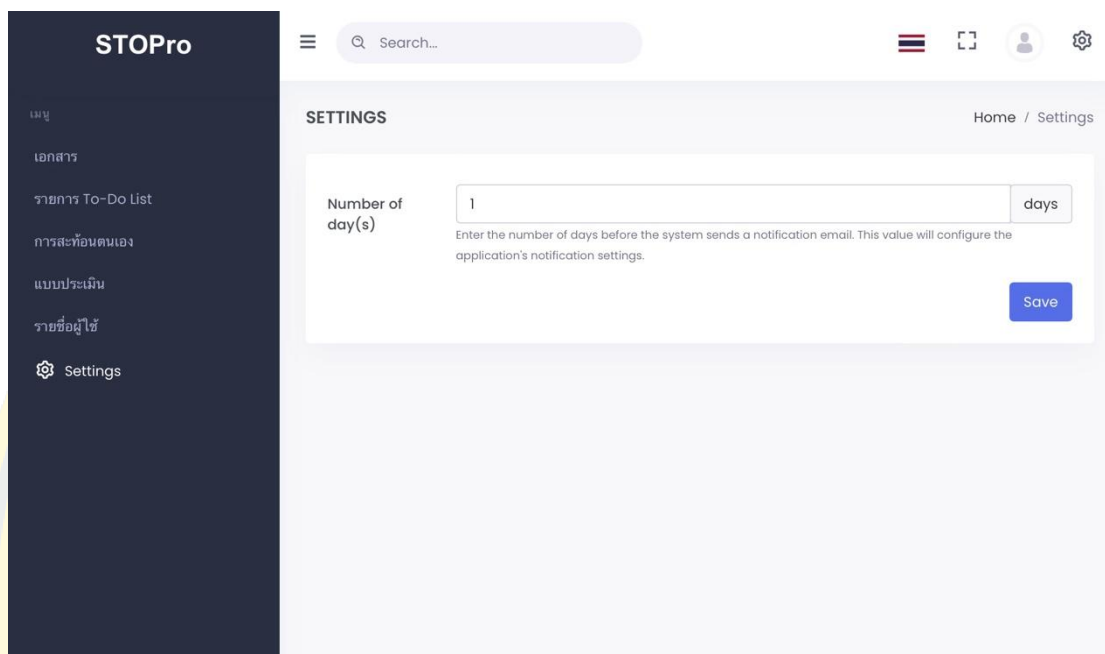
● งานเสร็จสมบูรณ์

6

● งานที่เกินกำหนด

1

6. กดเมนู Setting เพื่อเป็นการกำหนดระยะเวลาในการแจ้งเตือน



STOPPro

เมนู

เอกสาร

รายการ To-Do List

การสะท้อนตนเอง

แบบประเมิน

รายชื่อผู้ใช้

⚙️ Settings

≡ Search...

🇹🇭 📏 👤 ⚙️

SETTINGS Home / Settings

Number of day(s) 1 days

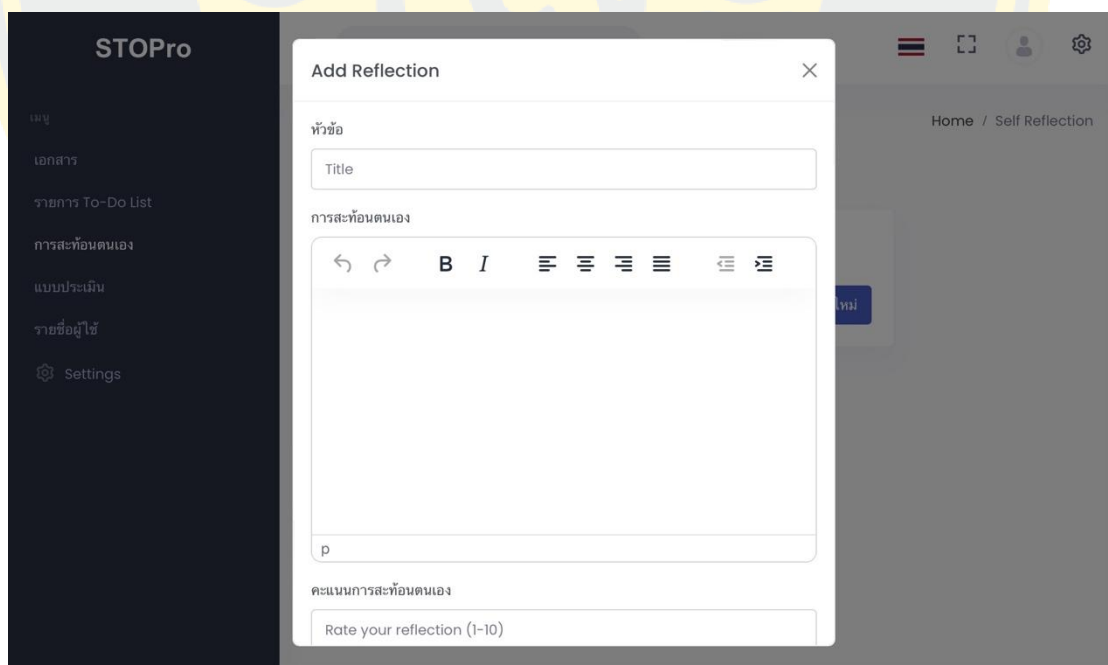
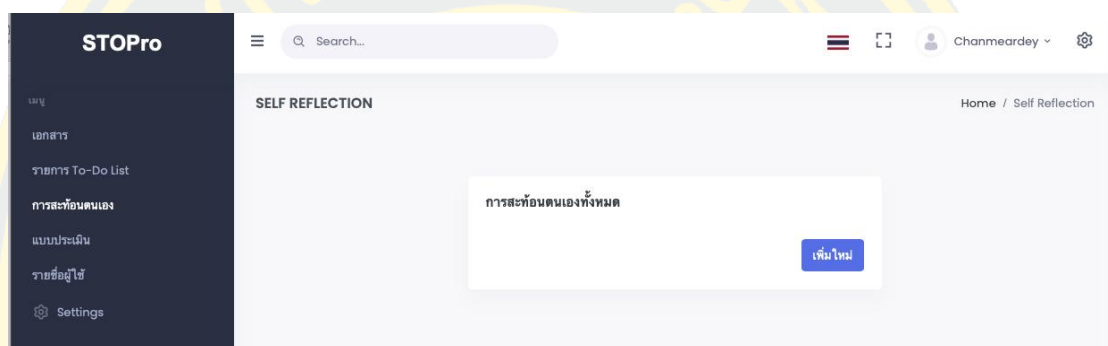
Enter the number of days before the system sends a notification email. This value will configure the application's notification settings.

Save

กิจกรรมที่ 3 สะท้อนตนเอง

ผู้ใช้งานสามารถเขียนการสะท้อนตนเองทุกสัปดาห์ เพื่อเป็นการเขียนจุดแข็ง และ จุดอ่อนของการเรียน หรือทำงานที่เกี่ยวกับการเรียนในสัปดาห์ที่ผ่านมาว่าเป็นอย่างไร ต้องทำการ ปรับปรุงตนอย่างไรบ้าง

1. กด “เพิ่มใหม่”
2. เขียนรายละเอียดของการสะท้อนตนเอง
3. ให้คะแนนการทำงานของตนในสัปดาห์ที่ผ่านมา



BIOGRAPHY

NAME Miss. Chanmeardey Chiv

DATE OF BIRTH 27 January 1992

PLACE OF BIRTH Phnom Penh, Cambodia

PRESENT ADDRESS #13 Soi 1, Longhat Bangsaen Road, Saen Sok, Bangsean,
Chonburi Province, 20131 Thailand

EDUCATION 2014 Bachelor degree in International Relations,
University of Cambodia
2018 Master's Degree in Research and statistic in
Cognitive Sciences at College of Research Methodology
and Cognitive Sciences, Burapha University.
2025 Ph.D of Research and Statistic in Cognitive Sciences
at College of Research Methodology and Cognitive
Sciences, Burapha University.

