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Flexible Thinking and Its Influence on Academic Satisfaction, Academic Self-Efficacy, and Study Time: A Case of Indonesian Undergraduate Students

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Abstract

Flexible thinking in learning was recently reconceptualized, with the creation of a three-component measurement model. The concept responds to today's complex educational environments, including advanced information technology. Yet, the understanding of its influence in learning remains limited. The main aim of this study was to examine how flexible thinking in learning relates to academic satisfaction, academic self-efficacy, and study time outside of class in higher education. A total of 419 Indonesian undergraduate students who majored in elementary education participated in this study. To investigate hypothetical relationships among the variables, the study applied path analysis. Results of the analysis indicated that, overall, flexible thinking in learning strongly affected academic satisfaction, academic self-efficacy, and study time, while self-efficacy significantly mediated between flexible thinking and satisfaction. However, the influence of each component of flexible thinking differed depending on the three constituents of learning technology acceptance, open-mindedness in learning, and adaptation to new learning situations. The results led to two conclusions. First, flexible thinking in learning as a whole is an influential competency that affects students' satisfaction, self-efficacy, and study time in an academic context. Second, the complex nature of flexible thinking requires considering not only its entire influence but also the individual effects of its three components.

Keywords: flexible thinking in learning, academic satisfaction, academic self-efficacy, study time, Indonesian university

1 Introduction

Flexibility has been well researched in a wide range of academic disciplines (Malo et al., 2022; Saleha et al., 2009) but has received particular attention in the domain of higher education. It has been discussed from the perspectives and standpoints of learners, teachers, and academic professionals (Dennis et al., 2020). Many concepts and meanings have emerged related to flexibility within higher education (Barnett, 2014; Collis and Moonen, 2011). We believe that the concept must be studied with a focus on students' learning in the context of our rapidly changing world. Today's information technology advancements are an integral part of the higher education system, requiring students to apply flexible thinking skills by making use of digital innovations and communication devices (Barak and Levenberg, 2016a). Congruently, the recent scoping review study of Kotsiou et al. (2022) also documented that flexibility is one of the meta-categories of skills for the 21st century. To respond to global changes along with accelerating technology innovations in higher education, Barak and Levenberg (2016a) recently reconceptualized the notion of flexible thinking in learning as a necessary competency (Barak and Levenberg, 2016a, 2016b; Durak and Uslu, 2023). However, this competency has received less attention than other competencies (Barak and Levenberg, 2016b); therefore, its effect is not fully understood. Accordingly, we focused on the influence of flexible thinking in learning in the current context of higher education.

Based on a grounded theory approach (Strauss and Corbin, 1990, 1994) and a comprehensive review on cognition and social studies, a conceptual model of flexible thinking in learning was developed (Barak and Levenberg, 2016a). It consists of three constructs relevant to the flexibility of a person's dispositions and cognitive flexibility (Barak and Levenberg, 2016a). As the unique feature in this flexibility model in higher education, one of the constructs specifically reflects a learning milieu of contemporary rapid information and communication progress. Since this concept and its measurement model are fairly new (Barak and Levenberg, 2016a, 2016b), few empirical studies on flexible thinking in learning have been done. To the best of our knowledge, these empirical studies include six research topics: the relationship between flexible thinking and resistance to change (Barak, 2018); the influence of high-fidelity simulation on flexible thinking (Tseng and Hill, 2020); the relationship among flexible thinking, learning self-efficacy, and student engagement (Tseng et al., 2020); the relationship among flexible thinking, achievement emotion, and self-regulation (Durak and Uslu, 2023); the relationship between flexible thinking and collaborative learning (Naamati-Schneider and Alt, 2023); and a scale test of the measurement model (Aktaş et al., 2024). On one hand, it is clear that the psychological traits and variables related to

flexible thinking in learning are important in higher education. On the other hand, previous research has limitations. These studies did not examine other important factors such as students' academic satisfaction, academic self-efficacy, and study time outside of class. Additionally, they did not explore the overall impact of flexible thinking in learning.

Academic satisfaction has been increasingly recognized as a key variable when analyzing problems related to "academic performance, motivation, and retention" (Kanter et al., 2017, p.1). Students' academic satisfaction is further conceived as an important index to understand how to fit in a context of higher education (Schmitt et al., 2008; York et al., 2015). From a practical view, academic satisfaction in turn becomes central information for the administrators of higher education when developing strategies to remain competitive (Lee and Jang, 2015). When looking at contemporary academic situations, academic satisfaction has been applied as a reliable indicator of the success of the implementation of information communication technology (Keržič et al., 2021). Even though many studies have been done on academic satisfaction with regard to a great number of variables, there is no study on the relationship between flexible thinking in learning and academic satisfaction. Although the study of Durak and Uslu (2023) investigated flexible thinking in learning in relation to academic achievement emotion, their study did not highlight academic satisfaction. It is still unknown how flexible thinking in learning as a necessary competency relates to students' academic satisfaction, either theoretically or empirically. This study sought to fill this gap.

Like academic satisfaction, student self-efficacy in the field of pedagogy and its relevant disciplines has become a key construct (Van Dinther et al., 2011), and it is frequently presented as academic self-efficacy in an educational context (Honicke and Broadbent, 2016). Academic self-efficacy is broadly examined because of its relation to students' various educational issues, which include educational development, academic motivation, academic achievement, academic affect, and educational self-regulation (Zimmerman, 1995). However, only one study has been conducted on the relationship between flexible thinking and academic self-efficacy. The study of Tseng et al. (2020) empirically investigated how three distinct components constituting flexible thinking influence learning self-efficacy, but their research did not consider the influence of the overall competency of flexible thinking in learning. Based on Barak and Levenberg's (2016b) measurement model of flexible thinking, we attempted to understand the overall impact of flexible thinking on academic self-efficacy, together with the individual influence of the three components of flexible thinking.

In higher education, one crucial issue is insufficient student study time outside the classroom (Fukuda and Yoshida, 2013; Nonis and Hudson, 2006; Nonis et al., 2006; Pan and Miyoshi, 2023; Wah et al., 2015). This issue may not be simply described as student laziness and

demotivation to learn. Rather, it is important to consider the complexity of student life, where students engage in multiple activities (Nonis et al., 2006; Song et al., 2020) and do not think they have enough study time for academic assignments and preparation for class (Wah et al., 2015). This situation raises a critical inquiry about how students can increase their study time outside of class in higher education. Of the above-mentioned past studies of flexible thinking in learning, two studies addressed student engagement (Tseng et al., 2020) and time management (Durak and Uslu, 2023). However, those two studies did not directly focus on students' study time; therefore, the influence of flexible thinking in learning on students' study time is also unclear.

In summary, the aim of this study was to investigate how flexible thinking in learning affects academic satisfaction, academic self-efficacy, and study time outside of class in higher education.

2 Literature review

2.1 Flexible thinking

In the 1960s, the concept of flexible thinking was described in the field of developmental psychology, where it referred to "the ability to consider alternative means to a given end" (Buss, 1969, p.585). As this description shows, flexible thinking can be understood in relation to human cognition and cognitive abilities. The concept has had a broad impact on multiple disciplines including psychology (Barak and Levenberg, 2016a; Brown and Campione, 1981; Gocłowska et al., 2013; Stanovich and West, 1997), education (Aktaş et al., 2024; Naamati-Schneider and Alt, 2023; Durak and Uslu, 2023; Sellars, 2011; Tseng and Hill, 2020), and social sciences (Flanagin et al., 2020). The term 'flexible thinking' is often used interchangeably with the term 'cognitive flexibility' (Barak and Levenberg, 2016b), with similar definitions (Tseng et al., 2020). Since cognitive flexibility can be seen in various ways (Ionescu, 2012), flexible thinking is also defined in multiple ways (Barak and Levenberg, 2016b). For this study, we offered two approaches to definitions of flexible thinking, one with the single construct and one with the construct in relation to learning.

2.1.1 Definitions of flexible thinking

The first definition of flexible thinking accentuates thinking dispositions. Stanovich and West (1997) illustrated that flexible thinking is a construct of thinking dispositions that refers to "the willingness to change one's beliefs in the face of contradictory evidence" (p.346), which is based on the idea of Baron (1988, cited in Flanagin et al., 2020): actively open-minded thinking (Flanagin et al., 2020). This open-minded thinking allows people to consider different views, leading them to change their own views when they face inconsistent situations (Flanagin et al., 2020). Flanagin et al. (2020) discussed that flexible thinking also relates to capturing trait-based distinctions, having openness to seek out various perspectives, and making a cognitive

effort in the face of ambiguous and conflicting information.

The second definition focuses more on the notion of adaptability to a challenging situation with changes in one's knowledge and behaviors. Gocłowska et al. (2013) explained that flexible thinking is the capacity to adapt by efficiently switching behaviors and strategies when facing new and/or demanding situations. They suggested that flexible thinking is also related to creativity and problem-solving (Gocłowska et al., 2013). A link between flexible thinking and problem-solving can be identified in the domain of mathematics education. Maulidya, Hasanah, and Retnowati (2017) discussed that flexible thinking helps students find a way to solve problems by thinking differently. In their perspective, students are expected to apply their own knowledge not only within its original context but also in new contexts (Maulidya et al., 2017). Such contextual changes require using flexibility and adaptability as the function of flexible thinking.

The third definition emphasizes a cognitive process and brain function ability in the fields of developmental psychology and neuropsychology. Sellars (2011) described flexible thinking as part of executive function and as one aspect of the cognitive abilities necessary for "goal setting and planning over time," cognitive and behavioral competencies (i.e., motivation, perseverance, and self-regulation), as well as "attention and memory systems" (p.102). According to Best and Miller (2010), executive functions are widely defined as cognitive processes "that underlie goal-directed behavior and are orchestrated by activity within the prefrontal cortex" (p.1614). Among constituents of executive functions, 'shifting' is a key ability of flexibility in cognitive processes. In the research area of executive function, Ionescu (2012) pointed out that the concept of 'shifting' has been receiving increasing attention and is synonymously considered cognitive flexibility. Shifting is the ability to shift between tasks, mental sets, and/or rule sets (Best and Miller, 2010; Miyake et al., 2000). In a responsive situation, shifting ability enables people "to rapidly change from one criterion, rule, or task to another" as a specific ability of cognitive flexibility (Ionescu, 2012, p.193).

As three types of definitions of flexible thinking were presented here, the nature of flexible thinking seems highly complex. In fact, Ionescu's (2012) extensive review reported that cognitive flexibility remains insufficiently and fragmentally understood, suggesting that cognitive flexibility would not be captured with simplicity. Her review study proposed cognitive flexibility as a property of the cognitive system, a dynamic entity rather than a static one, based on the study on flexibility in multiple disciplinary areas (Ionescu, 2012).

2.1.2 The definition of flexible thinking in learning

Our second approach to the definition of flexible thinking exclusively relied on the study of Barak and Levenberg (2016a, 2016b). The combined comprehensive review and

qualitative study conducted by Barak and Levenberg (2016a) generated a conceptual model of flexible thinking in learning in terms of a context of "contemporarily educational technology-enhanced education" (p.74). To create the model, Barak and Levenberg (2016a) took two steps: the initial phase was based on the comprehensive review, focusing on the domains of cognition and social studies, while the second phase was relevant to the qualitative study employing participants from educational institutions.

In the initial phase of their model creation that built on their review studies on (1) flexibility from a cognitive view, (2) flexibility from a social view, (3) cognitive flexibility, and (4) cognitive flexibility and education, Barak and Levenberg (2016a) organized multiple "approaches to the conceptualization of flexibility and cognitive flexibility" into a systematic diagram (p.77). The two terms flexibility and cognitive flexibility were theoretically differentiated in that diagram. Flexibility was characterized as a personality trait, consisting of a social component and a cognitive component (Barak and Levenberg, 2016a). The social component further has a feature of an interpersonal aspect, openness to others, while the cognitive component represents an intrapersonal aspect that includes openness to experience and a function of divergent thinking (Barak and Levenberg, 2016a). This social component, in part, would be congruent with the first definition of flexible thinking discussed in the section above: that is, actively open-minded thinking (Flanagin et al., 2020). Next, the cognitive flexibility presented in that diagram was exclusively characterized "as an ability to do things" (Barak and Levenberg, 2016a, p.75). It comprised three components: "an ability to adapt to new and changing situations," "an ability to solve ill-defined or unfamiliar problems," and "a set-shifting ability" of executive functions (Barak and Levenberg, 2016a, p.76). The first component was founded on the view of Spiro and Jehng (1990), which corresponds to "the ability to restructure knowledge in adaptive response to changing situation" (Barak and Levenberg, 2016a, p.82). The first and second components of cognitive flexibility could be analogous to our second definitions of flexible thinking explained by Gocłowska et al. (2013): a capacity to adapt by switching and to find a way to solve problems by thinking, respectively. The third component of a set-shifting ability is thought to be closely related to our third description: shifting of executive functions indicated by Best and Miller (2010). Overall, the hypothetical diagram created by Barak and Levenberg (2016a) was structured using two main constituents, flexibility and cognitive flexibility, which were theoretically distinguished. The initial phase built a conceptual basis with an organized structure linking to a flexible thinking model in learning, which was generated in the second phase.

In the second phase, Barak and Levenberg (2016a) conducted an online survey with open-ended questions together with semi-structured interviews involving 133 participants: 14

educational instructors, 46 university lecturers, and 73 student teachers. They asked two key questions of participants: "How and why is adapting to change a necessary skill in the 21st century?" and "What in your opinion is flexible thinking in learning?" (Barak and Levenberg, 2016a, p.78). To analyze the written data and interview transcripts, Barak and Levenberg (2016a) relied mainly on the grounded theory approach of Strauss and Corbin (1990, 1994). Their qualitative study found three themes: "Open-mindedness to others' ideas," "Adapting to change in learning situations," and "Accepting new or changing learning technologies" (Barak and Levenberg, 2016a, p.74). These themes were conceptualized, and each became a central constituent of the model of flexible thinking in learning. The first construct, open-mindedness to others' ideas, was described as "the ability to learn from others, manage teamwork, listen to multiple perspectives, and handle conflict while working with peers" (Barak and Levenberg, 2016a, p.83). This construct was theoretically linked with flexibility as a personality trait in the hypothetical diagram of "Flexible Thinking in Technology-Enhanced Learning (FT-TEL Model)" (Barak and Levenberg, 2016a, p.83). The second construct, adapting to change in learning situations, referred to "the ability to find multiple solutions, solve unfamiliar problems, and transfer knowledge to new situations" (Barak and Levenberg, 2016a, p.83). The third construct, accepting new or changing learning technologies, was defined as "the ability to easily adjust to new and advanced technologies and effectively use them to promote meaningful learning" (Barak and Levenberg, 2016a, p.83). The second and third constructs were theoretically connected to cognitive flexibility as the ability to do things in the FT-TEL Model (Barak and Levenberg, 2016a, p.83).

To define the concept of flexible thinking in learning as a whole, we attempted to integrate the three-construct definitions of Barak and Levenberg (2016a) through the following descriptions: "open-mindedness in learning" by receiving different ideas and views, leading to teamwork and managing conflicts; "adapting to new learning situations" that contain change in learning environments by transferring knowledge and by solving problems in multiple ways; and "learning technology acceptance" by adjusting and using advanced new technologies (Barak and Levenberg, 2016b, p.44).

The model of flexible thinking in learning elaborated by Barak and Levenberg (2016a) can be reflected by key concepts and definitions relevant to flexible thinking with integration from previous work (see Baron, 1988, as cited in Flanagin et al., 2020; Best and Miller, 2010; Flanagin et al., 2020; Gocłowska et al., 2013; Ionescu, 2012; Sellars, 2011; Stanovich and West, 1997). Particularly, this conceptual model of flexible thinking, together with the measurement model subsequently developed (Barak and Levenberg, 2016b), is thought to fit properly within a contemporary technology-enhanced higher education context (see Aktaş

et al., 2024; Barak, 2018; Durak and Uslu, 2023; Naamati-Schneider and Alt, 2023; Tseng and Hill, 2020; Tseng et al., 2020).

2.2 Academic satisfaction

Since academic satisfaction is of particular importance, it has been applied and incorporated into a number of models related to the areas of psychology, cognition, behavior, and careers in higher education (e.g., Akhtar et al., 2024; Ezeofor and Lent, 2014; Iqbal et al., 2023; Keržič et al., 2021; Lent, 2004; Morstain, 1977; Schmitt et al., 2008; York et al., 2015; Zalazar-Jaime et al., 2021).

2.2.1 Definitions of academic satisfaction

There is no doubt about the significance of academic satisfaction in the literature (Kanter et al., 2017). Yet, it should be noted that there have been arguments among researchers regarding the concept of academic satisfaction (Kanter et al., 2017; Zalazar-Jaime et al., 2022). Definitions of academic satisfaction can vary depending on whether emotional or cognitive human functioning is accentuated. From the view of the emotional aspect that students perceive, Bean and Bradley (1986) defined student satisfaction "as a pleasurable emotional state resulting from a person's enactment of the role of being a student" (p.398). Also, Lent et al. (2007) referred to a student's academic satisfaction as "the enjoyment of one's roles or experiences as a student" (p.87). Similarly, in an educational context of medicine, academic satisfaction was defined "as the extent to which people enjoy their role as medical students when carrying out their learning experiences" (An et al., 2023, p.1240).

On the cognitive side, definitions underline the importance of cognitive evaluation; that is, academic satisfaction concerns "a subjective and global cognitive assessment by students of their learning experiences at university" (Zalazar-Jaime et al., 2022, p.2). Congruently, student satisfaction is typically understood as a short-term attitude (Athiyaman, 1997) derived from judgment of a student's study experience (Elliott, 2002; Rahmatpour et al., 2019) requiring students to handle study stress and conditions (Kryshko et al., 2023). It is also defined as "the favorability of a student's subjective evaluation of the various outcomes and experiences associated with education" (Rahmatpour et al., 2019, p.1). Lee and Jang (2015) discussed that the favorable cognitive state resulted from a positive evaluation of a student's educational experience.

As shown, the concept of academic satisfaction is complex. In the research field of well-being psychology, academic satisfaction seems to be categorized as a domain specific of subjective well-being, which concerns a hedonic enjoyment aspect, while psychological well-being involves a eudemonic quality (Lent, 2004). Lent argued that "satisfaction is just as much an affective outcome as it is a cognitive one" when explaining subjective well-being (p.485). In this study, we captured academic satisfaction in the following manner: When students are satisfied, they have emotional experiences

that they perceive as enjoyment, a positive feeling, or a favorable attitude towards their educational experiences associated with their role. Additionally, some emotional experiences might come from cognitive evaluation. Academic satisfaction may thereby possess both emotional and cognitive aspects. As such, Lent (2004) described the psychological experiences of affect or emotion that require cognitive evaluation in the field of emotion.

2.2.2 Relationship between flexible thinking and academic satisfaction

As presented earlier, this study defined flexible thinking as learning technology acceptance, open-mindedness in learning, and adapting to new learning situations. In the context of higher education, flexible thinking enables students to learn the skills and knowledge necessary for adaptation to academic environments, including new information technologies (Barak and Levenberg, 2016a, 2016b) and online learning engagement (Tseng et al., 2020). The literature indicated that academic adaptation refers to "the process and result of student adjustment to the educational environment," leading to subjective well-being and the satisfaction of basic needs (Shamionov et al., 2020, p.817). This notion suggests that the more academic adaptation in relation to flexible thinking will make students happier and more satisfied in an academic context.

Academic adaptation is also captured as students' experience of a dynamic balance between them and their educational environment (Shamionov et al., 2020). In this regard, person-environmental (P-E) fit theory may be relevant to students' psychological response as they consider how their ability of flexible thinking matches the environmental demands. "P-E fit theory is well-established in work contexts"; its mechanisms seem to apply to an academic context (Bohndick et al., 2018, p.840) because educational contexts are similar to work contexts (Tynjala, 2008). P-E fit "is broadly defined as the compatibility between an individual and a work environment that occurs when their characteristics are matched well" (Kristof-Brown et al., 2005, p.281). Among the various types of P-E fit, the relationship between subjective abilities and subjective situational demands in academic contexts best explains academic success (Bohndick et al., 2018). The empirical study of Bohndick et al. (2018), which involved 693 students in teacher education program in a German university, documented that the fit between abilities and demands, as well as subjective abilities, significantly affected students' satisfaction with their studies. The authors suggested that if an academic environment requires a particular skill or ability, students with a high level of that skill or ability may be more satisfied with their academic context than those with a low level of it.

As discussed, flexible thinking is an important ability in an academic situation (Barak and Levenberg, 2016a), which can be understood as a demanding environment in terms of the requirement for flexible thinking;

thus, we can say that flexible thinking relates to academic satisfaction. Several empirical studies are thought to support this perspective. For example, Durak and Uslu (2023) revealed the significant impact of 'adapting to new learning situations' as one factor of flexible thinking affecting enjoyment in a study involving 438 university students in Turkey. Additionally, the study of Odacı and Cikrikci (2019) with 620 university students in Turkey showed that cognitive flexibility as a mediator significantly affected life satisfaction, while that of Demirtaş (2020) with 386 undergraduates in Turkey reported that cognitive flexibility as a mediator had a significant influence on happiness. Accordingly, we predicted that the more flexible thinking students have, the more they are satisfied with their academic environment.

Hypothesis 1 (H1): Students with a high degree of flexible thinking in learning have greater academic satisfaction than those with a low degree of it.

As discussed, flexible thinking in learning is composed of three constituent components: (a) learning technology acceptance, (b) open-mindedness in learning, and (c) adapting to new learning situations. In this study, it was assumed that if overall flexible thinking in learning affects a variable, its three components will also have an influence on it. According to those three components, this study also established the following additional three hypotheses.

Hypothesis 1a (H1a): Students with a high degree of learning technology acceptance have greater academic satisfaction than those with a low degree of it.

Hypothesis 1b (H1b): Students with a high degree of open-mindedness in learning have greater academic satisfaction than those with a low degree of it.

Hypothesis 1c (H1c): Students with a high degree of adapting to new learning situations have greater academic satisfaction than those with a low degree of it.

2.3 Academic self-efficacy

Self-efficacy is an important and central component of Bandura's (1986, 1997) social cognitive theory. Bandura (1982) discussed that personal efficacy in handling one's outer world is not just a fixed action or only a matter of acquiring knowledge, but it entails a generative capability in a dynamic process to arrange and execute one's skills necessary for the achievement of goals. Self-efficacy is defined as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p.3). Self-efficacy has a strong effect on a person's choices, effort, and perseverance (Pajares and Miller, 1994; Pajares and Schunk, 2001). Academic self-efficacy engages students' beliefs at educational institutions, referring to "a learner's judgements about his or her ability to successfully attain educational goals" (Elias and MacDonald, 2007, pp.2519–2520; Honicke and Broadbent, 2016). A considerable number of research studies have shown that academic self-efficacy plays a mainly predictive and mediating role in academic motivation, achievement,

and learning (Van Dinther et al., 2011). Also, the meta-analysis findings of Honicke and Broadbent (2016) suggested that academic self-efficacy has a moderate positive influence on academic performance in higher education while serving as a mediator and a moderator in relation to academic performance.

2.3.1 Relationship between flexible thinking and academic self-efficacy

To hypothesize a relationship between flexible thinking and academic self-efficacy, we largely relied on perspectives from research on cognitive flexibility. Martin and Rubin (1995) proposed that cognitive flexibility has multifaceted elements including self-efficacy in being flexible, awareness of alternative choices, and willingness to be flexible and adapt to a given situation (Martin and Anderson, 1998; Martin et al., 1998). Martin et al. (1998) discussed that people need to have beliefs of self-efficacy when selecting a behavior to meet a certain situation even if they are aware of alternative options and then must be willing to flexibly adapt. When people with a high level of cognitive flexibility decide to flexibly adapt to a challenging situation, it is possible to infer that they believe they are able to control their behavior and environments. In their beliefs, they can be self-efficacious in managing themselves. Otherwise, they would probably avoid activities and the situation or sit on the sidelines without taking action, indicating they may not be confident to deal with the environment by taking action.

In considering the relationships among choices, capabilities, and self-efficacy, Bandura (1997) argued that "choices are influenced by beliefs of personal capabilities" (p.160). This notion suggests that the mastery and breadth of capabilities would relate to activities and situations that people can engage in. Beliefs of self-efficacy can play a pivotal role in shaping lives, as it affects the choices made for different activities and situations (Bandura, 1997). Overall, the line of this argument seems to be supported by the discussion of Tseng et al. (2020) examining flexible thinking and self-efficacy. With the view of Bandura (1977), Tseng et al. (2020) presented that those with cognitive flexibility hold a strong self-belief and can behave in an effective manner.

Several empirical studies investigated relationships between cognitive flexibility or flexible thinking and self-efficacy beliefs. The study of Kazu and Pullu (2023) with 389 university students revealed a significant association between cognitive flexibility and teaching self-efficacy perceptions. Kim and Omizo (2005) conducted a cross-cultural study with 156 Asian American students in a West Coast university and reported a significant correlation between cognitive flexibility and general self-efficacy. With a research sample of 270 high school students, Çelikkaleli (2014) examined relationships between cognitive flexibility and three types of self-efficacy beliefs —academic, social, and emotional—showing significant correlations between them. The study of El-Sayed et al. (2024) analyzed the

mediating role of cognitive flexibility in the relationships between self-perception of age, body appreciation, and general self-efficacy in 189 elderly women. Their study found a significant impact of cognitive flexibility on general efficacy beliefs. Although Aydin and Odaci (2020) and Brewster, Moradi, DeBlaere, and Velez (2013) did not specifically investigate relationships between cognitive flexibility and self-efficacy beliefs, they reported significant relationships between them. Aydin and Odaci (2020) studied school counselors' cognitive flexibility in relation to counseling self-efficacy (N=176), while Brewster et al. (2013) examined bisexual individuals' cognitive flexibility and bicultural self-efficacy (N=411). Finally, Tseng et al. (2020) examined how flexible thinking affects learning self-efficacy as well as online student engagement among 254 first-time online students in a US higher education institution. Their study highlighted each of the three components of flexible thinking rather than the influence of flexible thinking as a whole. Results showed that the two components of 'open-mindedness in learning' and 'adapting to new learning situations' significantly affected learning self-efficacy, while the component of 'learning technology acceptance' had no significant relation to self-efficacy (Tseng et al., 2020). The researchers explained this insignificance by noting that the first-time online user participants showed similar degrees of acceptance of new learning technologies, which did not lead to a difference in efficacy beliefs (Tseng et al., 2020). Most previous empirical studies consistently demonstrated a strong association between cognitive flexibility or flexibility thinking and beliefs of self-efficacy among various samples in diversified contexts. Based on the aforementioned theoretical discussion and empirical results, we proposed the following hypotheses:

Hypothesis 2 (H2): Students with a high degree of flexible thinking in learning have greater academic self-efficacy than those with a low degree of it.

Hypothesis 2a (H2a): Students with a high degree of learning technology acceptance have greater academic self-efficacy than those with a low degree of it.

Hypothesis 2b (H2b): Students with a high degree of open-mindedness in learning have greater academic self-efficacy than those with a low degree of it.

Hypothesis 2c (H2c): Students with a high degree of adapting to new learning situations have greater academic self-efficacy than those with a low degree of it.

2.4 Study time

In higher education, students engage in various types of out-of-class matters, including academic and nonacademic activities (Nonis et al., 2006; Song et al., 2020). They often complain that they do not have sufficient study time outside of class for their academic assignments (Wah et al., 2015). In this regard, it can be assumed that university students are busy with multiple activities and it is not easy for them to have enough time to study outside

the classroom. This notion suggests that it is necessary for students to set aside adequate study time to complete academic assignments and prepare for class.

2.4.1 Relationship between flexible thinking and study time

In the present study, we discuss how flexible thinking relates to students' study time. Students are required or willing to engage in multiple out-of-class activities, including completing academic tasks/preparation for class, leisure/recreation, student club activities, physical exercise, volunteering, and part-time jobs (Song et al., 2020). Unlike students' part-time work, their study time may not always be fixed each day or week, since the volume of their academic assignments changes. In this case, students need to be flexible in controlling study time so that they can adequately complete assignments and prepare for class. Since students' time management skills are often less developed (Tseng et al., 2020), their study time may be lacking (Wah et al., 2015). "Flexible thinking" requires students to adapt to changes in situations by finding various solutions (Barak and Levenberg, 2016a); thus, those with flexible thinking skills would be able to set up sufficient study time. In fact, the empirical study of Durak and Uslu (2023) with 438 students as pre-service teachers in higher education revealed a positive direct effect of flexible thinking on time management. Also, because flexible thinking in learning has a positive influence on learning engagement (Tseng et al., 2020), students with a higher level of flexible thinking skills may prioritize a situation where they can engage more in academic activities than nonacademic activities outside of classes. Accordingly, this study proposed the third hypothesis as follows:

Hypothesis 3 (H3): Students with a higher level of flexible thinking in learning have longer study time outside the classroom.

Hypothesis 3a (H3a): Students with a higher level of learning technology acceptance have longer study time outside the classroom.

Hypothesis 3b (H3b): Students with a higher level of open-mindedness in learning have longer study time outside the classroom.

Hypothesis 3c (H3c): Students with a higher level of adapting to new learning situations have longer study time outside the classroom.

2.5 Academic self-efficacy and academic satisfaction

As discussed above, it seems that academic satisfaction is classified into a domain-specific type of subjective well-being that holds a hedonic enjoyment feature (Lent, 2004). Pajares and Schunk (2001) discussed that "a strong sense of efficacy enhances human accomplishment and well-being in countless ways" (p.242). This notion, particularly regarding well-being, suggests that the higher the sense of self-efficacy, the greater the subjective well-being people have. Several empirical studies supported this hypothetical relationship. The study of Caprara and Steca (2005) in 683 adults indicated that self-efficacy

of affective and social self-regulation influenced subjective well-being. Similarly, Caprara, Steca, Gerbino, Paciello, and Vecchio (2006) involved 664 Italian adolescents and revealed that self-efficacy beliefs relate to adolescents' subjective well-being in terms of positive thinking and happiness. Also, the study of Loton and Waters (2017) in a large sample of 11,368 Australian adolescents indicated that general self-efficacy as a mediating variable positively affected happiness while negatively influencing anxiety and depression. Hayat, Shateri, Amini, and Shokrpour (2020) investigated a structural equation model with psychological variables with a sample of 279 medical students; they found that academic self-efficacy significantly influenced positive learning-related emotions consisting of enjoyment, pride, and hope.

Like the above-mentioned studies concerning the relationships between self-efficacy and subjective well-being, several empirical studies supported the relationship between self-efficacy and domain-specific satisfaction in educational contexts. DeWitz and Walsh (2002) investigated the relationship between three types of self-efficacy beliefs and college student satisfaction in 312 undergraduates and found that college self-efficacy had a strong influence on satisfaction. The study of Prifti (2022) focused on self-efficacy and student course satisfaction in blended learning courses in higher education. With a sample of 342 students, his study indicated that self-efficacy for learning management systems strongly affected course satisfaction. Additionally, three studies addressed the context of online education in terms of self-efficacy and satisfaction variables. In a study involving 108 online students in a distance learning program, Lin, Lin, and Laffey (2008) indicated the importance of self-efficacy for student learning satisfaction in online learning. Shen, Cho, Tsai, and Marra (2013) showed that online learning self-efficacy strongly affected online learning satisfaction in an online educational context where most of the 406 students were pursuing an undergraduate or graduate degree. With regard to a corporate online educational program, the study of Gunawardena, Linder-VanBerschot, LaPointe, and Rao (2010) with 37 participants found that online self-efficacy was a significant predictor of learner satisfaction.

Furthermore, Lent's (2004) social cognitive model of normative well-being hypothesized that domain-specific and life satisfaction is influenced by cognitive, social, personality, and behavioral variables (Sheu et al., 2014; Sheu and Lent, 2009). Along with a test of this normative model in whole and in part, a number of empirical research studies substantiated the impact of self-efficacy on academic satisfaction (Akhtar et al., 2024; An et al., 2023; Lent et al., 2007) and showed a significant zero-order correlation between them (Sheu et al., 2014; Zalazar-Jaime et al., 2022). Accordingly, this study proposes the fourth hypothesis as follows:

Hypothesis 4 (H4): Students who have a greater level of academic self-efficacy will exhibit higher academic satisfaction.

Figure 1 depicts Path Model 1, which

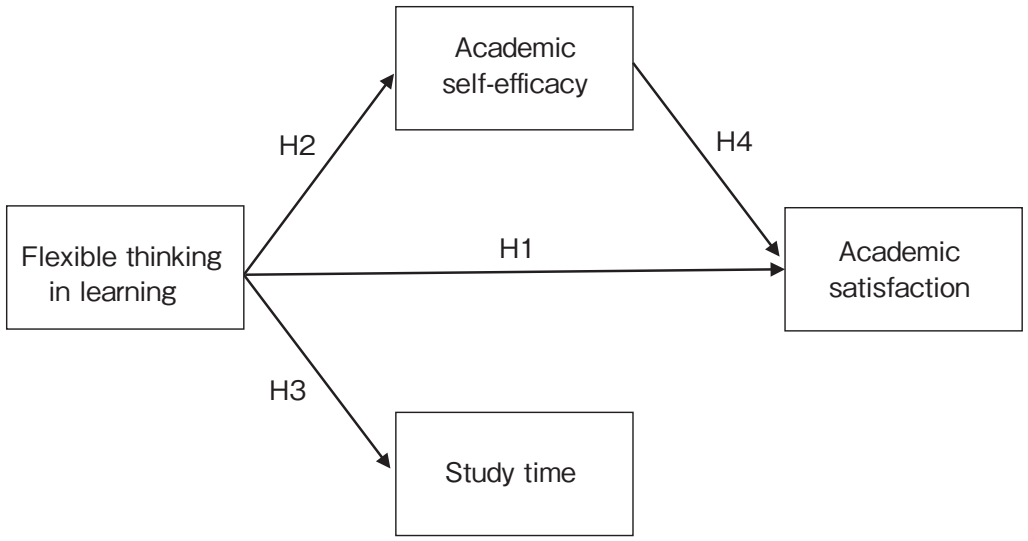

Figure 1. Path Model 1: Flexible thinking in learning as a whole in relation to academic satisfaction, academic self-efficacy, and study time.

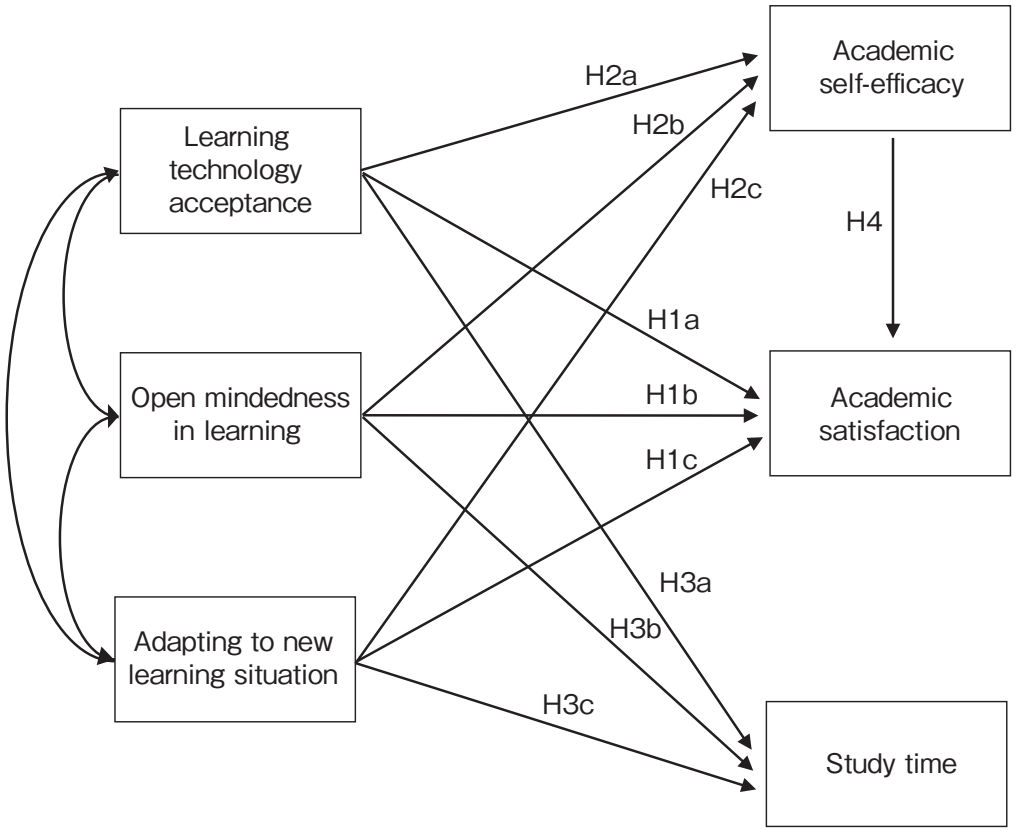

Figure 2. Path Model 2: Three components of flexible thinking in learning in relation to academic satisfaction, academic self-efficacy, and study time.

focuses on overall flexible thinking in learning as a whole, including the four hypotheses H1, H2, H3, and H4. Figure 2 presents Path Model 2, in which the three constituent components of flexible thinking in learning relate to academic satisfaction, academic self-efficacy, and study time, respectively. Model 2 addresses 10 hypotheses: H1a, H1b, H1c, H2a, H2b, H2c, H3a, H3b, H3c, and H4.

3 Methods

3.1 Research contexts and sites

The study sample was an Indonesian university. Previous studies using the measurement model of flexible thinking in learning (Barak and Levenberg, 2016b) were carried out in three countries: Israel (Barak, 2018; Barak and Levenberg, 2016b; Naamati-Schneider and Alt, 2023), Turkey (Aktaş et al., 2024; Durak and Uslu, 2023), and the USA (Tseng and Hill, 2020; Tseng et al., 2020). There is value in having different countries as a research site. In fact, Barak and Levenberg (2016b) discussed that questionnaires of flexible thinking in learning should be used and examined in various learning situations such as "academic backgrounds, ethnicities, and nationalities" (p.50).

Based on the Global Education Monitoring Report Team (2023), Indonesia has been greatly progressing by integrating hardware and software into its educational system. Although there is a notable challenge to be tackled, educational institutions have invested in digital learning applications and tools to promote technology integration in class (Global Education Monitoring Report Team, 2023). Since the concept and measure of flexible thinking in learning were generated to fit into current learning situations, including information communication technology (Barak and Levenberg, 2016a), an Indonesian university seemed to be an appropriate research context to explore various aspects of flexible thinking in learning.

3.2 Sample and sampling procedures

The sample of this study consisted of 419 undergraduate students who majored in elementary school teacher education at the Faculty of Teacher Training and Education of an Indonesian university. Of the students, 114 (27%) were first-year students; 120 (29%), second-year; 69 (16%), third-year; 55 (13%), fourth-year; and 61 (15%) fifth year or above. Most participants (357, 85%) were women; 62 (15%) were men. The average age of the participants was 20.3 years old (SD = 1.34).

Data were collected for this study at the end of the spring term of 2023. One of the authors explained the purpose of the study in her classes and asked students to participate in it. Subsequently, online survey questionnaires were distributed. We received a total of 425 questionnaires from the students who agreed to participate in this research through an online survey system. Six questionnaires were eliminated because they did not follow the instructions, and 419 remained for our analysis.

3.3 Measures

The questionnaires for this study were composed of questions about demographic characteristics; a question asking about the 'average studying time you spend a day except class attendance at the university'; and questions related to the three main variables: flexible thinking in learning, academic satisfaction, and academic self-efficacy.

3.3.1 Flexible thinking in learning

The Flexible Thinking in Learning (FTL) Scale developed by Barak and Levenberg (2016b) consists of three subscales: Learning Technology Acceptance (TA, 5 items), Open-Mindedness in Learning (OM, 7 items), and Adapting to New Learning Situations (AL, 5 items). The FTL measurement model was designed to examine individuals' FTL level as a whole as well as its three components by a six-point Likert-type scale that ranges from 1 (strongly disagree) to 6 (strongly agree). Barak and Levenberg (2016b) verified the three-factor structure (i.e., TA, OM, and AL) measured by the subscales, reporting that the fit indices of goodness of fit index (GFI: 0.94), comparative fit index (CFI: 0.97), Tucker-Lewis index (TLI: 0.96), and root mean square error of approximation (RMSEA: 0.05) were acceptable. Tseng et al. (2020) also completed confirmatory factor analysis of this three-factor measurement model, showing acceptable values (GFI = 0.90, CFI = 0.956, TLI = 0.974, and RMSEA = 0.079). Aktaş et al. (2024) concluded that the three-factor measurement model of Barak and Levenberg (2016b) is an excellent scale for examining flexible thinking in learning based on the results of their test of the measurement (minimum discrepancy divided by degrees of freedom [CMIN/DF] = 2.4, GFI = 0.90, CFI = 0.98, RMSEA = 0.068, and standardized root mean square residual [SRMR] = 0.035). The FTL scale reliability for the current study's sample of 419 students was acceptable based on the values of Cronbach's alphas (entire FTL: 0.94; TA: 0.84; OM: 0.88; AL: 0.84).

3.3.2 Academic satisfaction

This study used the scale of academic satisfaction developed by Schmitt et al. (2008), consisting of 5 items assessing satisfaction with academics in school as a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Several studies applied this scale to examine academic satisfaction of students (Polat and Karabatak, 2022) and academic life satisfaction (Balkis, 2013; Balkis and Duru, 2017). The study of Balkis (2013) reported that this satisfaction scale had one factor. All reliability coefficients of these previous studies showed acceptance values over 0.80. The Cronbach's alpha for the current study sample was 0.85.

3.3.3 Academic self-efficacy

To analyze student's academic self-efficacy, we applied the self-efficacy questionnaire included as a main subscale of the Motivated Strategies for Learning Questionnaire (Pintrich

and De Groot, 1990). This self-efficacy scale consisted of 9 items on a seven-point Likert-type scale ranging from 1 (not at all true of me) to 7 (very true of me). The scale has been used in multiple academic disciplines such as psychology (Zhen et al., 2017), education (Liu et al., 2018), media education (Shen, 2024), technological education (Joo et al., 2000), medicine (Hayat and Shateri, 2019), and English as a foreign language (Mori, 2004). The study of Zhen et al. (2017) reported that most fit indices based on confirmatory factor analysis fell in an acceptable range (CMIN/DF = 4.89, CFI = 0.96, TLI = 0.94, RMSEA = 0.08, SRMR = 0.035). These past studies showed a high degree of reliability for this self-efficacy scale, with Cronbach's alphas of 0.89 or higher. Similarly, the internal coefficient for this study was 0.91.

3.4 Translation procedures

The survey questionnaires applied in this study were offered in Indonesian languages. According to the translation procedures for cross-cultural studies (Brislin et al., 1973), we took three steps. First, one of the authors translated the original English version of all questionnaires to Indonesian languages. Second, a researcher in the same faculty of an Indonesian university was asked to back-translate the translated Indonesian version back to English independently. Additionally, an individual with strong knowledge of English and Indonesian languages was also asked to do the same work separately. Third, the meanings of the original English and back-translated versions were compared by the other two authors. After discussion among the authors involved with the questionnaires, the back-translated version was slightly modified and then finalized.

4 Results

Initially, correlation analysis was done in terms of four main variables (flexible thinking in learning, academic satisfaction, academic self-efficacy, and study time) and three component variables of flexible thinking (learning technology acceptance [TA], open-mindedness in learning [OM], and adapting to new learning situations [AL]). As shown in Table 1, all correlation coefficients were significant.

Table 1. Correlations among key variables (N = 419)

	Key variables	Mean	S.D.	1	2	3	4	5	6
1	Academic satisfaction	4.08	0.53	—					
2	Academic self-efficacy	5.46	0.79	0.34**	—				
3	Study time out of class	2.47	1.37	0.11*	0.20**	—			
4	Flexible thinking	4.97	0.54	0.49**	0.50**	0.20**	—		
5	Learning technology acceptance	5.00	0.60	0.46**	0.48**	0.20**	0.91**	—	
6	Open-mindedness in learning	5.07	0.57	0.46**	0.43**	0.15**	0.93**	0.74**	—
7	Adapting to new learning situations	4.82	0.61	0.41**	0.47**	0.21**	0.91**	0.77**	0.75**

Note: $^{**}p < 0.01$, $^{*}p < 0.05$.

Table 2. Path model fit indices (N = 419)

Path model	χ^2	Sig.	CMIN/DF	CFI	NFI	GFI	AGFI	RMSEA	SRMR
1	5.869	0.053	2.935	0.985	0.977	0.993	0.965	0.068	0.032
2	5.092	0.078	2.546	0.997	0.995	0.996	0.958	0.061	0.021

Note: CMIN/DF=minimum discrepancy divided by degrees of freedom; CFI=comparative fit index; NFI= normed fit index; GFI=goodness of fit index; AGFI=adjusted goodness of fit index; RMSEA=root mean square error of approximation; SRMR=standardized root mean square residual.

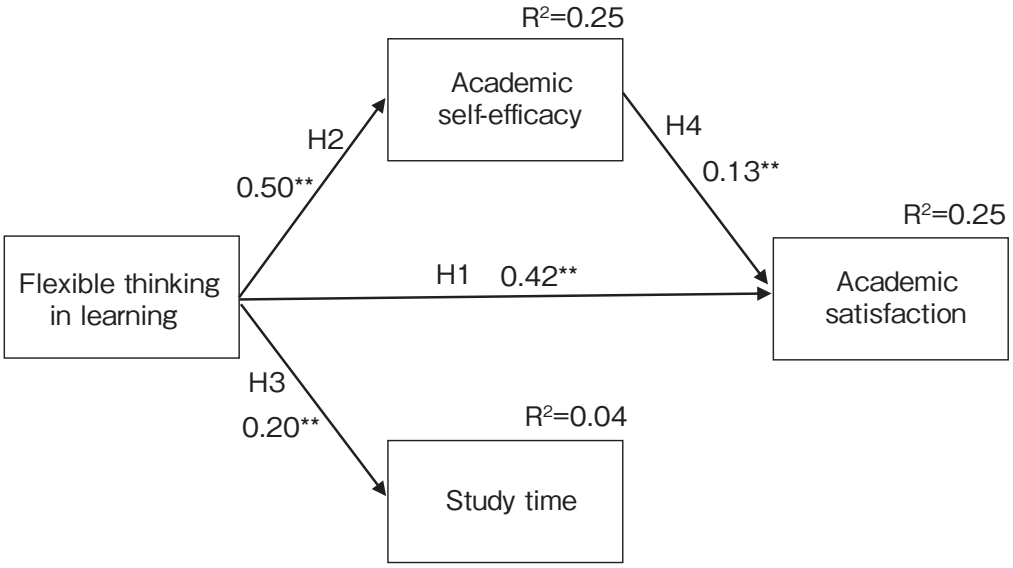

Figure 3. Results of pass analysis on Path Model 1: Flexible thinking in learning as a whole.

4.1 Test of Path Model 1

This study conducted path analysis in order to test four hypotheses: the relationship between flexible thinking as a whole and academic satisfaction (H1), that between flexible thinking and academic self-efficacy (H2), that between flexible thinking and study time (H3), and that between academic self-efficacy and academic satisfaction (H4). These four hypotheses were part of Path Model 1. The results of the path analysis revealed that Path Model 1 had a good model fit, as indicated by the acceptable fit indices (for example: χ^2 = 5.869, $p > 0.05$; CMIN/DF = 2.935; CFI = 0.985; GFI = 0.993; RMSEA =0.068), as described in Table 2. The coefficient between flexible thinking and academic satisfaction was 0.42 ($p < 0.01$), that with academic self-efficacy was 0.50 ($p < 0.01$), that with study time was 0.20 ($p < 0.01$). Additionally, academic self-efficacy significantly affected academic satisfaction as a mediating variable (path coefficient = 0.13, $p < 0.01$) (Figure 3). Accordingly, all four hypotheses were supported, indicating that students who are more equipped with flexible thinking in learning as a whole are more satisfied with school (H1), have greater

academic self-efficacy (H2), and are able to spend more study time outside of class (H3). Also, if they hold greater academic self-efficacy, they are more satisfied with school (H4).

4.2 Test of Path Model 2

Path Model 2 illustrated that each of the three constituent components of flexible thinking related to academic satisfaction, academic self-efficacy, and study time, while academic self-efficacy affected satisfaction as a mediator. Model 2 tested 10 hypotheses: H1a, H1b, H1c, H2a, H2b, H2c, H3a, H3b, H3c, and H4. Since Path Model 2 was structurally slightly different from Path Model 1, H4 was included: the relationship between self-efficacy and satisfaction. Results of path analysis revealed that Model 2 also showed a good model fit with observed data. As presented in Table 2, model fit indices were acceptable (for example: $\chi 2$ = 5.092, p > 0.05; CMIN/DF = 2.546; CFI = 0.997; GFI = 0.996; RMSEA = 0.061).

As illustrated in Figure 4, six path coefficients relevant to the 10 hypotheses were found to be significant, but four were not. The significant coefficients were 0.23 ($p < 0.01$) and 0.25 ($p < 0.01$) for the relationship between learning technology acceptance and academic satisfaction (H1a) and academic self-efficacy (H2a), respectively; 0.25 ($p < 0.01$) for

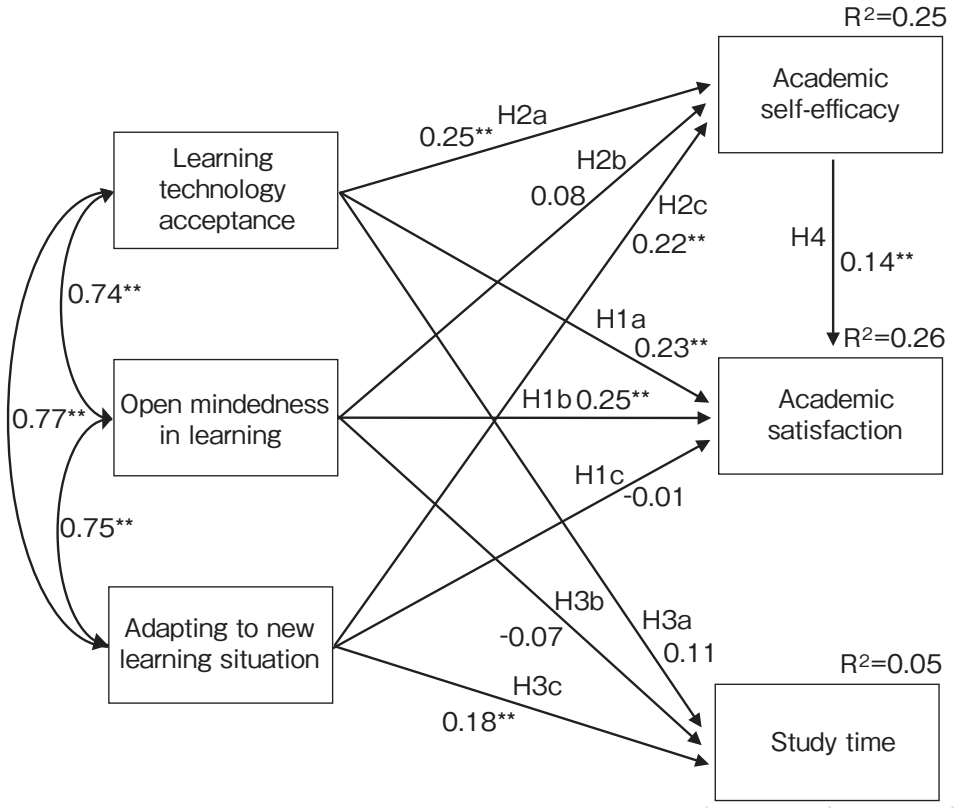

Figure 4. Results of pass analysis on Path Model 2: Three constituent subcomponents of flexible thinking in learning.

Table 3. Results of hypothesis testing

Path model	Hypothesis	Independent variables	Dependent variables	Path coefficient	Results
1	H1	Flexible thinking as a whole	Academic satisfaction	0.42**	Accept
	H2	Flexible thinking as a whole	Academic self-efficacy	0.50**	Accept
	H3	Flexible thinking as a whole	Study time	0.20**	Accept
	H4	Academic self-efficacy	Academic satisfaction	0.13**	Accept
2	H1a	Learning technology acceptance	Academic satisfaction	0.23**	Accept
	H1b	Open-mindedness in learning	Academic satisfaction	0.25**	Accept
	H1c	Adapting to new learning situations	Academic satisfaction	−0.01	Reject
	H2a	Learning technology acceptance	Academic self-efficacy	0.25**	Accept
	H2b	Open-mindedness in learning	Academic self-efficacy	0.08	Reject
	H2c	Adapting to new learning situations	Academic self-efficacy	0.22**	Accept
	H3a	Learning technology acceptance	Study time	0.11	Reject
	H3b	Open-mindedness in learning	Study time	−0.07	Reject
	H3c	Adapting to new learning situations	Study time	0.18**	Accept
	H4	Academic self-efficacy	Academic satisfaction	0.14**	Accept

Note: $^{**}p < 0.01$, $^{*}p < 0.05$.

the relationship between open-mindedness in learning and satisfaction (H2b); 0.22 ($p < 0.01$) and 0.18 ($p < 0.01$) for the relationship between adapting to new learning situations and self-efficacy (H2c) and study time (H3c); and 0.14 ($p < 0.01$) with regard to the relationship between self-efficacy and satisfaction (H4). Thus, those six hypotheses were supported.

However, the following four path coefficients were not significant. Those insignificant coefficients were -0.01 ($p > 0.05$) concerning a relationship between open-mindedness in learning and academic satisfaction (H1c); 0.08 ($p > 0.05$) and -0.07 ($p > 0.05$) with regard to that between adapting to new learning situations and academic self-efficacy (H2b) and study time (H3b), respectively; and 0.11 ($p > 0.05$) in terms of the relationship between learning technology acceptance and study time (H3a). Accordingly, H1c, H2b, H3a, and H3b were rejected. Hypothesis testing results are summarized in Table 3.

5 Discussion

5.1 Results summary and past study comparison

5.1.1 Overall flexible thinking in learning

This study primarily aimed to investigate how flexible thinking in learning affects academic satisfaction, academic self-efficacy, and study time outside of class in higher education.

In addition, we examined how academic self-efficacy influences academic satisfaction as a mediator. As the concept of flexible thinking in learning consists of three components, the study also explored the influence of each individual component. To analyze the relationships, we applied path analysis. As predicted, based on Path Model 1 analysis, overall flexible thinking significantly influenced satisfaction, self-efficacy, and study time, while self-efficacy strongly mediated between flexible thinking and satisfaction. Since there has been no past empirical study on the relationships between flexible thinking in learning as an entire component and those three variables, we referred to previous similar results of cognitive flexibility in relation to satisfaction/well-being and self-efficacy. There were two studies on the relationships between cognitive flexibility and satisfaction/well-being (Demirtaş, 2020; Odacı and Cikrikci, 2019), and their results were congruent with our study results. Regarding self-efficacy beliefs, the results of six studies were consistent with those of the present study (Aydin and Odaci, 2020; Brewster et al., 2013; Çelikkaleli, 2014; El-Sayed et al., 2024; Kazu and Pullu, 2023; Kim and Omizo, 2005). With regard to study time outside of class, to the best of our knowledge, no empirical study has been done on its relationship with cognitive flexibility.

5.1.2 Three components of flexible thinking in learning

The three components of flexible thinking had varied correlations with the three variables. In summary, learning technology acceptance significantly related to satisfaction and self-efficacy; open-mindedness in learning significantly related only to satisfaction; adapting to new learning situations significantly related to self-efficacy and study time; and the other relationships were insignificant. Results of two previous studies (Durak and Uslu, 2023; Tseng et al., 2020) are partly comparable. In terms of academic satisfaction, the study of Durak and Uslu (2023) focused only on the variable of adapting to new learning situations and documented its significant effect on enjoyment. Although their research focused on enjoyment and not satisfaction, their results were seemingly inconsistent with those of the present study, which showed that adapting to new learning situations was not significantly related to academic satisfaction. However, this inconsistent result may need to be further considered. Results of our correlation analysis showed a significant relationship between adapting to new situations and satisfaction; therefore, some other effects of exogenous variables towards academic self-efficacy presented in Path Model 2 might be intervening. Also, when developing hypotheses for this study, we assumed that if overall flexible thinking in learning affects a variable, each of its three components will also have an influence on it. That turned out to be a limitation of this study. From this notion, in future studies it will be important to examine an intervening effect among the exogenous variables, as well as to investigate the assumption.

With regard to academic self-efficacy, our study result—the significant influence of adapting to new learning situations on self-efficacy—was congruent with that of Tseng et al. (2020). However, results of the other two components were inconsistent between this study and that of Tseng et al. (2020). The influence of learning technology acceptance on self-efficacy was significant in our study, while the study of Tseng et al. (2020) showed insignificance. As discussed in the literature review, Tseng et al. (2020) explained that the insignificance could be related to the characteristics of their sample. Their online student participants would possibly have a similar level of accepting new or changing learning information technologies, suggesting that its effect might not be sufficiently detectable concerning their learning self-efficacy. They suggested that in samples with different characteristics, learning technology acceptance would have a significant influence on self-efficacy beliefs, as was the case with the Indonesian participants in this study. In other words, the component of learning technology acceptance itself might be easily affected by characteristics of samples. This view is speculative, so investigation is needed.

The study result of Tseng et al. (2020) revealed a significant relationship between open-mindedness in learning and self-efficacy, while our results were significant in the correlation analysis but insignificant in the path analysis. Based on those results, a possible explanation is that the three components as exogenous variables might be intervening or influence each other when affecting self-efficacy. As a consequence, the influence of open-mindedness may become weaker than the other two components of flexible thinking in learning. Also, our study and that of Tseng et al. (2020) had very different participants: The sample of Tseng et al. (2020) consisted of online students from a university in the southern USA, whereas our study sample consisted of Indonesian undergraduate students who attended class in a face-to-face format. In terms of open-mindedness in learning, Indonesian students as a whole are thought to have a relatively higher level of the competency of open-mindedness in terms of learning from others, managing teamwork, and listening to various views. As explained by Tseng et al. (2020) in terms of learning technology acceptance, open-mindedness in learning itself might be easily influenced by sample characteristics when investigating its relationship with self-efficacy beliefs. Additionally, as already discussed, there is a need to investigate the assumption in our hypotheses that if overall flexible thinking in learning affects a variable, each of its three components will also have an influence on it.

Finally, in this study, the variable of study time outside of class was influenced only by adapting to new learning situations and not the other two components of flexible thinking in learning. This result appears to be consistent with Durak and Uslu (2023), who reported that adapting to new learning situations significantly affects time management, allowing students to

adjust their study time as needed. Based on our study result, it was suggested that students who adapt better to changes in learning situations, requiring them to find multiple solutions to unfamiliar problems, tend to have more study time outside of class. In the present study, however, study time was not affected by the other two components, learning technology acceptance and open-mindedness in learning.

5.2 Limitations

This study had several limitations. The first limitation concerns the assumptions used in this study. Initially, for the generation of Hypothesis 1 (i.e., the relationships between flexible thinking in learning and academic satisfaction), we assumed that flexible thinking in learning is theoretically linked with P-E fit theory. To validate this assumption, another study may need to check how a degree of flexible thinking in learning is matched with P-E fit. Next, to develop Hypothesis 3 (on the relationship between flexible thinking and study time), it was assumed that university students are busy and do not have enough time to study outside class. To verify this assumption, a future study should investigate to what extent students actually lack study time outside class. Third, as already presented, we assumed that if overall flexible thinking in learning has an influence on a variable, each of its three components would also affect it.

Our second limitation relates to methodological issues. This study applied the 17-item version of the FTL scale developed by Barak and Levenberg (2016b), although a 19-item version also exists (Barak and Levenberg, 2016b; Barak, 2018). A simple question may be raised about whether our study results using the 17-item version would be the same as if we had used the 19-item version. Also, our participants were Indonesian undergraduates majoring in elementary education, who were collaborative students for our study. To generalize our conclusions and to explore literature development in terms of flexible thinking, other types of participants in higher education institutions are necessary, including students with different majors, universities, and countries and with various experiences. In particular, students in higher education experience post-pandemic situations and rapidly changing information technology including generative AI or chatGPT; thus, this contextual change requires analysis of other influential aspects of flexible thinking in learning. Another key limitation of this study is the potential impact of cultural factors on the findings. The participants were Indonesian undergraduate students, who come from a culture that emphasizes group harmony and collective goals. This cultural orientation can shape students' learning behaviors and attitudes, potentially influencing their flexible thinking, academic satisfaction, and self-efficacy. These influences may differ significantly from those in more individualistic societies, where personal achievement and autonomy are often prioritized. Cultural factors can also impact students' self-efficacy and academic

satisfaction, as beliefs about learning and success are deeply embedded in cultural norms and values. Therefore, the levels of academic satisfaction reported by Indonesian students may be influenced by their cultural context, which values community and collective success. Considering these cultural differences is essential when generalizing findings to students from different cultural backgrounds.

6 Conclusion

Based on the discussion, we have two conclusions. First, flexible thinking in learning as a whole is an important competency in higher education because it affects students' satisfaction, their self-efficacy, and the time they spend studying. Second, the complex nature of flexible thinking requires consideration of not only its overall influence but also the effect of its three individual components.

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柔軟な思考が学業的満足度、自己効力感、学習時間に与える影響：インドネシアの学部生における研究

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概要

近年、「学習における柔軟な思考」は3つ構成要素からなる測定モデルとともに、再概念化された。この再概念化の特徴は高度なITを含む今日の複雑な教育環境に対応していることである。しかし「学習における柔軟な思考」が及ぼす影響については依然として不明な点が多い。この研究の目的は、「学習における柔軟な思考」が、高等教育における学業的満足度、自己効力感、授業外の学習時間にどのように影響しているかを調査することである。調査対象者は初等教育を専攻するインドネシアの学部生 419名である。分析方法はパス解析である。分析結果は、総合的な「学習における柔軟な思考」は学業的満足度、自己効力感、学習時間に有意に影響した。さらに自己効力感は「学習における柔軟な思考」と満足度との関係に、媒介効果があることが示された。しかし、「学習における柔軟な思考」の3要素―①学習におけるITの受容性、②学習におけるオープンマインド、③新たな学習状況への適応―の影響は、構成要素ごとに異なった。今回の研究結果から 次の2つを結論として導きだした。(1)「学習における柔軟な思考」は全体として、学生の満足度、自己効力感、学習時間に影響を与える重要な能力であること。(2)「学習における柔軟な思考」は、全体的な影響だけでなく、3つ構成要素の影響も考慮する必要がある。

キーワード：学習における柔軟な思考、学業的満足度、自己効力感、学習時間、インドネシアの大学生

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