ISSN 2962-5548
https://doi.org/10.56773/ejer.v3i2.40
Eureka: Journal of Educational Research, 3(2), 115-127

The reflective factors of students' determination for effective learning in higher education

Audi Yundayani[1]*, Fiki Alghadari[2]
[1]English Education Study Program, STKIP Kusuma Negara, Indonesia
[2]Faculty of Teacher Training and Education, Universitas Jambi, Indonesia
*audi_yundayani@stkipkusumanegara.ac.id

Received: April 27, 2024
Revised: May 26, 2024
Accepted: July 2, 2024

Abstract

Promoting self-determination was identified as facilitating access to effective learning in higher education contexts. However, amidst the competitive educational climate and various contemporary educational issues, there remained a gap in understanding the factors influencing its implementation. This study explored the factors that reflected students' self-determination for effective learning. This quantitative study involved two hundred and eighty-five participants from private universities. Data were collected using a questionnaire containing twenty-three statement items to measure students' determination in their learning, and then the data were analyzed using exploratory and confirmatory factor analysis. The study revealed six factors of student determination for effective learning. They were learning control and flexibility, learning strategy development, academic ability and engagement, academic progress and evaluation management, perception of the academic environment, and collaboration and social engagement. These factors need to be considered in developing strategies and educational interventions that are truly efficient, as in a teaching scenario, to facilitate students' self-determination performance and promote academic success and student well-being.

Keywords

Performance-influencing factors, personalized learning environment, self-determination, self-learning analytics.

INTRODUCTION

Technology-based modern education must support students' mental well-being and encourage independence and intrinsic motivation to enhance academic achievement. Current learning supports 21st-century skills and demands a high level of commitment from students [1], [2]. It also encourages students to take responsibility for managing their learning process, overcoming challenges, recognizing their abilities and potential, and providing flexibility in learning time [3], [4]. This model supports students' autonomy and self-development following the principles of Self-Determination Theory (SDT) to enhance engagement and learning outcomes [5]–[7]. Self-determination has shown its important role in enabling students to take responsibility for their learning process [2], [3], [8]. According to the recommendations of Ekundayo et al. [9] and the findings of Yun and Jurang's [10] review, the ideal educational system should support personalized learning for students who have different learning needs, thus allowing students more control over how they learn. Ambler et al.

[11] revealed that curriculum customization affects student engagement and achievement, allowing students to explore their learning preferences and strengths. However, rigid educational systems often fail to provide space for students to adjust their learning methods according to their needs. In some educational systems, the focus on external assessments and tight control by teachers or institutions reduces students' autonomy and weakens their intrinsic motivation [12], [13]. Teacher-centered approaches and an emphasis on grades often overlook the importance of students' self-determination in achieving optimal learning outcomes [7], [12]. As a result, students cannot take an active role in their learning process, and their sense of control and self-development tends to diminish, thus hindering the development of learning independence.

On the other hand, the transition to distance or hybrid learning during the pandemic and post-pandemic period has recorded various student experiences. Some students struggled with self-directed learning without direct supervision from teachers [14], [15]. Other students also lacked sufficient cognitive and motivational skills, including self-regulation, to direct their learning independently [1], [2], [5], [16]. Students often relied on external incentives, were less engaged in learning, and struggled with time and task management [14], [16]. Some students also had difficulty maintaining internal motivation, especially in environments affected by external distractions such as social media and online gaming [4], [17]. Additionally, the increasing academic pressure often was not matched with developing student's skills, such as emotional control, to manage that load. High pressure from school, family, or themselves could negatively impact students' mental well-being, reduce self-determination, and turn learning into a burdensome rather than enjoyable activity [18]. These experiences have highlighted the lack of students' readiness for self-determined learning, particularly in managing time, maintaining motivation, and overcoming learning barriers in less structured environments.

Effective learning is essential for achieving optimal academic outcomes [15]. Moreover, students are still expected to develop intrinsic motivation and independence in continuous learning within the framework of modern education. According to several studies involving Self-Determination Theory (SDT), the implementation of psychological support that addresses the needs for autonomy, competence, and relatedness positively impacts various educational and personal development contexts [13], [19]–[21]. Several studies indicate that autonomous motivation facilitates optimal learning outcomes, improves writing skills, and affects emotional engagement and student satisfaction, both in language learning, higher education, and schools with alternative models [20]–[23]. Other research shows that a supportive classroom climate, the use of educational-social media, and integrative emotion regulation strategies play important roles in supporting learning, academic achievement, and the development of cross-cultural social-emotional skills [19], [20], [24], [25]. Outside the educational domain, self-determination has also been found to play a crucial role in overcoming issues such as work procrastination, underscoring its broad relevance in promoting independence and success in various aspects of life [21], [26]. However, there remains a gap in understanding the specific and combined factorsof autonomy, competence, and relatedness that influence the application of self-determination in more diverse learning environments. Further research exploring these factors is relevant in a competitive educational climate and various contemporary educational issues, particularly in creating better conditions for long-term learning and enhancing effective learning.

This study identifies factors that support student independence, provides insights into creating learning environments that support mental well-being and academic achievement, and explores the application of SDT in the context of more independent learning—such as online, distance, and hybrid learning—which is increasingly common and aligns with the needs of future education. Its benefits are expected to help educators develop more independent and effective learning strategies, support students' autonomy, and strengthen self-regulation and emotional control. This research may also be helpful in formulating strategies that encourage students to take responsibility for their learning, face the challenges of 21st-century learning that require independence and innovation, and address educational challenges related to flexibility, mental well-being, and 21st-century competencies. Therefore, this study aims to explore factors that reflect students' self-determination for effective learning.

RESEARCH METHOD

This study utilized a quantitative approach to explore the factor structure of the variable students' determination for effective learning. A total of 285 students, consisting of 199 females and 86 males, participated in the research from three universities in Jakarta and one in Tangerang, Indonesia. Eighty students were over twenty, 126 were under twenty, and the remaining were over twenty.

Data were collected using a questionnaire sent to participants through Google Forms. This data collection method supported convenience sampling techniques across the three universities and relied on respondents' willingness from the entire population. The research instrument comprised 23 statements, each coded as SDT1 to SDT23, providing response options ranging from 0 to 4. The statements covered various aspects relevant to the concept of student determination in the learning context, including (a) learning objectives (SDT1-SDT5), which reflected autonomy in planning and managing their learning; (b) control in learning (SDT6-SDT9), emphasizing the importance of having the freedom to choose their preferred learning methods; (c) learning competency (SDT10-SDT13), which assessed students' confidence in their abilities; (d) social support (SDT14-SDT20), highlighting their sense of connectedness with others in the academic environment; and (e) social engagement (SDT21-SDT23), which supported more effective learning through social interaction. The instrument's validity was between 0.528 and 0.756, and its reliability was 0.942.

Data were analyzed using factor analysis, including exploratory and confirmatory techniques. The analysis followed these steps: (1) assessing variable suitability using Kaiser Meyer Olkin (KMO) and the measure of sampling adequacy (MSA) with an MSA standard of over 0.5; (2) classifying factors using the principal component analysis method; (3) factor rotation using the varimax method to produce uncorrelated factors; (4) determining the reproduced correlation matrix (Rr) and residual correlation matrix (Res); (5) conducting a reliability test for each factor using Cronbach's Alpha coefficient, where a value greater than 0.7 was considered adequate; (6) employing Confirmatory Factor Analysis (CFA) with Goodness of Fit (GoF) statistics to test the adequacy of the codes; and (7) interpreting the results of the factor analysis [27], [28].

RESULT AND DISCUSSION

The results of the descriptive statistical analysis of the data, including the minimum value (X_{min}), maximum value (X_{max}), mean (M), and standard deviation (SD), are presented in Table 1.

Table 1. Descriptive statistics of the data

Code	X_{min}	X_{max}	M	SD	Code	X_{min}	X_{max}	M	SD
SDT1	0	4	2.870	0.760	SDT13	0	4	2.568	0.949
SDT2	1	4	2.842	0.769	SDT14	0	4	3.088	0.748
SDT3	0	4	2.979	0.741	SDT15	0	4	2.856	0.825
SDT4	0	4	2.782	0.806	SDT16	0	4	2.877	0.728
SDT5	0	4	2.712	0.823	SDT17	0	4	3.105	0.878
SDT6	0	4	2.842	0.831	SDT18	0	4	2.968	0.921
SDT7	0	4	3.042	0.813	SDT19	0	4	2.786	0.938
SDT8	0	4	2.989	0.794	SDT20	0	4	2.740	0.940
SDT9	0	4	3.133	0.734	SDT21	0	4	3.137	0.795
SDT10	0	4	3.032	0.748	SDT22	0	4	2.884	0.898
SDT11	0	4	2.818	0.881	SDT23	0	4	2.898	0.852
SDT12	0	4	2.712	0.909					

Table 1 shows that the mean values of all codes ranged from 2.568 to 3.137 on a scale of 0 to 4. This indicates that students generally scored in the moderate to relatively high range regarding their ability and motivation to regulate, control, and take responsibility for their learning. Furthermore, the highest mean score was for SDT21 (M=3.137), with the statement, "I enjoy being actively involved as part of a team in completing group assignments." This suggests that most students felt they had the freedom to seek additional information needed to support their learning and showed high motivation in team collaboration. On the other hand, the

statement with the relatively lower mean value was SDT13 (M=2.568), which is, "I can move on to the next competency when I am ready, even though other students in the course are not ready." This suggests that many students felt less flexible in managing the pace of their self-directed learning, indicating that flexible learning progress management needs improvement to achieve more independent and practical learning.

The subsequent analysis assessed the suitability of variables in the factor analysis using Kaiser Meyer Olkin (KMO) and the measure of sampling adequacy (MSA) with a standard above 0.5. The analysis results are presented in Table 2.

Table 2. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.922
Bartlett's Test of Sphericity	Approx. Chi-Square	4118.716
	df	253
	Sig.	0.000

Based on Table 2, the KMO value was found to be 0.922 (*p*-value=0.000), above the standard of 0.5. This indicates that there is a significant correlation between the correlation matrix. Additionally, all the correlation values in the anti-image matrix were above 0.5, ranging from 0.847 to 0.965. Factor analysis could proceed.

The next step was to classify factors using the principal component analysis method based on eigenvalues and total variance. Eigenvalues considered were more significant than or equal to 1, with total variance explained by the factors being over 60%. The results are presented in Table 3.

Table 3. Eigenvalues and total variance

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	10.354	45.016	45.016
2	1.710	7.433	52.449
3	1.278	5.558	58.007
4	1.149	4.996	63.003
5	1.093	4.753	67.756
6	1.001	4.354	72.110
7	0.693	3.011	75.122
…	…	…	…
23	0.168	0.730	100.000

Table 3 shows that there were six components with total eigenvalues greater than 1, while the others were less than 1. This means that six factors were formed based on the 23 codes analyzed. The residual correlation matrix results showed that absolute values of 53 (20%) were above 0.05. The extraction method by Principal Component Analysis did not distribute each code into the six factors. Therefore, the rotation method by Varimax with Kaiser Normalization was applied. The results of the rotation method by Varimax are presented in Table 4.

Based on Table 4, the factor loading value for SDT10 in the six factors was no higher than 0.45, which falls under the poor category, according to Watkins [27]. Therefore, the data from SDT10 was excluded from further analysis. The loading values for the other codes ranged from 0.502 (fair category) to 0.857 (excellent category). A total of 12 codes fell into the excellent category (greater than 0.7), namely SDT5, SDT7, SDT8, SDT9, SDT11, SDT12, SDT13, SDT17, SDT19, SDT20, SDT22, and SDT23. Five codes were in the outstanding category (between 0.63 and 0.70), namely SDT2, SDT6, SDT14, SDT16, and SDT18. Four codes were in the good category (between 0.55 and 0.63), namely SDT1, SDT3, SDT4, and SDT15. Only one code was in the fair category (between 0.45 and 0.55), namely SDT21. None of the codes from SDT11 to SDT23 had the highest factor loading in F1 and F2.

Additionally, the results of the rotation method by Varimax revealed six factors formed from the 23 codes. The first factor (F1) was based on SDT6, SDT7, SDT8, and SDT9, with a

Cronbach's Alpha (α) reliability coefficient of 0.887. The second factor (F2) was based on SDT1, SDT2, SDT3, SDT4, and SDT5, with a Cronbach's Alpha (α) reliability coefficient of 0.871. The third factor (F3) was based on SDT14, SDT15, SDT16, and SDT17, with a reliability coefficient of Cronbach's Alpha (α) of 0.831. The fourth factor (F4) was based on SDT11, SDT12, and SDT13, with a reliability coefficient of Cronbach's Alpha (α) of 0.850. The fifth factor (F5) was based on SDT18, SDT19, and SDT20, with a Cronbach's Alpha (α) reliability coefficient of 0.828. The sixth factor (F6) was based on SDT21, SDT22, and SDT23, with a Cronbach's Alpha (α) reliability coefficient of 0.752.

Table 4. Results of factor rotation using the varimax method

Code	Loading						F	Code	Loading				F
	1	2	3	4	5	6			3	4	5	6	
SD1		0.626*					2	SD13		0.754*			4
SD2		0.695*					2	SD14	0.639*				3
SD3		0.628*					2	SD15	0.609*				3
SD4		0.617*					2	SD16	0.660*				3
SD5		0.752*					2	SD17	0.744*				3
SD6	0.636*						1	SD18			0.687*		5
SD7	0.822*						1	SD19			0.817*		5
SD8	0.857*						1	SD20			0.852*		5
SD9	0.752*						1	SD21				0.502*	6
SD10	0.381	0.173	0.195	0.388	0.258	0.342	-	SD22				0.803*	6
SD11				0.747*			4	SD23				0.743*	6
SD12				0.782*			4						

Note: F= factor; (-)= not assigned; (*)=The selected loading values for the factor

Confirmatory factor analysis (CFA) was conducted to test the adequacy of the model for the factors that had been formed. The CFA results are presented in Figure 1. Based on Figure 1, it shows that all factor loading values are above 0.5, with $\chi 2/df$= 510.38/194= 2.631, Root Mean Square Error of Approximation (RMSEA) Standardized Root Mean Square Residual (SRMR)=0.053, Comparative Fit Index (CFI)=0.970, Goodness of Fit Index (GFI)=0.860, Adjusted Goodness of Fit Index (AGFI)=0.820, and Normed Fit Index (NFI)=0.960. All factors, from F1 to F6, are correlated with each other. The F1-F6 correlation matrix is presented in Table 5.

Table 5. Matrix correlation of independent factors

	F1	F2	F3	F4	F5	F6
F1	1.000					
F2	0.727	1.000				
F3	0.662	0.781	1.000			
F4	0.562	0.677	0.730	1.000		
F5	0.438	0.572	0.585	0.541	1.000	
F6	0.596	0.686	0.720	0.576	0.623	1.000

Based on Table 5, it is evident that the matrix shows a strong correlation among the extracted factors. Most of the correlation values are above 0.5, indicating that these factors are not entirely independent. The findings of this study reveal that there are six reflective factors of students' determination for effective learning, referred to as F1 through F6, which will be discussed in the next section. The highest correlation occurs between F2 and F3 (0.781), indicating that both factors represent highly related aspects in the context of student learning, while the lowest correlation is between F1 and F5 (0.438), reflecting a weaker relationship compared to the other factor pairs. All factors exhibit positive correlations, suggesting that various aspects of self-determination in learning support one another. No factor stands completely alone.

On the other hand, the study's findings also reveal that F1 has a high correlation with F2

(0.727) and a moderate correlation with F3 (0.662), indicating that autonomy in learning is closely related to learning planning, as well as self-competence development, self-confidence, and active participation of students. Students' good ability to plan their learning can enhance their ability to take control of the learning process and strengthen their confidence in achieving academic goals [1]. Dinh and Phuong [3] have summarized such relationships, showing that students who have control over how they learn tend to have well-planned learning strategies and strong self-efficacy in their academic abilities, thus ultimately strengthening the connection between self-regulation and academic success.

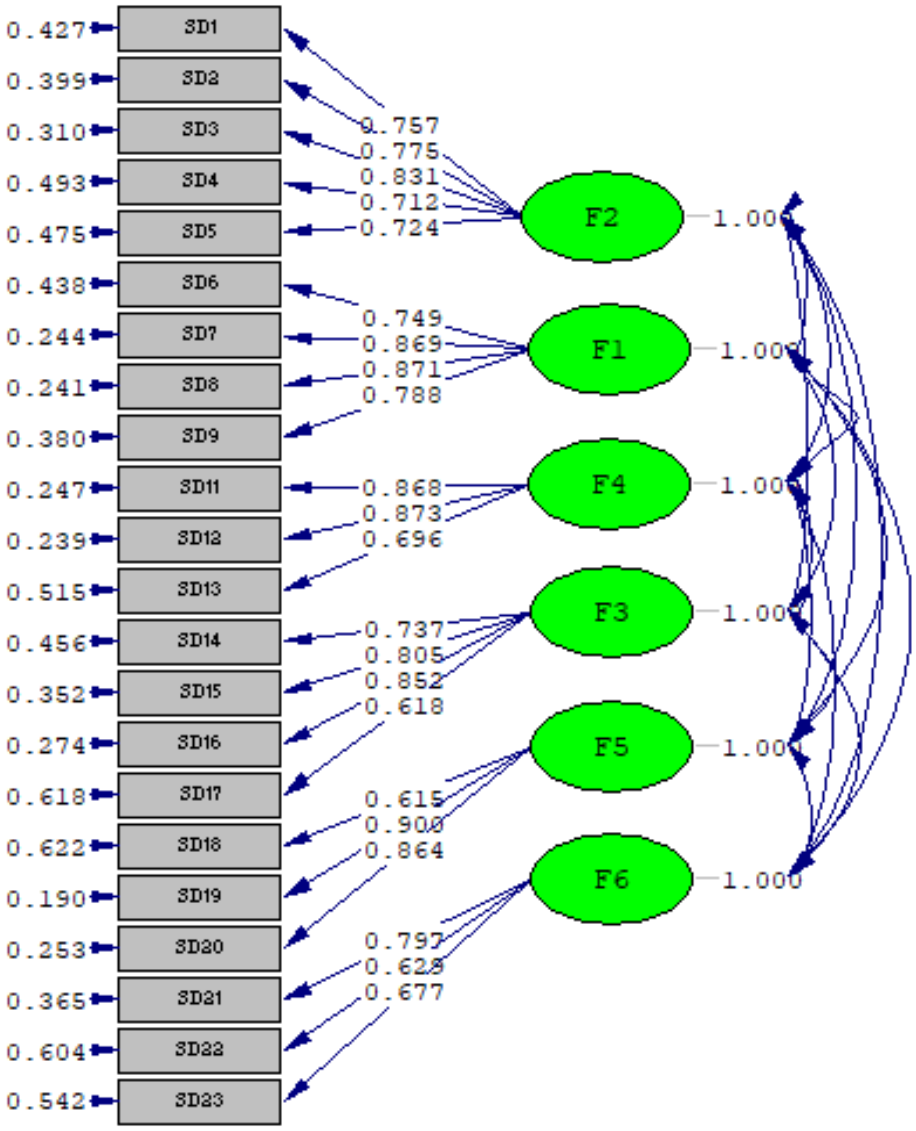

Figure 1. CFA correlation model of students' determination

F1: Learning control and flexibility

The first factor (F1) is reflected by the codes SDT6, SDT7, SDT8, and SDT9. According to the results of identifying the statements for each indicator used in the data collection, this factor reveals students' ability and freedom to control, choose, and adjust the process, methods, and learning resources according to their preferences and needs. The two main aspects central to this factor are (1) students' ability to organize and adjust their learning approaches and (2) their freedom to determine the methods and learning resources most suitable for their personal needs.

The use of information and communication technology (ICT) facilitates students' learning independence through the development of

flexibility and the opportunity to control and develop their learning processes [1], [29]. Technology use also motivates students to engage actively, collaboratively, interactively, and independently [30]. This phenomenon is reflected in the fact that many students prefer online learning over face-to-face learning because it offers a flexible, interactive, and autonomous learning experience, giving them control over their learning methods and schedules [31]. Moreover, technology facilitates flexibility in learning, which is ideal for adult learning, as it allows for location or situation flexibility and can be done anytime [1], [8]. This plays a significant role in promoting lifelong learning and preparing graduates to participate actively in a knowledge-based society [32]. Several studies (e.g. [1], [33], [34]) have emphasized the importance of flexibility, autonomy, and a supportive environment in enhancing student engagement and motivation, highlighting the need for a personalized and adaptive approach to meet their unique needs.

When students can make choices independently, it reflects their attribution of previous learning outcomes and self-confidence in their learning abilities, referred to as learning control, according to D'Ailly [35]. In an academic context, learning control often requires self-control, where individuals need adaptation, planning, responsibility management, and independent learning activity management, all contributing to better learning outcomes [15], [36]. Zhou et al. [7] summarized that the higher the students' determination, the greater control they have over optimizing deep learning processes. Additionally, accessibility that allows students to learn adaptively without significant disruption to their conditions represents the concept of flexibility, as explained by Veletsianos and Houlden [37]. Students with strong determination tend to be more flexible in their learning approaches, stay focused on their ultimate goals, and seek alternatives if the methods are ineffective. This control and flexibility in learning help students achieve academic goals, develop self-awareness, and navigate various challenges and choices during their college years. Differences in thinking, learning, and decision-making that affect an individual's journey during their college years can be seen as learning control and flexibility [38], [39]. Therefore, F1 is identified as learning control and flexibility.

F2: Learning strategy development

The second factor (F2) is reflected by the codes SDT1, SDT2, SDT3, SDT4, and SDT5, which are interrelated in forming a reflective and proactive cycle in managing an effective learning process. The identification results for the SD1-SD5 codes point to several characteristics, such as metacognitive awareness, independence and autonomy, flexibility and adaptation, reflection and evaluation, innovation, and continuous development.

In line with these findings, Kurniawan and Alghadari [15] discovered a latent factor in online learning called effective learning strategies, a constructive approach rooted in awareness and responsibility. This strategy helps students organize, manage, and optimize the learning process to achieve maximum results [1]. With strong autonomy, students determine flexible learning steps and adapt to challenges or situation changes based on their needs [40]. They can conduct periodic evaluations to identify the strengths and weaknesses of their learning strategies, enabling them to improve their methods and approaches continuously. The evaluation process is followed by innovation and continuous development, which results from focused determination in learning. Students with high determination tend to seek new ways to improve their learning efficiency. Effective learners are those who can identify learning needs, solve technical problems, and adapt to new technologies to support innovative learning processes [41], are proactive, and take the initiative in developing learning strategies for better outcomes [42], as well as manage academic tasks and challenges independently and fully engage in learning [43]. This learning process, which involves identifying needs, adapting technology, initiative, and independence, is known as strategic learning, aimed at supporting innovative learning and achieving optimal results. Häkkinen et al. [44] emphasized that students must plan learning activities, monitor progress, and regularly evaluate the outcomes. These activities are closely related to strategic learning skills.

Strategic learning skills, which continue to evolve, involve self-regulation and can be strengthened through innovative learning experiences with the aid of technology. Personal learning development can be enhanced through enjoyable, interactive learning experiences involving creativity, such as VR and project

activities[45]. Ping and Hong [36] added that hybrid learning strategies involving planning, monitoring, evaluation, and self-reflection through an integrated approach between face-to-face and online learning via digital platforms support self-regulation and metacognitive awareness. These strategies fall under the scope of learning strategy development. Thus, F2 is identified as the factor known as learning strategy development.

F3: Academic ability and engagement

The third factor (F3) is reflected by SDT14, SDT15, SDT16, and SDT17. This factor reflects self-competence and active participation in learning. Specifically students' confidence in their ability to complete academic tasks, face challenges, possess sufficient skills, and actively engage in learning activities within the academic environment. It leads to several characteristics, such as self-confidence, self-competence, active participation, and willingness to take risks.

In the context of learning, students who doubt their abilities tend to be less active and are more likely to lack intention and interest in addressing problems. Their abilities, in this case, academic abilities, are crucial factors that make them active, willing to take risks, and face challenges [40]. Students who believe in their competencies are more likely to plan their learning effectively and maintain motivation while consistently facing academic challenges because they have clear goals and targeted strategies [1], [7], [36]. Strong academic abilities provide a solid foundation for students to believe in themselves, encouraging them to engage willingly in their learning practices. Studies have reported that students with strong self-determination are more likely to be confident in completing academic tasks, possess the skills to overcome obstacles, are resilient, seek solutions, and adapt to various situations[46]. This reflects their commitment to remaining actively involved in learning activities. Students who develop academic self-efficacy can manage their learning process well, such as planning, monitoring, and reflecting on learning outcomes, which leads to greater involvement in learning [1], [40]. This active engagement not only enhances material comprehension and learning capabilities [7] but also strengthens the sense of achievement and improves academic success [40]. Therefore, one of the key factors in building strong self-confidence in students, including in facing challenges, which is identified in this study as F3, is academic ability and engagement.

F4: Academic progress and evaluation management

The fourth factor (F4) is built based on SDT11, SDT12, and SDT13. These codes reflect individual progress-based competency achievement, specifically, students' ability to identify, demonstrate, and continue mastering competencies according to their readiness, regardless of the progress of other students. This factor has the highest correlation with F3 (academic ability and engagement) at 0.730 and strongly correlated with F2 (learning strategy development) at 0.677. These correlations have also been explained in the study by Ustun et al. [47].

Essentially, students' academic progress is based on relevant achievements without comparing themselves to the progress of others. This supports focused and adaptive learning, carried out independently by students through identifying learning needs and setting learning goals that demonstrate mastery of competencies according to their readiness rhythm, rather than merely following the group's progress of the group [29], [40]. In this case, self-determination also shapes students' ability to continue mastering competencies through reflection and tailored learning strategies [36]. It must also be recognized that meeting students' needs for competency mastery impacts their motivation, which plays a key role in supporting their academic success [29], [48]. This is important because self-determination, in the context of education, underpins the behaviours exhibited by students due to intrinsic motivation (things they find interesting), alignment with their beliefs or values (integration), and not because of externally referenced reasons [49]. These skills are not just about achieving academic results but also include effectively demonstrating competency mastery inside and outside the classroom.Due to the rapid development of technology today, several models, such as open digital badges, competency-based learning technology, and adaptive learning technology, have been developed to support the implementation of personalized learning in higher education[29]. With these models, students can independently guide their learning progress and needs through feedback recommended by an innovative learning

analytics system after assessing readiness [1]. The use of learning analytics-based feedback and recommendations to monitor students' academic progress has been reported in the study by Ustun et al. [47], where its use led to significant improvements in academic achievement and self-regulated learning skills. Here, learning analytics is crucial in supporting students in planning, monitoring, and evaluating their learning [10]. Informative feedback and highly personalized recommendations from learning analytics function as metacognitive support for students [1]. This is the important role of learning analytics within ICT systems, which can also be directly managed by students when they are not engaged with a system-based learning process. In this context, two central elements discussed in learning analytics are academic progress and evaluation management, which are the factors identified in this study. Other literature also discusses these two elements of learning analytics as calculation and recommendation [1].

F5: Perception of academic environment

The fifth factor (F5) is reflected in SDT18, SDT19, and SDT20. These codes measure the sense of connection and social support in the academic environment, such as the extent to which students feel accepted, supported, and cared for by facilitators and how they perceive the institution where they study as the right place for their development. This reflects a supportive learning environment. The study by Mousavi et al. [50] highlights the importance of connection and social support in the academic environment, particularly in e-learning. Factors such as program effectiveness, teaching quality, ethics and professionalism, learner support, safety and comfort, and student awareness of rules are key elements shaping students' perceptions of the educational environment. Students' perceptions of these factors reflect reflective aspects that can influence their overall learning experience. Additionally, the results of this study show that F5 has the lowest correlation with F3 (academic ability and engagement at 0.585) compared to the other factors.

The study by Rokhafrooz et al. [51] adds that students' perceptions of the educational environment encompass not only strengths, such as good teaching methods, but also weaknesses, such as teacher-centeredness and lack of professional preparation. Therefore, a support system is needed to strengthen students' enthusiasm and self-confidence by creating a more effective learning environment [46]. This support is reinforced by Al Sheikh's [52] findings, which show that the quality of teaching methods and the surrounding learning atmosphere directly impact students' perceptions. Improvements in these aspects, such as changing teaching methods, can enhance motivation, learning outcomes, learning experience, and student well-being. Furthermore, students from non-conventional learning groups were reported to have more positive perceptions of the academic environment than those from conventional groups. This underscores the importance of tailoring the learning approach to individual needs to support a sense of connection in the academic environment. Moreover, students' perceptions of the academic environment affect their learning approaches, such as elaboration, memorization, and self-regulation strategies. Simut dan Godor [53] reported that gifted students show higher levels of involvement, control, and elaboration compared to normative students, who rely more on memorization strategies. Therefore, the perception of the academic environment is influenced by the determination of each individual in their learning and is an important element in shaping students' sense of connection, social support, and learning success.

F6: Collaboration and social engagement

The sixth factor (F6) is built based on SDT21, SDT22, and SDT23. These codes measure the extent to which students actively participate, feel comfortable interacting, and utilize their roles and responsibilities in effectively completing group tasks. This factor has a high correlation with F3 (academic ability and engagement at 0.720) and is quite strongly correlated with F2 (learning strategy development at 0.686).

Karim and Alam [4] state that to achieve an effective learning environment, there are four key elements to consider: (a) learner-centred, (b) knowledge-centred, (c) assessment-centred, and (d) community-centred. Further in line with the codes, achieving learning goals includes developing collaborative skills within the community, such as willingness to contribute, confidence in sharing ideas, managing group interactions, and building interpersonal skills important for resolving conflicts and maintaining group harmony. Effective learning is achieved through communication and dialogue that

develops active knowledge, where learners must communicate their learning in writing, orally, and visually while mastering collaboration and teamwork skills [34]. Participation in teamwork supports more effective learning through positive social interactions. An example is computer-supported collaborative learning, which facilitates synchronous and asynchronous communication and group collaboration. This allows students to engage in self-directed learning actively, contribute to discussions with teachers and peers, help create a productive collaborative environment, and encourage them to understand their roles and responsibilities in completing group tasks, thus improving the quality of their learning and skills. With good self-regulation, students can organize their contributions according to their expertise, ensure fair task distribution, and support achieving collective goals [54]. The ability to self-regulate enables students to feel comfortable communicating with team members, creating an atmosphere where each member feels valued, strengthening group dynamics, and thus improving cooperation effectiveness and motivating them to give their best. Students who can manage emotions and adapt to social situations will be more successful in collaborating to achieve optimal outcomes. Today's education must integrate technology and collaboration to support sustainable distance learning, focusing on the development of communication skills, teamwork, and community support to address challenges such as time limitations, lack of competence, and minimal social interaction, which can lead to low motivation and high dropout rates [55]. Thus, collaboration and social engagement, identified as F6 from this study's findings, are among the factors that determine students' ability to learn effectively.

CONCLUSION

This study provides an in-depth analysis of various factors influencing students' self-determination in facilitating effective learning. In this study, the author explains how these interconnected constructs impact students' self-directed learning—through questions about learning objectives, control in learning, learning competency, social support, and social engagement. The study also emphasizes that self-determination is not a singular attribute; instead, it is a multi-faceted construct shaped by several intra- and inter-related factors that influence students' academic performance in one way or another. This study reveals six factors of student determination for effective learning, namely: (1) learning control and flexibility, (2) learning strategy development, (3) academic ability and engagement, (4) academic progress and evaluation management, (5) perception of the academic environment, and (6) collaboration and social engagement. The research findings also underline the importance of a comprehensive approach that encourages autonomy and the students' roles in their learning process. A more comprehensive support system, including social support and engagement in a conducive academic environment, is also necessary for effective learning. This system empowers students to take control of their learning journey, emphasizing the importance of learning practices that foster student autonomy and cultivate a sense of community and collaboration, which are crucial for academic success and sustained motivation. In short, this study supports the interdependence between the academic environment and personal initiative, enhancing the understanding of self-determination among students.

This research provides valuable insights into how various academic and social factors facilitate self-determined effective learning. Additionally, educational frameworks and policies should be designed to support student autonomy while providing broader social support to facilitate students' academic success. The development of educational strategies and interventions that are truly effective in promoting academic success and student well-being must also consider factors such as learning control, learning strategy development, academic ability, and supportive social interactions.

REFERENCES

[1] J. Wong, M. Baars, B. B. de Koning, and F. Paas, "Designing instructional support in online learning environments: Insights from research on supporting self-regulated learning in MOOCs," in *Handbook of Digital Higher Education*, R. Sharpe, S. Bennett, and T. Varga-Atkins, Eds. Edward Elgar Publishing, 2022, pp. 111–122.

[2] K. Duggal, P. Singh, and L. R. Gupta, "Intrinsic and Extrinsic Motivation for Online Teaching in COVID-19: Applications, Issues, and Solution," in *Emerging technologies for battling Covid-19: Applications and innovations*, F. Al-Turjman, A. Devi, and A. Nayyar, Eds. Springer, Cham, 2021, pp. 327–349.
[3] C.-T. Dinh and H.-Y. Phuong, "Examining Student Characteristics, Self-Regulated Learning Strategies, and Their Perceived Effects on Satisfaction and Academic Performance in MOOCs," *Electron. J. e-Learning*, vol. 22, no. 8, pp. 41–59, Jul. 2024.
[4] N. S. Karim and M. Alam, "Struggling with Digital Pandemic: Students' Narratives about Adapting to Online Learning at Home during the COVID-19 Outbreak," *Southeast Asia A Multidiscip. J.*, vol. 21, no. 2, pp. 15–29, Dec. 2021.
[5] J. Du, K. F. Hew, and L. Zhang, "Designing a recommender system to promote self-regulated learning in online contexts: A design-based study," *Educ. Inf. Technol.*, pp. 1–40, Jul. 2024.
[6] S. Alhazbi and M. A. Hasan, "The Role of Self-Regulation in Remote Emergency Learning: Comparing Synchronous and Asynchronous Online Learning," *Sustainability*, vol. 13, no. 19, p. 11070, Oct. 2021.
[7] Q. Zhou, H. Zhang, and F. Li, "The Impact of Online Interactive Teaching on University Students' Deep Learning—The Perspective of Self-Determination," *Educ. Sci.*, vol. 14, no. 6, p. 664, Jun. 2024.
[8] D. Schwam, D. Greenberg, and H. Li, "Individual Differences in Self-regulated Learning of College Students Enrolled in Online College Courses," *Am. J. Distance Educ.*, vol. 35, no. 2, pp. 133–151, Apr. 2021.
[9] T. Ekundayo, Z. Khan, and S. A. Chaudhry, "ChatGPT's Integration in GCC Higher Education: Bibliometric Analysis of Trends," *Educ. Process Int. J.*, vol. 13, no. 3, pp. 69–84, 2024.
[10] G. Y. Yun and S. H. I. N. Jurang, "Institutional Perspectives on Personalized Education: A Topic Modeling Analysis of Korean News Media," *Educ. Technol. Int.*, vol. 25, no. 2, pp. 331–368, 2024.
[11] T. Ambler, I. Solomonides, and A. Smallridge, "Students' experiences of a first-year block model curriculum in higher education," *Curric. J.*, vol. 32, no. 3, pp. 533–558, Sep. 2021.
[12] J. E. L. Spinney and S. E. Kerr, "Students' Perceptions of Choice-based Assessment," *J. Scholarsh. Teach. Learn.*, vol. 23, no. 1, pp. 46–58, Apr. 2023.
[13] K. A. Shogren *et al.*, "The Impact of Teacher Supports for Implementing the Self-Determined Learning Model of Instruction on Student Outcomes in Inclusive General Education Classes," *Teach. Educ. Spec. Educ. J. Teach. Educ. Div. Counc. Except. Child.*, vol. 47, no. 4, pp. 261–282, Nov. 2024.
[14] E. Zigh, R. H. Abdalli, and B. Kouninef, "Impact of E-Learning on INTTIC Students during the COVID-19," *J. Educ. e-Learning Res.*, vol. 9, no. 1, pp. 28–37, 2022.
[15] D. Kurniawan and F. Alghadari, "Latent factors of elementary school students' self-control in online learning," *Eureka J. Educ. Res.*, vol. 2, no. 1, pp. 41–50, Aug. 2023.
[16] J. Eberle and J. Hobrecht, "The lonely struggle with autonomy: A case study of first-year university students' experiences during emergency online teaching," *Comput. Human Behav.*, vol. 121, p. 106804, Aug. 2021.
[17] A. J. Dontre, "The influence of technology on academic distraction: A review," *Hum. Behav. Emerg. Technol.*, vol. 3, no. 3, pp. 379–390, Jul. 2021.
[18] M. J. Chemagosi, "Student Well-Being in Higher Education Institutions: Academic Pressures," in *Student Well-Being in Higher Education Institutions*, P. Aloka, Ed. IGI Global, 2024, pp. 81–106.
[19] F. Wang, R. B. King, and L. M. Zeng, "Supporting students' basic needs is associated with better socio-emotional skills across cultures: A self-determination theory perspective," *Learn. Individ. Differ.*, vol. 116, p. 102535, Dec. 2024.
[20] U. Alturki and A. Aldraiweesh, "The impact of self-determination theory: the moderating functions of social media (SM) use in education and affective learning engagement," *Humanit. Soc. Sci. Commun.*, vol. 11, no. 1, p. 693, May 2024.
[21] C. Hartkamp-Bakker and R. Martens, "True choice and taking ownership of life: a qualitative study into self-determination in Sudbury model schools," *Horiz. Int. J. Learn. Futur.*, vol. 32, no. 2/3, pp. 130–144, Oct. 2024.
[22] H. Shafiee Rad, J. Alipour, A. Jafarpour, and M. Hashemian, "Unlocking the magic of digital adaptivity: Unleashing students' writing skills and self-determination motivation through digital literacy instruction," *System*, vol. 125, p. 103454, Oct. 2024.
[23] J. Li, R. B. King, and V. W. Lee, "Distinct trajectories of EFL motivation: A self-determination theory perspective," *System*, vol. 126, p. 103441, Nov. 2024.
[24] T. Luo and A. Derakhshan, "Examining the role of classroom climate and teacher-student relationships in EFL students' perceived learning outcomes: A self-determination theory perspective," *Learn. Motiv.*, vol. 88, p. 102062, Nov. 2024.
[25] F. Sadr, G. Zargarinejad, F. Fathali Lavasani, and K. Zahedi Tajrishi, "The Mediating Role of Intrinsic Motivation in the Relationship of Emotion Regulation Styles and Self-determination With Goal Pursuit In

Iranian Adolescents," *Iran. J. Psychiatry Clin. Psychol.*, vol. 29, no. 04, pp. 478–493, Jan. 2024.
[26] X. Wang, J. L. Howard, and L. Zhong, "Why do perfectionists procrastinate (or not)? Exploring the interaction between perfectionism dimensions through self-determination theory," *Appl. Psychol.*, vol. 74, no. 1, Feb. 2025.
[27] M. W. Watkins, *A Step-by-Step Guide to Exploratory Factor Analysis with SPSS*. New York, NY: Routledge, 2021.
[28] J. F. Hair, W. C. Black, B. J. Babin, and R. E. Anderson, *Multivariate data analysis*. Prentice Hall, 2013.
[29] H. A. Alamri, S. Watson, and W. Watson, "Learning Technology Models that Support Personalization within Blended Learning Environments in Higher Education," *TechTrends*, vol. 65, no. 1, pp. 62–78, Jan. 2021.
[30] R. D. Mahande, A. Akram, and E. S. Rahman, "A PLS-SEM approach to understand ARCS, McClellands, and SDT for the motivational design of online learning system usage in higher education," *Turkish Online J. Distance Educ.*, vol. 23, no. 1, pp. 97–112, 2022.
[31] T. Szopiński and K. Bachnik, "Student evaluation of online learning during the COVID-19 pandemic," *Technol. Forecast. Soc. Change*, vol. 174, p. 121203, Jan. 2022.
[32] J. Nagy and J. McDonald, "New models for learning flexibility: Negotiated choices for both academics and students," *ASCILITE 2007 - Australas. Soc. Comput. Learn. Tert. Educ.*, pp. 737–746, 2007.
[33] K. M. Bockorny, T. M. Giannavola, S. Mathew, and H. D. Walters, "Effective engagement strategies in HyFlex modality based on intrinsic motivation in students," *Act. Learn. High. Educ.*, vol. 25, no. 3, pp. 455–472, Nov. 2024.
[34] A. J. Koppi, J. R. Lublin, and M. J. Chaloupka, "Effective Teaching and Learning in a High-tech Environment," *Innov. Educ. Train. Int.*, vol. 34, no. 4, pp. 245–251, Nov. 1997.
[35] H. D'Ailly, "Children's autonomy and perceived control in learning: A model of motivation and achievement in Taiwan," *J. Educ. Psychol.*, vol. 95, no. 1, pp. 84–96, 2003.
[36] A. M. Ping and Q. Hong, "Designing self-regulated language learning strategy instructional program in a blended learning environment for pre-service teachers in China," *Eur. J. English Lang. Teach.*, vol. 6, no. 3, pp. 86–101, Feb. 2021.
[37] G. Veletsianos and S. Houlden, "An analysis of flexible learning and flexibility over the last 40 years of Distance Education," *Distance Educ.*, vol. 40, no. 4, pp. 454–468, 2019.
[38] D. F. Khan, S. R. Ghazi, and G. Shehzad, "The Influences of Sports Activities on Developing Purpose of College Students," *Stud. Philos. Sci. Educ.*, vol. 2, no. 3, pp. 105–112, Nov. 2021.
[39] G. Tsaousoglou, K. Mitropoulou, K. Steriotis, N. G. Paterakis, P. Pinson, and E. Varvarigos, "Managing Distributed Flexibility under Uncertainty by Combining Deep Learning with Duality," *IEEE Trans. Sustain. Energy*, vol. 12, no. 4, pp. 2195–2204, 2021.
[40] M. H. A. Al-Abyadh and H. A. H. Abdel Azeem, "Academic Achievement: Influences of University Students' Self-Management and Perceived Self-Efficacy," *J. Intell.*, vol. 10, no. 3, p. 55, Aug. 2022.
[41] S. Vishnu *et al.*, "Digital competence of higher education learners in the context of COVID-19 triggered online learning," *Soc. Sci. Humanit. Open*, vol. 6, no. 1, p. 100320, 2022.
[42] J. Tsang, M. So, A. Chong, B. Lam, and A. Chu, "Higher Education during the Pandemic: The Predictive Factors of Learning Effectiveness in COVID-19 Online Learning," *Educ. Sci.*, vol. 11, no. 8, p. 446, Aug. 2021.
[43] Ó. Gavín-Chocano, I. García-Martínez, E. Pérez-Navío, and A. Luque de la Rosa, "Learner engagement, motivación académica y estrategias de aprendizaje de estudiantes universitarios," *Educ. XX1*, vol. 27, no. 1, pp. 57–79, Jan. 2024.
[44] P. Häkkinen, S. Järvelä, K. Mäkitalo-Siegl, A. Ahonen, P. Näykki, and T. Valtonen, "Preparing teacher-students for twenty-first-century learning practices (PREP 21): a framework for enhancing collaborative problem-solving and strategic learning skills," *Teach. Teach.*, vol. 23, no. 1, pp. 25–41, Jan. 2017.
[45] M. Ioannou and A. Ioannou, "Technology-enhanced Embodied Learning: Designing and Evaluating a New Classroom Experience," *J. Educ. Technol. Soc.*, vol. 23, no. 3, pp. 81–94, 2020.
[46] Y. Wang, L. Wang, L. Yang, and W. Wang, "Influence of perceived social support and academic self-efficacy on teacher-student relationships and learning engagement for enhanced didactical outcomes," *Sci. Rep.*, vol. 14, no. 1, p. 28396, Nov. 2024.
[47] A. B. Ustun, K. Zhang, F. G. Karaoğlan-Yilmaz, and R. Yilmaz, "Learning analytics based feedback and recommendations in flipped classrooms: an experimental study in higher education," *J. Res. Technol. Educ.*, vol. 55, no. 5, pp. 841–857, Sep. 2023.
[48] C. Wang, H. Zhao, and H. Zhang, "Chinese college students have higher anxiety in new semester of online learning during COVID-19: A machine learning approach," *Front. Psychol.*, vol. 11, p. 3465, 2020.
[49] C. Wang, Y. Zhang, J. D. Moss, E. M. Bonem, and C. Levesque-Bristol, "Multilevel Factors Affecting College Students' Perceived Knowledge Transferability: From the Perspective of Self-Determination

Theory," *Res. High. Educ.*, vol. 61, no. 8, pp. 1002–1026, 2020.
[50] A. Mousavi, A. Mohammadi, R. Mojtahedzadeh, M. Shirazi, and H. Rashidi, "E-learning educational atmosphere measure (EEAM): a new instrument for assessing e-students' perception of educational environment," *Res. Learn. Technol.*, vol. 28, pp. 1–12, Jan. 2020.
[51] D. Rokhafrooz, Z. Alborzi, S. S. G. Z. Shustari, and M. Heydari, "Nursing Students' Perception of the Educational Environment in a Public University in Ahvaz, Iran: A Study Based on DREEM Questionnaire," *Nurse Media J. Nurs.*, vol. 12, no. 1, pp. 88–99, Apr. 2022.
[52] M. H. Al Sheikh, "Educational environment measurement, how is it affected by educational strategy in a Saudi medical school? A multivariate analysis," *J. Taibah Univ. Med. Sci.*, vol. 9, no. 2, pp. 115–122, Jun. 2014.
[53] C. C. Simut and B. P. Godor, "Investigating potential differences in the approaches to studying of gifted and normative learners via PISA math tests results/Istraživanje potencijalnih razlika u pristupima učenju nadarenih i prosječnih učenika putem rezultata PISA testova iz matematike," *Croat. J. Educ. - Hrvat. časopis za Odgoj i Obraz.*, vol. 25, no. 1, pp. 101–138, Mar. 2023.
[54] M. A. McDaniel and G. O. Einstein, "Training Learning Strategies to Promote Self-Regulation and Transfer: The Knowledge, Belief, Commitment, and Planning Framework," *Perspect. Psychol. Sci.*, vol. 15, no. 6, pp. 1363–1381, 2020.
[55] S. Parahakaran, "Tackling Challenges for Higher Education: Learner Support Services for Distance Learning for Sustainable Collaborative Learning Communities," in *Technology for Efficient Learner Support Services in Distance Education*, Anjana, Ed. Singapore: Springer Singapore, 2018, pp. 243–258.