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Exploring Students' Learning Motivation Orientation in the Algorithms and Computer Programming Course (A Case Study of Information Technology Education at UMTAS)

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ABSTRACT

The Algorithms and Computer Programming course constitutes a fundamental component of information technology education; however, it is often perceived by students as a challenging subject. This condition highlights learning motivation as a crucial factor in successful learning outcomes. This study aims to explore students' learning motivation orientation in the Algorithms and Computer Programming course. An exploratory quantitative descriptive approach was employed, involving 23 students as respondents. Data were collected using a learning motivation questionnaire and analyzed using descriptive statistics in including frequencies and percentages. The results indicate that 95.7% of students expressed a positive attitude toward the programming course. Students' learning motivation orientation was predominantly intrinsic (65.2%), while extrinsic motivation also played a notable role (39%). Although 61% of students perceived the course as difficult, overall learning motivation remained high. These findings suggest that students' learning motivation orientation is adaptive and resilient. The implications of this study emphasize the importance of instructional strategies that strengthen intrinsic motivation while constructively managing extrinsic motivation.

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1. INTRODUCTION

The rapid development of digital technology has positioned computer programming skills as an essential competency in higher education, particularly in information technology and technology education. The Algorithms and Computer Programming course serves as a

foundational subject that enables students to develop logical, systematic, and structured thinking in solving computational problems (Hartanti & Yahfizham, 2023; Mardianto & Yahfizham, 2024). However, in practice, this course is often perceived as difficult and has been associated with learning anxiety among some students.

The level of conceptual difficulty, algorithmic abstraction, and the need for precision in syntax and programming logic frequently influence students' attitudes and interest in learning [3], [4], [5], [6]. These conditions directly impact students' active participation, persistence, and continuity in learning. Therefore, psychological aspects, particularly learning motivation, play a crucial role in determining the success of learning Algorithms and Computer Programming [7], [8], [9].

Learning motivation not only serves as an initial driving force in the learning process but also sustains students' consistency and resilience when facing learning difficulties [10], [11], [12]. In this context, learning motivation orientation becomes an important aspect to explore further, as students exhibit diverse motivational tendencies. Some students are driven by interest and the desire to master programming skills, while others are more influenced by external factors such as academic grades or career prospects [13].

To date, research on programming education has largely focused on instructional methods and learning outcomes, whereas studies that specifically explore students' learning motivation orientation remain relatively limited [14], [15], [16], [17], [18]. Therefore, this study aims to explore students' learning motivation orientation in the Algorithms and Computer Programming course, as a basis for developing more effective, student-centered instructional strategies.

Learning motivation refers to internal and external drives that influence individuals to engage actively and persistently in learning activities. In educational contexts, motivation plays a vital role in directing learners' attention, effort, and perseverance toward achieving learning goals. Students with high levels of learning motivation tend to demonstrate greater engagement and better adaptability to academic challenges (Achmad Efendi & Dahlia, 2025; Amores-Valencia et al., 2022; Annisania & Nursanti, 2023; Cabras et al., 2023; Daulay, 2021; Plooy et al., 2024).

Learning motivation orientation refers to individuals' tendencies regarding the goals and reasons underlying their learning activities. This orientation is commonly categorized into intrinsic and extrinsic motivation. Intrinsic motivation is characterized by learning driven by interest, curiosity, and satisfaction in mastering content, whereas extrinsic motivation is associated with external factors such as grades, rewards, academic demands, and career opportunities [25], [26], [27], [28], [29].

In higher education contexts, learning motivation orientation influences how students perceive and engage in the learning process. Students with intrinsic motivation orientation tend to focus on conceptual understanding and skill mastery, whereas those with extrinsic orientation emphasize outcomes and formal achievement.

Learning Algorithms and Computer Programming requires logical, analytical, and systematic thinking skills. Students are expected to translate problems into algorithms and implement them using programming languages. Key challenges in this learning process include understanding abstract concepts, handling programming errors, and maintaining

consistent practice. These challenges make learning motivation a crucial determinant of learning success.

2. METHOD

This study employed an exploratory, descriptive approach. This approach was selected to obtain a comprehensive overview of students' learning motivation orientation without intervening in instructional variables.

The research participants were students enrolled in the Algorithms and Computer Programming course at a higher education institution. Data were collected using a learning motivation questionnaire developed based on indicators of intrinsic and extrinsic motivation. The questionnaire was used to measure respondents' levels of agreement with the provided statements. The collected data were analyzed using descriptive analysis to identify trends in students' learning motivation orientation. The results were presented in the form of percentage distributions and narrative interpretations.

The respondents consisted of 23 first-semester students enrolled in the Algorithms and Computer Programming course, comprising 8 males (35%) and 15 females (65%). All respondents belonged to the same cohort and had diverse secondary education backgrounds (science-based high schools, social science-based high schools, vocational schools, and Islamic senior high schools). This diversity provides relevant context for understanding variations in students' learning motivation orientation, particularly in a conceptually and technically demanding course.

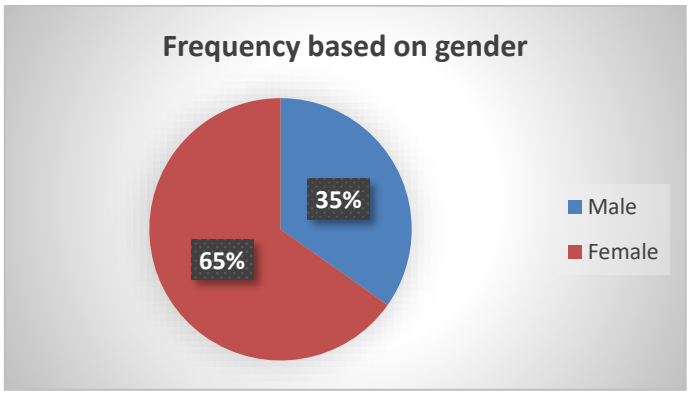

Figure 1. Students' Distribution based on gender

Table 1. Prior School background

Prior Major	Count	%
Science / IPA	4	17%
Social Science/ IPS	13	57%
Office Management	1	4%
Vocational High School/ SMK	5	22%

3. RESULTS AND DISCUSSION

3.1. Results

The analysis results indicate that most students exhibited a positive learning motivation orientation toward the Algorithms and Computer Programming course. Based on

responses to the question “Do you like the programming course?”, the following findings were obtained.

Table 2. Student Interest in Algorithms and Computer Programming Course

Preference	Frequency	%
Like	22	95,7
Dislike	1	4,3
Total	**23**	**100**

Table 2 shows that 22 out of 23 students (95.7%) reported liking the programming course, while one student (4.3%) indicated otherwise. This finding suggests that, overall, students demonstrate a positive affective attitude toward the Algorithms and Computer Programming course, despite being at an early stage of their studies and facing relatively high levels of difficulty.

Based on students’ responses to open-ended questions about their reasons for interest and learning motivation, learning motivation was conceptually categorized into intrinsic and extrinsic motivation.

Table 3. Student Learning Motivation Orientation

Motivation	Frequency	%
Intrinsic	14	61%
Extrinsic	9	39%
Total	**23**	**100**

Table 3 indicates that intrinsic motivation was the dominant orientation among students (61%), while extrinsic motivation also played a significant role (39%) in encouraging students’ engagement in learning Algorithms and Computer Programming. Although intrinsic motivation predominated, the proportion of students who relied on extrinsic motivation suggests that more than one-third of students used external factors as their primary learning drivers. The classification of motivation orientation was based on respondents’ most dominant response tendencies, consistent with an exploratory descriptive approach.

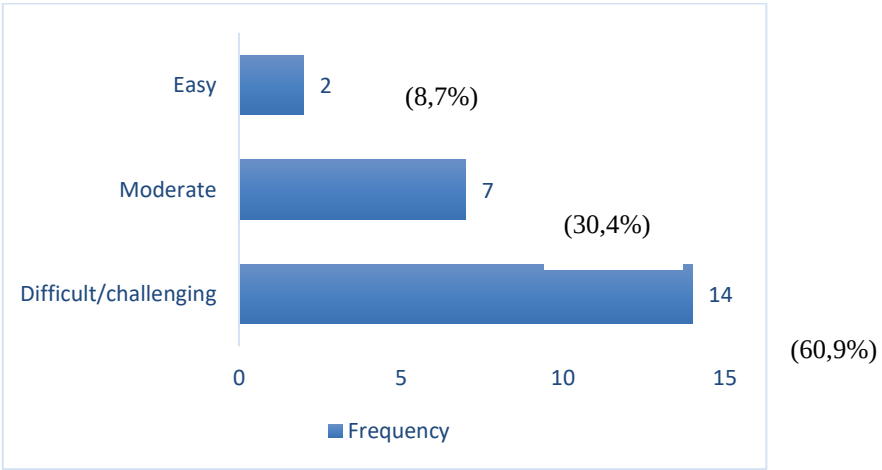

Figure 2. Student Perceptions of the Algorithms and Computer Programming Course

Based on Figure 2, most students (60.9%) perceived the Algorithms and Computer Programming course as difficult or challenging. However, this high perception of difficulty did not directly reduce students' learning motivation, as reflected in their predominantly positive attitudes toward the course.

3.2. Discussion

The findings in Table 2 indicate that 95.7% of students expressed positive affective attitudes toward the Algorithms and Computer Programming course. Such positive affective attitudes serve as an early indicator of sustained learning motivation, particularly in courses that require high levels of cognitive engagement. Previous studies have shown that positive attitudes toward a course are associated with greater learning engagement and academic persistence [30]. In programming education, initial interest functions as a psychological entry point that prepares students to face the complexity of algorithmic concepts (Lestari et al., 2023). Thus, the high percentage of students who liked the course represents pedagogical potential that should be optimized through challenging yet supportive instructional strategies.

Based on Table 3, students' learning motivation orientation was predominantly intrinsic (65.2%), characterized by learning interest, curiosity, and satisfaction in understanding programming materials. This finding is consistent with recent developments in Self-Determination Theory, which emphasize that intrinsic motivation strongly contributes to meaningful learning and long-term student engagement [32].

Empirical studies in higher education contexts indicate that students with high intrinsic motivation tend to adopt deep learning strategies and exhibit stronger learning resilience [33]. In the context of Algorithms and Computer Programming, this orientation is particularly relevant, as conceptual understanding is more critical to success than procedural memorization. The dominance of intrinsic motivation among students in this study indicates that the programming course is perceived not only as an academic requirement but also as a means of developing cognitive and professional competencies.

Although intrinsic motivation was the primary orientation, extrinsic motivation (39%) also played a supportive role. Academic grades, graduation requirements, and career prospects served as external motivators that influenced students' learning engagement. The literature suggests that extrinsic motivation does not necessarily have negative effects when integrated adaptively into the learning process (Rismayanti et al., 2023; Nunes et al., 2024). In programming education, linking learning content to real-world applications and labor market demands can enhance learning meaning without undermining intrinsic motivation [36]. Thus, extrinsic motivation in this study functions as a supporting factor that helps maintain students' learning consistency, particularly when they face technical and conceptual difficulties.

The results presented in Figure 4 indicate that 60.9% of students perceive the Algorithms and Computer Programming course as difficult or challenging. This perception of difficulty is consistent with recent research findings suggesting that programming learning involves a relatively high level of cognitive load, particularly for novice students [37].

However, a high perception of difficulty does not necessarily have a negative impact on learning motivation. Recent studies show that students with a mastery-oriented motivation tend to perceive difficulties as learning challenges that can enhance their competence [38]. This helps explain why students in this study continued to demonstrate high levels of learning motivation despite recognizing the course's complexity. These findings reinforce the view that programming education requires a learning environment that supports exploration, tolerates errors, and provides formative feedback to sustain students' motivational resilience.

Overall, the findings indicate that students' learning motivation orientation is multidimensional and dynamic, involving interactions among intrinsic motivation, extrinsic motivation, and perceptions of learning difficulty. The literature recommends instructional approaches that balance cognitive challenges with pedagogical support in order to sustain students' learning motivation [39].

Therefore, instructors of the Algorithms and Computer Programming course are encouraged to implement project-based learning, contextual problem-solving, and reflective learning practices to strengthen intrinsic motivation while constructively leveraging extrinsic motivation.

4. CONCLUSION

This study confirms that students' motivation in learn Algorithms and Computer Programming is primarily driven by intrinsic factors, with extrinsic factors serving as complementary support in navigating academic challenges. The findings imply that instructional design should prioritize autonomy-supportive, student-centered approaches that enhance curiosity and mastery while aligning external incentives with meaningful learning goals. However, this study is limited by its small sample size and reliance on a single quantitative approach within a single cohort, which may limit generalizability. Future research is recommended to involve larger, more diverse samples and to apply mixed-method designs to capture deeper motivational dynamics. Overall, this study contributes to educational practice by providing empirical insight into how motivational orientation can be strategically leveraged to improve engagement and learning resilience in programming education.

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