

# Learning Style Profiles and Adaptive Teaching Needs in EFL Higher Education: A Felder–Silverman-Based Mixed-Methods Study

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## ABSTRACT

*This study investigates the learning style profiles of EFL undergraduate students and the relationship between these profiles and the necessity of adaptive teaching in higher education. The study builds on the understanding that students respond differently to instructional input, while classroom teaching continues to be delivered through a fairly homogenous approach. This study used the Felder–Silverman Learning Style Model as the analytical framework to identify students' learning style tendencies and to analyse the perceptions of the lecturers and students on the need of adaptive teaching. To gain a broader understanding of the issue, a convergent mix-methods design was employed. Quantitative data were collected from 98 students, using the Index of Learning Styles and an adaptive teaching needs questionnaire. 11 lecturers filled in a similar needs questionnaire. Qualitative data were gathered through structured interviews with selected lecturers and students. The questionnaire data were analyzed using descriptive statistics, whereas the interview data were examined thematically and integrated during the interpretation stage. The findings revealed that active, sensing, visual, and sequential tendencies were the most dominant among the students. However, the presence of reflective, intuitive, verbal, and global learners indicates that instruction should remain flexible and varied rather than being guided by fixed learning-style labels. Both lecturers and students reported strong needs for adaptive teaching, especially in relation to learner profile data, varied instructional strategies, multimodal resources, flexible learning activities, adaptive assessment, remedial support, and enrichment. The study concludes that learning style profiles are most useful as diagnostic information for supporting inclusive, responsive, and adaptable EFL instruction.*

## KEYWORDS

*Adaptive teaching; English as a Foreign Language; Felder–Silverman Learning Style Model; learning style profiles; mixed-methods study.*

## INTRODUCTION

Higher education is now expected to provide learning experiences that are not only inclusive but also flexible to address diverse student characteristics. Today's university classrooms are comprised of students with varying academic backgrounds, prior knowledge levels, learning speeds, motivations, preferences, and information-processing styles. Because of this diversity, educators need to go beyond uniform instruction and

design learning activities that better reflect students' diverse learning characteristics. This issue becomes increasingly relevant as digital transformation and artificial intelligence increasingly shape educational practices. Recent international discussions in education emphasize personalization, human-centered learning, and the need to ensure that technological innovation remains balanced with meaningful, teacher-led pedagogy (UNESCO, 2025). Therefore, higher education faces a dual challenge: integrating digital tools while strengthening pedagogical practices that help educators respond more effectively to students' diverse learning needs.

These issues are especially salient in English as a Foreign Language (EFL) higher education, where learning is more than the transfer of linguistic knowledge. Students will participate in communicative, multimodal, reflective, collaborative and performance-based activities. They will also be required to plan lessons, conduct teaching simulations, evaluate teaching practices and reflect on their teaching experiences in Teaching English as a Foreign Language (TEFL) course. Hence, EFL teaching should use a variety of strategies, learning media, classroom activities, and assessment practices to meet the different ways of students to receive, process, organize, and express information.

Adaptive teaching is a pedagogical solution to learner diversity that enables instructors to adjust strategies, activities, resources, assessments, and feedback based on student needs and classroom conditions. This approach is attracting increasing interest in higher education. Du Plooy et al. found that personalized adaptive learning can enhance academic performance and student engagement, yet it is often linked to technological systems (du Plooy, E., Casteleijn, D., & Franzsen, 2024). Furthermore, Alajlani and Crabb highlighted that adaptive teaching should not be limited to algorithmic personalization as teachers also make instructional decisions in real-time in classroom practice (Alajlani, N., & Crabb, 2025). Similarly, Bach et al. defined the construct of adaptivity as consisting of interrelated aspects such as context, adaptive resources, assessment, delivery, operationalization, and learning outcomes (Bach et al., 2025). Such a view implies that adaptive teaching should be interpreted not only as a digital mechanism, but also as a teacher-driven pedagogical practice.

Student learning style profiles are a valuable source of information that can aid the implementation of adaptive instruction. The Felder-Silverman Learning Style Model (FSLSM) classifies student learning preferences into four bipolar dimensions, active-reflective, sensing-intuitive, visual-verbal and sequential-global (Felder & Silverman, 1988). These dimensions are of great importance to EFL higher education, as language learning requires students to be active participants and reflect individually, understand concrete examples and abstract concepts, process visual and verbal representations, and develop knowledge by sequential and holistic understanding. Felder and Henriques also point out the importance of learning and teaching styles in foreign and second language education, since students may differ in their perception, processing and response to instructional input (Felder & Henriques, 1995). Thus, the FSLSM can serve as a means for instructors to identify the diversity of students' learning tendencies and to use this as a starting point for designing more diverse, balanced, and responsive instruction.

Nevertheless, the use of learning styles in educational practice must be approached with caution and critical awareness. Learning styles should not be interpreted as fixed labels that limit students to a single preferred learning style. Coffield et al. caution that learning style theories are highly variable and therefore need to be applied cautiously in teaching contexts (Coffield, F., Moseley, D., Hall, E., & Ecclestone, 2004). Similarly, Pashler et al. argue that the practice of strictly matching instruction to individual learning styles is not strongly supported by empirical evidence (Pashler, H., McDaniel, M., Rohrer, D., & Bjork,

2008). For this reason, this study does not treat learning style profiles as rigid categories or use them as a basis for separating students into exclusive instructional groups. Rather, these profiles are understood as diagnostic information that can help instructors recognize the distribution of learning preferences in the classroom and design more diverse, inclusive, and responsive learning opportunities. Thus, the focus of this study is not on whether students should be taught solely based on their preferred learning styles, but on how learning style information can inform the need for adaptive instruction in EFL higher education.

Recent research shows that the study of adaptive learning and learning styles has evolved in several directions. Some researchers have examined personalized adaptive learning in higher education (Du Plooy, E., Casteleijn, D., & Franzsen, 2024), while others have focused on artificial intelligence-based learning style detection in adaptive learning systems (Ezzaim, A., Dahbi, A., Aqqal, A., & Haidine, 2025) and machine learning approaches to identify learning styles using the Felder–Silverman framework (Gayathri, G., Begam, M. F., & Aashika, 2023). In English language teaching, adaptive learning has also been discussed in relation to digital learning environments, AI-supported instruction, gamification, learning platforms, and technology-enhanced learning. These studies have contributed to the growing body of knowledge on adaptive learning. However, much of the existing literature still tends to emphasize technological systems, automated detection, digital platforms, and adaptive learning applications rather than lecturer-led adaptive teaching in classroom practice.

Therefore, several research gaps can be identified. First, empirical studies linking the Felder–Silverman learning style profiles in EFL students with the adaptive teaching needs of lecturers and students are still limited. Second, many studies on adaptive learning emphasize system-driven personalization, while lecturer-led adaptive teaching in face-to-face EFL higher education has received less attention. Third, learning style studies are often presented descriptively and are not always connected to instructional needs, such as the need for diverse teaching strategies, learning media, classroom activities, assessments, remedial support, and enrichment. Fourth, only a few studies examine learning style profiles and adaptive teaching needs through mixed-methods designs that integrate quantitative mapping with qualitative insights from lecturers and students. These gaps highlight the need for contextual studies that examine learning style diversity and adaptive teaching needs as an empirical basis for designing responsive EFL instruction.

## **RESEARCH METHODS**

This study employed a convergent mixed methods design because it required both quantitative and qualitative evidence to examine the learning style profiles of EFL students and the perceived adaptive teaching needs of lecturers and students. In this design, quantitative and qualitative data were collected at relatively similar stages in the research process, analyzed separately, and then combined during the interpretation stage to gain a more comprehensive understanding of the research problem (Creswell, J. W., & Creswell, 2018; Gay, L. R., Mills, G. E., & Airasian, 2019). In this study, quantitative data were used to describe the Felder–Silverman learning style profiles of students and to measure the level of adaptive teaching needs. Meanwhile, qualitative data were used to explore participants' experiences, expectations, and perceived challenges related to adaptive teaching in EFL higher education.

This paper presents the analytical stage of a larger project of doctoral dissertation that aims to create an adaptive teaching model based on the model of Felder-Silverman. The wider dissertation process had several steps: design of the model, validation by experts,

implementation of the model in the classroom and evaluation of effectiveness of the model. This article is focused only on the first empirical step. The article particularly aims at identifying learning style profiles of students based on the Felder–Silverman Learning Styles Model and at exploring the perceived adaptive teaching needs of lecturers and students. Therefore, the results of experiments, expert validation, implementation of the model or testing of its effectiveness are not included in this article. This article, on the other hand, provides the empirical foundation to help promote the future development of adaptive EFL teaching.

This research was conducted in the Study Program of English Language Education of a state university in Indonesia. The participants were fourth semester undergraduate students enrolled in the Teaching English as a Foreign Language (TEFL) course in the 2024/2025 academic year. The context of the research was the course that included a variety of learning activities such as theoretical discussions, presentations, teaching simulations, lesson planning, student-to-student feedback and reflection. With these characteristics, the TEFL course is a suitable context in which to study the range of student learning styles and the need for flexible teaching in EFL higher education.

The population of the study was 119 students of fourth semester taking TEFL course in five classes. From this population 98 students completed and returned the questionnaire which gave a response rate of 82.35%. For the quantitative analysis of learning style profiles and adaptive teaching needs, only fully completed questionnaires were used. Questionnaires that were not returned or were incomplete were excluded. This research also involved 11 lecturers of the English Language Education Study Program, in addition to the student respondents, who filled the adaptive teaching needs questionnaire. These lecturers were deliberately chosen because they had relevant teaching experience, were familiar with the EFL learning context and had enough understanding of students' learning characteristics.

The inclusion criteria for student respondents were that they had to be enrolled in a TEFL course, they were part of the accessible population of the study and they completed all the required questionnaires. We excluded incomplete questionnaires from the analysis. The inclusion criteria for lecturer respondents were: active teaching in the English Language Education Study Program; having experience in teaching EFL-related courses; and willingness to provide information about adaptive teaching needs. The sampling strategy was therefore a mixture of using the completed student questionnaire responses and the purposeful selection of lecturer respondents and of qualitative participants. This strategy was deemed suitable as the study was interested in obtaining extensive descriptive data from the students and contextual data from some selected lecturers and students.

The study employed three major instruments. The first is the Index of Learning Styles (ILS), developed by Solomon and Felder, based on the Felder-Silverman Learning Style Model. The ILS is composed of 44 forced-choice items measuring four bipolar dimensions of learning styles: active–reflective, sensing–intuitive, visual–verbal, and sequential–global. There are 11 items for each dimension (Soloman & Felder, 1999). The second instrument is an adaptive teaching needs questionnaire which is given to students and lecturers. The aim of this questionnaire is to determine perceived needs regarding learning style diversity, teaching strategies, instructional media, learning activities, assessment, remedial support, enrichment, and the integration of teaching approaches using a five-point Likert scale. The third tool was a structured interview guide with open-ended questions. Qualitative data were collected through interviews to understand participants' experiences, challenges, expectations, and suggestions regarding adaptive teaching in EFL higher education.

Data collection was undertaken in a number of systematic stages. First, the researchers selected an accessible student population and conducted an ILS questionnaire to determine their learning style profiles. Secondly, an adaptive teaching needs questionnaire was administered to students and lecturers to establish the perceived level of adaptive teaching needs. Third, some selected lecturers and students were interviewed in a structured way to deepen and clarify the quantitative findings. Fourth, academic and teaching materials, such as course-related materials and curriculum information, were reviewed to understand the teaching context. The use of multiple data sources enhanced the credibility of the findings, and the interpretations of adaptive teaching needs were based on numerical patterns and the experiences and contextual evidence of the participants.

Quantitative data were analysed through descriptive statistics. For the Learning Style Index data, student responses were scored by calculating the number of responses associated with each pole of the four Felder–Silverman dimensions. Then the difference between the two poles in each dimension was used to identify students’ learning style tendencies. These preferences were rated for strength on three levels: balanced, moderate and strong preference. The distribution of students in the active–reflective, sensing–intuitive, visual–verbal and sequential–global dimensions was described using frequencies and percentages. The data from the adaptive instructional needs questionnaire were evaluated with mean scores and percentages. The mean scores obtained were interpreted to determine the degree of need for adaptive instruction for each aspect. The descriptive approach was considered appropriate because the aim of the quantitative analysis was to map patterns and perceived needs, rather than to test cause-effect relationships.

The qualitative data from structured interviews were analysed using thematic analysis. The analysis was conducted in several stages and involved repeated reading of participants’ responses, identification of meaningful statements, development of initial codes, grouping of related codes into subthemes, formulation of broader themes, and interpretation of the themes in relation to the research focus (Braun, V., & Clarke, 2006). The analysis focused on the following themes: awareness of learner diversity; the impact of perceived learning style on understanding and engagement; constraints of uniformed instruction; the importance of varied strategies and media; flexible assessment; and expectations for a more responsive EFL instruction. Qualitative results provided explanation and complementing to the quantitative results especially in terms of explaining why some aspects of adaptive instruction were considered very important by students and instructors.

## **RESULTS AND DISCUSSION**

The findings will be presented and discussed according to the two research questions of this study, namely: (1) what is the Felder–Silverman learning style profile of EFL students in higher education? And (2) what are the adaptive teaching needs perceived by lecturers and students in the EFL higher education context? The discussion is structured in four main sections: students’ learning style profiles, the strength of their learning style preferences, lecturers’ need for adaptive teaching, and students’ need for adaptive teaching. Results and discussion are integrated so that results can be discussed directly with respect to relevant theories and previous studies.

### ***Students’ Learning Style Profiles Based on the Felder–Silverman Learning Style Model***

The first research question was about the learning style profiles of the EFL students according to the Felder–Silverman Learning Style Model (FSLSM). The Learning Style Index (LSI) was administered to 98 students from whom data were collected. The instrument was used to identify students’ tendencies in four bipolar dimensions (active–reflective, sensing–intuitive, visual–verbal, and sequential–global). Table 1 presents the distribution of students’ learning style profiles in these dimensions.

**Table 1.** Distribution of Students’ Learning Style Profiles Based on FSLSM

FSLSM Dimension	Learning Style Category	Frequency (n)	Percentage (%)
Active–Reflective	Active	63	64.3
	Reflective	35	35.7
Sensing–Intuitive	Sensing	78	79.6
	Intuitive	20	20.4
Visual–Verbal	Visual	76	77.6
	Verbal	22	22.4
Sequential–Global	Sequential	60	61.2
	Global	38	38.8

As seen in Table 1, students were mostly characterised by active, sensory, visual and sequential learning tendencies. In the active-reflective dimension, 63 students (64.3%) were classified as active learners and 35 students (35.7%) as reflective learners. This trend indicates that most students learn better when they are involved in direct participation, discussions, practice, simulations and collaborative learning activities. Nevertheless, the number of reflective learners also indicates that the EFL instruction should afford learners sufficient opportunities for individual reflection, written responses, analytical tasks and time for thinking before they are required to respond orally.

For the sensing-intuitive dimension, 78 students or 79.6% of the respondents were sensing learners and 20 students or 20.4% were categorised as intuitive learners. This dimension had the strongest tendency of the four dimensions of the FSLSM. Results indicated that many students preferred learning through concrete information, factual explanations, structured examples, practical applications, and clear procedures. These findings emphasise the significance of offering model lesson plans, examples of classroom practice, guided instructional steps and concrete demonstrations in the context of EFL and TEFL learning. But the presence of intuitive learners also suggests that teaching should include conceptual exploration, problem-solving tasks, and opportunities for interpretation and creative thinking.

In the visual-verbal dimension, 76 students (77.6%) were classified as visual learners, and 22 students (22.4%) as verbal learners. The results suggest that visual representations are significant in assisting students to understand the EFL learning materials. Diagrams, presentation slides, infographics, videos, mind maps, charts and other visual learning resources can be useful for students who have a visual learning preference. But the existence of verbal learners suggests that lecturers also need to provide clear verbal explanations, written instructions, reading materials and opportunities for discussion. Therefore, the use of visual media in EFL teaching should not be separated but combined with verbal modes to create a more balanced learning experience.

In sequential-global dimension, 60 students or 61.2% were identified as sequential learners whereas 38 students or 38.8% were categorised as global learners. The results indicate that most students prefer learning materials presented in a structured, gradual, and step-by-step manner. However, the relatively high number of global learners also indicates

that many students need a more general overview of the topic, the interconnections between concepts and an understanding of how specific materials relate to the overall learning context. EFL instructors should therefore integrate systematic learning sequences with holistic explanations and conceptual mapping to address both sequential and global learning tendencies.

To conclude, the findings of this research imply that the EFL students in this study had different learning style profiles. Sensing, visual and sequential learning tendencies appeared to be the dominant patterns while the presence of reflective, intuitive, verbal and global learners remained significant while active. This means that learning style profiles should not be applied to rigidly label students or categorise students into fixed instructional groups. Instead, they should be viewed as a form of diagnostic information that informs instructors about the diversity in their classrooms and enables them to create more diverse, balanced, and responsive instruction. This aligns with the position of Felder and Silverman, who argued that understanding the learning style dimensions can assist educators in discovering differences among learners (Felder, R, M & Silverman, L, 1988). It is also consistent with the work of Felder and Henriques who stressed the importance of learning and teaching styles in foreign and second language education because students differ in their perception and processing of instructional input (Felder & Henriques, 1995).

### **Strength of Students' Learning Style Preferences**

This study also explored the strength of students' preferences within each Felder–Silverman dimension, as well as mapping students' learning style categories. Preference strength was divided into three levels: balanced, moderate and strong. This classification was used to see if students had flexible tendencies across both extremes of a dimension or if they had a stronger preference for one particular learning style. Table 2 shows the distribution of students' preference strength.

**Table 2.** Strength of Students' Learning Style Preferences

FSLSM Dimension	Balanced n (%)	Moderate n (%)	Strong n (%)
Active–Reflective	68 (69.4%)	30 (30.6%)	0 (0.0%)
Sensing–Intuitive	39 (39.8%)	48 (49.0%)	11 (11.2%)
Visual–Verbal	55 (56.1%)	37 (37.8%)	6 (6.1%)
Sequential–Global	71 (72.4%)	26 (26.5%)	1 (1.0%)

Table 2 shows that majority of the students had balanced or moderate preference across all the four dimensions of FSLSM. Regarding the active-reflective dimension, 68 students (69.4%) were classified as balanced and 30 students (30.6%) showed moderate preferences. There were no students identified as having a high preference in this dimension. These findings indicate that while active learning was more prevalent, there was still significant room for students to engage in the active and reflective learning activities.

In the sensing-intuitive dimension, 48 students (49.0%) showed a moderate preference and 11 students (11.2%) showed a strong preference. This finding implies that the sensing tendency is the most dominant profile and also relatively stronger than other learning style dimensions. Thus, EFL teaching should lay great emphasis on concrete examples, structured procedures, factual explanation and practical applications. However, the balance category still had 39 students or 39.8 % of the students. Therefore the teaching should also

include conceptual discussions, exploratory tasks and opportunities for students to engage in more abstract forms of thinking.

In the visual-verbal dimension, 55 students (56.1%) were in the balanced category, 37 students (37.8%) showed moderate preference, and 6 students (6.1%) showed strong preference. The results suggest that visual materials are useful to support student learning but should not replace verbal explanations. A similar trend was observed in the sequential-global dimension, with 71 students (72.4%) categorised as balanced, 26 students (26.5%) having a moderate preference, and only one student (1.0%) having a strong preference. This indicates that most students would benefit from a stepwise approach and a broader conceptual review.

These findings are significant because they lend support to an important interpretation of learning style theory. Student preferences were not strongly fixed on most dimensions so the results should not be used to justify rigidly matching teaching methods to individual learning styles. This is in line with the cautions raised by Coffield et al. and Pashler et al. who argued that learning styles should not be seen as deterministic categories (Coffield, F., Moseley, D., Hall, E., & Ecclestone, 2004; Pashler, H., McDaniel, M., Rohrer, D., & Bjork, 2008). In this study, ILS results were interpreted more as classroom-level diagnostic information that might help instructors design different learning paths, rather than as a basis for assigning students to fixed learning groups.

### **Lecturers' Needs for Adaptive Teaching**

The second research question asked about the perceived adaptive teaching needs of lecturers and students in EFL higher education. The data from the 11 lecturers indicated that adaptive teaching is considered very necessary in the learning contexts of this study. The average scores for the needs of lecturers were between 4.08 and 4.69. This means that all aspects assessed were classified as high or very high. Table 3 summarises the salient features of lecturers' adaptive teaching needs.

**Table 3. Lecturers' Needs for Adaptive Teaching**

No.	Aspect of Need	Mean	Category
1	Mapping students' learning styles in instruction	4.69	Very High
2	Student learning profile data for instructional planning	4.69	Very High
3	An inclusive, flexible, and effective adaptive teaching guide	4.69	Very High
4	Accommodating learning style differences in objectives & strategies	4.62	Very High
5	Understanding students' learning tendencies	4.62	Very High
6	Variation of learning media	4.54	Very High
7	Integration of teaching strategies for diverse learning styles	4.54	Very High
8	Identification of individual differences for instructional decision-making	4.46	Very High
9	Additional support according to students' learning needs	4.46	Very High
10	Adaptive syntax combining active-reflective, visual-verbal, and sensing-intuitive pathways	4.46	Very High
11	Remedial support based on learning styles	4.08	High

The highest average scores were seen in three areas, namely, mapping of student learning styles, the use of student learning profile data for lesson planning and the need for inclusive, flexible and effective adaptive teaching guidelines. Average scores for each of these aspects were 4.69. These results imply that lecturers need more than a basic

understanding of learner diversity. They also need practical data and learning guidelines to help them translate student learning characteristics into concrete classroom decisions.

The high mean scores of instructional media variety (4.54), strategy integration (4.54) and identification of individual differences for instructional decision-making (4.46) also suggest that lecturers expect adaptive teaching to be used in classroom practice. In this sense, adaptive teaching is not only a theoretical idea, but also a practical approach to selecting the appropriate strategies, media, learning activities, assessment methods, remedial support and enrichment. This is consistent with Alajlani and Crabb who stressed that adaptive teaching in higher education means real-time instructional decisions made by educators (Alajlani, N., & Crabb, 2025). This further supports Bach et al. who described adaptation as context, adaptive resources, assessment, delivery, operationalisation, and learning outcomes (Bach et al., 2025). Qualitative findings from interviews with lecturers supported the questionnaire results. Thematic analysis identified five main themes: awareness of differences in learning styles by lecturers, impact of learning styles on participation in class, challenges with traditional teaching, need for adaptive teaching models and expectations for support in implementation. These themes imply that lecturers are cognisant of the heterogeneity of students' learning characteristics and that uniform teaching is not adequate to address this heterogeneity. They also highlighted the need for teaching guidance and learning media to support adaptive teaching. This suggests that adaptive teaching requires lecturer awareness, practical resources, institutional support and well-structured pedagogical guidance.

### ***Students' Needs for Adaptive Teaching***

#### **Adaptive Teaching and Students' Needs**

The student questionnaire also revealed that there was a lot of demand for adaptive teaching. Data from 98 students indicated that they wanted more instruction to meet their learning needs and classroom needs. Table 4 shows some of the main indicators of students' needs for adaptive teaching, such as the knowledge of the learning styles by the instructors, the usage of diverse learning pathways, the flexibility of the learning activities and the support for the different learning modes.

**Table 4. Students' Needs for Adaptive Teaching**

<b>No.</b>	<b>Aspect of Need</b>	<b>Mean</b>	<b>Percentage</b>	<b>Category</b>
1	Lecturers need to understand students' learning styles	4.50	90.00%	Very High
2	Learning styles influence material comprehension	4.40	87.96%	Very High
3	Need for multiple learning pathways, such as video, text, and discussion	4.30	85.92%	Very High
4	Students have different ways of learning and need to be accommodated	4.22	84.49%	Very High
5	Need for instruction aligned with students' learning preferences	4.22	84.49%	Very High
6	Need for varied learning media	4.18	83.67%	High
7	Need for learning activities aligned with students' preferences	4.17	83.47%	High
8	Need for learning resources for adaptive instruction	4.16	83.27%	High
9	Need for flexible assignments based on students' learning characteristics	4.15	83.06%	High
10	Need for alternative learning modes: visual, verbal, active, and reflective	4.12	82.45%	High

As shown in Table 4, students had a strong expectation that instructors should know their learning styles. The highest score was given to the item “Instructors need to understand students’ learning styles” with a mean of 4.50 and a percentage of 90.00%. This suggests that knowledge of learning style differences by instructors is an important aspect of effective teaching support in the eyes of the students. The second highest score was obtained for the item “Learning styles influence understanding of the material” (M = 4.40; 87.96%), indicating that students believe that their learning styles have an effect on how they understand the course material. The third highest score pertained to the need for multiple learning pathways such as videos, texts and discussions (M = 4.30; 85.92%). These findings suggest that students prefer learning experiences with multiple modes of access to learning resources and not merely one mode of delivery.

The student data can also be summarized into four main aspects, as shown in Table 5.

**Table 5.** Summary of Students’ Adaptive Teaching Needs by Main Aspect

Main Aspect	Mean	Percentage	Category
Awareness of the need for learning style adaptation	4.24	84.90%	Very High
Need for adaptive strategies, media, activities, and assignments	4.15	83.06%	High
Need for remedial support, enrichment, and additional assistance	3.63	72.65%	High
Need for integration of adaptive strategies and learning resources	4.10	81.92%	High
<b>Overall Mean</b>	<b>4.03</b>	<b>80.63%</b>	<b>High</b>

Table 5 shows that students' adaptive teaching needs achieved an overall mean score of 4.03, equivalent to 80.63%, which is categorized as high. Among the four main aspects, awareness of the need for learning style adaptation received the highest score (M = 4.24; 84.90%), indicating that students recognize the importance of considering learning differences in classroom instruction. The need for adaptive strategies, media, activities, and assignments was also rated high (M = 4.15; 83.06%), indicating that students desire more diverse, flexible, and responsive learning to their characteristics. Although remedial support, enrichment, and additional assistance received the lowest mean score (M = 3.63; 72.65%), this aspect was still categorized as high. This indicates that students continue to view follow-up support as an important component of adaptive teaching, even though it is not the strongest need identified.

The qualitative data from student interviews offered deeper explanations for these quantitative results. Thematic analysis revealed four main themes: attention to individual differences, adjustment of instruction to student characteristics, compensatory support through remedial and enrichment activities, and integration of teaching approaches and strategies. Students stated that lecturers need to understand how they learn, that students have different learning preferences, and that appropriate learning methods can help them understand materials more effectively. They also reported that discussion, practice, teaching simulation, and visual media such as PowerPoint and videos supported their learning. At the same time, students perceived that remedial and enrichment activities were often still implemented uniformly, indicating the need for more adaptive follow-up mechanisms.

### **Discussion**

The findings indicate a significant relationship between students' learning style profiles and the need for adaptive instruction in EFL higher education. The dominance of active, sensing, visual, and sequential learning styles suggests that many students may benefit

from participatory, concrete, visually supported, and regularly organized learning activities. This is particularly relevant in EFL and TEFL contexts, where students are expected to connect theoretical knowledge with practical teaching activities. For example, students with an active learning style can be supported through discussions, teaching simulations, and collaborative tasks. Those with a sensing style may need concrete examples and clear procedures, while visual learners may benefit from diagrams, videos, and visual slides. Sequential learners, in turn, may require learning materials organized in clear, step-by-step steps.

However, these findings also suggest that EFL instruction should not be developed solely based on dominant learning style tendencies. The presence of reflective, intuitive, verbal, and global learners suggests that instruction needs to remain balanced and inclusive. Reflective learners need opportunities to think, write, and analyze before responding. Intuitive learners need space for conceptual exploration and problem-solving. Verbal learners benefit from explanations, reading materials, and discussions, while global learners require broader conceptual overviews to understand how specific ideas interrelate. Therefore, the primary implication of learning style data is not rigid matching, but rather balanced instruction. This interpretation supports the critical and flexible use of FSLSM. As Coffield et al. and Pashler et al. have argued, learning styles should not be treated as fixed labels or as the sole basis for instructional decisions (Coffield, F., Moseley, D., Hall, E., & Ecclestone, 2004; Pashler, H., McDaniel, M., Rohrer, D., & Bjork, 2008). In this study, learning style profiles are better understood as diagnostic information that can guide instructors in designing diverse learning opportunities.

The findings also reveal that adaptive teaching was perceived as necessary by both lecturers and students. Lecturers needed learning profile data, adaptive teaching guidance, varied media, integrated strategies, and tools for instructional decision-making. Students expected lecturers to understand their learning styles, provide multiple learning pathways, vary learning media, design flexible assignments, and offer additional support. These findings suggest that adaptive teaching is not only a concern of lecturers, but also a need perceived by students. This strengthens the argument that adaptive instruction in EFL higher education should be developed from both teacher and learner perspectives.

The findings are consistent with recent studies on adaptive learning and adaptive teaching. Du Plooy et al. reported that personalized adaptive learning in higher education may support academic performance and engagement (du Plooy, E., Casteleijn, D., & Franzsen, 2024). The present study adds that, in EFL higher education, adaptive teaching needs do not only arise from digital learning systems, but also from classroom-level learner diversity and lecturer decision-making. Alajlani and Crabb emphasize the importance of educator-led adaptive teaching, and the present findings support this view by showing that lecturers require data and practical guidance to adapt strategies, media, activities, and assessment (Alajlani, N., & Crabb, 2025). Moreover, Bach et al. also argue that adaptivity involves sources of adaptation, assessment, delivery, operationalization, and outcomes (Bach et al., 2025). In this study, students' FSLSM profiles function as a source of adaptation, while lecturers' and students' needs indicate the areas in which adaptive teaching should be operationalized.

The contribution of this study lies in its attempt to link learning style diagnosis with the need for adaptive teaching in EFL higher education. Many previous studies on learning styles primarily describe student preferences, while studies on adaptive learning often focus on digital platforms or automated systems. This study seeks to bridge these two areas by demonstrating that learning style profiles can provide an empirical basis for identifying adaptive teaching needs in face-to-face EFL classrooms. The findings suggest that adaptive

teaching should be developed through the integration of various strategies, learning media, classroom activities, assessments, remedial support, and enrichment. Therefore, learning style diagnosis should not stop at classification but should be followed by pedagogical interpretation and lesson planning.

Several factors may have shaped the findings of this study. First, the TEFL course context may have strengthened students' preferences for active, visual, and sequential learning because the course naturally involves discussion, presentation, teaching simulation, lesson planning, and structured pedagogical content. Second, students' high need for varied media and multiple learning pathways may reflect their increasing familiarity with multimodal learning resources in contemporary higher education. Third, lecturers' strong need for learning profile data and adaptive teaching guidance may indicate that although lecturers are aware of student diversity, they still need practical tools to translate that awareness into classroom decisions.

Despite these contributions, this study has several limitations. First, it was conducted in only one English Language Education Study Program, so the findings may not be fully representative of all EFL higher education contexts. Second, the quantitative data were obtained through self-report questionnaires, meaning the results reflect participants' perceptions rather than direct observations of classroom behaviour. Third, this article presents only the analytical phase of a larger doctoral dissertation project and does not examine the implementation or effectiveness of adaptive teaching models. Fourth, the use of learning style profiles remains a controversial issue in educational research. Therefore, the findings should be interpreted as diagnostic and pedagogical information, not as evidence for rigidly matching instruction to learning styles. Future studies are encouraged to involve multiple institutions, including classroom observations, and examine how adaptive teaching based on learning style diagnoses affects student engagement, the learning process, and learning outcomes.

In summary, the results indicate that EFL students in this study had diverse learning style profiles, with dominant tendencies toward active, sensing, visual, and sequential learning. At the same time, lecturers and students expressed strong needs for adaptive teaching that accommodates learning differences through varied strategies, media, activities, assignments, assessment, remedial support, and enrichment. These findings provide an empirical basis for developing a Felder–Silverman-based adaptive teaching model that is flexible, inclusive, and responsive to the needs of EFL higher education.

## **CONCLUSION**

This study aimed to identify the learning style profiles of EFL students using the Felder–Silverman Learning Style Model and to examine the adaptive teaching needs perceived by lecturers and students in higher education. Findings indicate that students have diverse learning style profiles, although active, sensing, visual, and sequential learning styles emerged as the most dominant. This pattern suggests that many students can be supported through participatory learning activities, concrete examples, visual materials, and instructions presented in a clear and systematic sequence. However, the presence of reflective, intuitive, verbal, and global learners also suggests that EFL instruction should not be designed solely around dominant learning styles. Instead, learning style information should be used as diagnostic data to help lecturers develop more balanced, inclusive, and diverse instruction.

The findings also reveal that adaptive teaching was strongly needed by both lecturers and students. Lecturers required student learning profile data, practical guidance for implementing adaptive teaching, diverse learning media, integrated instructional strategies,

and mechanisms that support instructional decision-making. From the students' perspective, adaptive teaching was associated with lecturers' ability to understand their learning styles, provide multiple learning pathways, use varied media, design flexible activities and assignments, and offer appropriate learning support. These results indicate that adaptive teaching in EFL higher education is not only a conceptual issue, but also a practical need experienced by both teachers and learners.

From a theoretical perspective, this study contributes to the discussion on adaptive teaching by positioning the Felder–Silverman learning style profiles as diagnostic information, rather than as fixed labels. The findings support the critical and flexible use of learning style data. Learning styles should not be used to separate students rigidly or to determine only one instructional mode for each learner. Rather, they can help lecturers better understand learner diversity and design teaching practices that are more responsive to classroom needs. Practically, this study offers an empirical foundation for developing adaptive EFL instruction that integrates varied strategies, media, activities, assessment, remedial support, and enrichment.

On the basis of these results, the authors suggest diagnosis of learning styles as a first step in trying to understand the students in EFL higher education, while at the same time providing a flexible and balanced instruction for all learners. Programs of English teacher education might also explore the development of adaptive teaching guidelines to assist instructors in translating student learning profiles into effective instructional choices. Future research is recommended for implementation of adaptive teaching models based on learning style diagnosis in classroom practice and its influence on student engagement, learning processes and learning outcomes. Therefore, adaptive teaching can be translated from a theoretical debate into a reflective pedagogical practice that fosters a more inclusive and meaningful EFL learning.

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