

Personalized Learning Strategies in Higher Education in Saudi Arabia: Identifying Common Approaches and Conditions for Effective Implementation

Abdullah Alenezi ¹

¹ Northern Border University, Arar, Saudi Arabia

Abstract - The aim of the study is to identify the most commonly used personalized learning strategies in higher education in Saudi Arabia and explore the conditions for effective implementation of these strategies. In this study, a mixed-methods approach was employed, which involved conducting a survey of 390 students and conducting interviews with 18 students across three universities in Saudi Arabia. The findings reveal that the most commonly used personalized learning strategies are tailoring instruction to individual needs and preferences, providing one-on-one support and guidance, and allowing for student choice and autonomy. Flexible pacing and learner agency were also identified as important strategies, while adaptive assessment was found to be the least commonly used strategy. The study suggests that adequate resources, training and support, collaboration and communication, flexibility and adaptability, assessment and feedback, and clear goals and expectations are necessary for effective implementation of personalized learning strategies. These findings provide insights into the prerequisites for the successful execution of personalized learning approaches in tertiary education in Saudi Arabia and can serve as a blueprint for formulating impactful policies and practices that improve student-learning results.

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Corresponding author: Abdullah Alenezi,
Northern Border University, Arar, Saudi Arabia
Email: abdullah.AIAsmar@nbu.edu.sa


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Keywords – Personalized learning, higher education, Saudi Arabia, flexible pacing, adaptive assessment, learner agency, student-centered learning.

1. Introduction

Recently, higher education institutions have used individualized learning methodologies to improve student learning. This method personalizes instruction to the specific needs of each individual student needs and interests, improving engagement and performance. Technology and data analytics allow schools to customize material and support, letting students shape their own learning paths. This study examines how Saudi Arabian higher education institutions adopt individualized learning methodologies. This research seeks to advance individualized learning by examining best practices, difficulties, and outcomes in Saudi Arabia. It also guides institutions in maximizing the benefits of individualized learning in Saudi Arabia's unique higher education setting. Understanding the influence of personalized learning in Saudi Arabian higher education can lead to more inclusive, engaging, and effective educational experiences for students. This research illuminates the dynamics of individualized learning in Saudi Arabia, enabling informed decisions and educational improvements.

1.1. Background

Saudi Arabia has made significant advances in higher education in recent years. The Saudi Arabian Ministry of Education reports 29 higher education institutions in 2021, up from 10 in 1975. Student enrollment has increased from 8,000 in 1975 to nearly 1.7 million in 2020. Despite this positive improvement, worries remain about school quality and traditional teaching methods. Research shows that lecture-based methods may not maximize student involvement, motivation, and learning [1], [2]. In response to these issues, personalized

learning solutions that tailor education to student requirements and preferences seem promising.

Personalized learning models emphasize student-centered instruction. Using cutting-edge technology and intelligent data analytics to adapt learning experiences improves student accomplishment [3], [4]. Personalized learning practices are becoming more popular in higher education worldwide, although little is known about their success in Saudi Arabia. This study examines how individualized learning tactics affect student learning outcomes in Saudi Arabian higher education to fill this gap. Vision 2030 emphasizes the importance of education to Saudi Arabia's growth. This ambitious strategy aims to transform the education system by stressing quality and innovation and preparing students for the labor market [5]. To achieve these ambitious objectives, effective teaching and learning practices that guarantee student success must be identified and implemented. By emphasizing student-centered learning, personalized learning solutions support Vision 2030. This study could make a significant and timely contribution to Saudi Arabia's efforts to improve education and prepare students for the future by thoroughly examining personalized learning strategies.

1.2. *Significance of the Study*

This research can guide the creation and implementation of effective personalized learning strategies in Saudi Arabian higher education institutions. The education system of nation has ambitious plans to improve quality and equip pupils with 21st-century capabilities. While individualized learning strategies are a viable way to achieve these goals, research on their usefulness in Saudi Arabia is lacking. By studying the effects of individualized learning strategies on student learning outcomes in Saudi Arabian higher education institutions, this study may reveal when they work best. The information gained can help build individualized learning interventions targeted to Saudi Arabian student requirements and contexts. Additionally, the findings can add to the Western-dominated literature on individualized learning in higher education.

Effective personalized learning practices in Saudi Arabia's higher education could boost economic and social development. In line with Vision 2030, which emphasizes the role of education in creating a knowledge-based economy and preparing youth for the workforce, these strategies can improve student learning outcomes, retention rates, and job market readiness. In addition, this work can contribute to the worldwide discourse on individualized learning and higher education difficulties. Flexible and adaptable learning methods that meet varied student

needs and preferences have been highlighted by the COVID-19 pandemic [6]. With the ability to meet this requirement, personalized learning systems lack higher education research on their efficacy and implementation.

This study can advance evidence-based approaches with broad applicability across educational contexts by examining the impact of individualized learning tactics in Saudi Arabia. This work has the potential to improve personalized learning tactics in higher education worldwide. This study can help create and implement treatments that improve student learning and prepare them for 21st-century workplace problems. Saudi Arabia's Vision 2030 and the global agenda emphasize the need for inclusive, engaging, and successful educational approaches.

1.3. *Research Questions*

1. How are Saudi higher education institutions using individualized learning?
2. How do personalized learning tactics affect Saudi higher education student outcomes?
3. Under what conditions do Saudi Arabian higher education institutions use individualized learning methodologies most effectively?

2. *Literature Review*

The literature study examines several definitions and conceptualizations of individualized learning in higher education. Mastery learning, diversified education, individualized learning plans, adaptive learning systems, and self-regulated learning are covered. Meta-analyses and individual research are used to critically assess various tactics in higher education. It also emphasizes the importance of precise conditions for personalized learning tactics to succeed. These conditions include learning objectives, instructional design and content, technological integration, teacher training and support, instructor flexibility, and student characteristics. This section synthesizes research to explain the extent and importance of individualized learning strategies in higher education. The goal is the identification of common techniques and execution conditions, with a focus on Saudi Arabia's unique situation.

2.1. *Personalized Learning Definition and Concept*

Personalized learning is defined in many ways in the literature. Based on Vygotsky's socio-cultural theory, individualized learning targets student zones of proximal development (ZPD) [7]. In practice, this

means matching instructions difficulty to knowledge and skill of learners to maximize learning results. A second definition of customized learning is a strategy that tailors training and learning to individual learner requirements, interests, and preferences [8]. This approach gives students more control over their education, allowing them to choose the speed, method, and topic that best suits them. Using technology to personalize learning is another aspect of personalized learning [9]. Personalized learning uses digital tools and resources to construct adaptive learning pathways, provide real-time feedback, and recommend content based on the performance and preferences of learners.

Instructional methods, learning experiences, and technology facilitate personalized learning. The key is meeting particular requirements, interests, and preferences of the students. The method maximizes learning by tailoring training to each learner. This holistic vision of tailored learning goes beyond a one-size-fits-all approach since learners are diverse. Technology and tailored instruction provide an inclusive educational atmosphere that values unique traits of each student. Its dynamic and adaptable approach optimizes learning outcomes, making it suitable for current teaching. Teachers and academics studying customized learning contribute to the discussion regarding educational strategies that fulfill students evolving needs.

2.2. Types of Personalized Learning Strategies

The literature discusses personalized learning strategies that tailor training to individual needs and choices of learners. Procedures are listed: Mastery Learning: This method breaks learning into small, sequential components to ensure mastery before proceeding. Allowing students to progress at their own pace, providing tailored feedback and adapting teaching approaches to individual performance and needs achieves personalization [10]. Differentiated instruction adapts to student needs and abilities. Flexible grouping, tempo, and alternative pathways cater to varied learning profiles [11].

Personalized Learning Plans: goals, strengths, limitations, and learning preferences of the students influence their route. These plans personalize instruction, provide feedback and assistance, and empower students to learn [12]. Adaptive learning systems use technology to tailor training by adjusting content, pace, and feedback based on student performance. They track progress, provide real-time support, and adjust lessons based on weaknesses [13]. Teaching students to monitor, control, and direct their learning is self-regulated learning. Personalized self-regulated learning helps

students set goals, track progress, and reflect. It encourages students to own their learning and tackle their strengths and limitations [14].

Recent studies emphasize collaborative and peer-to-peer social personalized learning [15]. This method stresses student collaboration, knowledge sharing, and socialization. Social personalized learning fosters meaningful connections, idea sharing, and peer learning in an inclusive and supportive setting for kids with specialized strategy issues. In conclusion, individualized learning incorporates instructional methods, technology, and collaboration. This diversity can help educators create personalized, engaging learning experiences that help students grow and succeed by understanding and meeting their particular needs.

2.3. Higher Education Personalized Learning Strategies Effectiveness

Higher education is increasingly using personalized learning methodologies, which adjust instruction to the needs of each student. However, educational and scientific groups have debated the efficacy of these practices in higher education. Personalized learning strategies in higher education have been studied extensively, revealing their effects on student results. Sereno's study [16] showed that individualized learning improves academic performance. A meta-analysis by Ogwari *et al.* [17] found that individualized learning improves student success, engagement, and motivation.

Makhambetova *et al.* [18] found that individualized learning improved academic performance and motivation of the students, demonstrating its efficacy in higher education. Kryshko *et al.* [19] found that individualized learning boosts student motivation, engagement, and pleasure. We must accept that not all research has shown that individualized learning practices in higher education are beneficial. According to Apriza *et al.* [20], individualized learning did not improve academic performance of the students. Iqbal *et al.* [21] found that individualized learning improved interest and engagement of the students but not academic performance. These findings demonstrate the complexity and variability of individualized learning processes impacted by context and implementation. Understanding the complexities of individualized learning in higher education requires acknowledging these variances.

This study suggests a comprehensive analysis of factors affecting higher education individualized learning interventions. Future research should establish when and how to implement individualized learning. Personalized learning in higher education appears to depend on many factors. This covers the

personalized learning approach, contextual complications, and student choices. Thus, further research is needed to determine what makes higher education customized learning strategies effective.

Individualized learning strategies have mostly been studied in Western education. This emphasizes exploring diverse cultural and educational backgrounds, including Saudi Arabia. This study examines the effects of personalized learning strategies on Saudi higher education to bridge research gaps and illuminate their efficacy and usefulness in non-Western contexts. This research affects more than Saudi Arabia. It may clarify individualized learning and student results. Additionally, the findings can inform Saudi Arabian and other similar cultural and educational policies and practices. The research seeks to broaden the topic of individualized learning in higher education.

2.4. Effectiveness Conditions for Personalized Learning Strategies

The literature emphasizes many factors in the adoption of customized learning techniques. Aligning individualized learning with course learning objectives is crucial [22]. The tailored learning strategy must complement course learning outcomes and be carefully constructed. The success of the personalized learning approach in helping students accomplish their goals depends on alignment. Students benefit from tailored learning when learning objectives are considered throughout design and execution. Instructional design and content quality matter [23]. Engaging instructional design and content is essential. Technology skills enhance personalized learning beyond learning objectives. Fast feedback from technology helps students assess their progress and adjust their learning approaches. Technology lets students collaborate, communicate, and exchange ideas. Thus, digital tools and platforms make student learning dynamic, interactive, and customized. Technology enhances personalized learning, student engagement, cooperation, and comprehension [24]. Instructors are key to individualized learning. Personalized learning requires pedagogy, instructional techniques, and technology training and support [24]. Teachers must also be adaptable to the requirements of the students [22]. Student factors affect the performance of tailored learning tactics. A tailored learning environment may work for self-motivated pupils [24], but others who need more discipline may struggle. The literature concludes that personalized learning strategies involve a thorough examination of various factors. These include learning objectives, instructional design and content, technological use, teacher

training and support, flexibility, and student characteristics.

3. Methodology

The methodology section describes the research strategy and methods for personalized learning strategies in Saudi higher education. The study uses mixed techniques to combine quantitative survey data and qualitative semi-structured interviews. This comprehensive approach examines higher education individualized learning methodologies, including trends and implementation factors. The survey collects quantitative data on the prevalence, efficacy, and challenges of personalized learning strategies. Meanwhile, interviews seek to understand perspectives of the participants. These strategies are combined to provide a comprehensive understanding of individualized learning in Saudi Arabian higher education. This technique should reveal common practices and implementation conditions.

3.1. Research Design

The study employs mixed-methods study that combines semi-structured interviews and surveys to obtain comprehensive data. This option ensures a thorough review of higher education customized learning methods. Semi-structured interviews go further into these approach performance elements, while surveys collect quantitative data and evaluate their efficacy. Quantitative and qualitative data are used to understand higher education individualized learning strategies and their success. The survey is the major data collection tool for Saudi Arabian higher education's multiple individualized learning methodologies and student success ratings. This method additionally collects student learning results and perceived barriers to individualized learning tactics. Semi-structured interviews are also conducted to better understand what makes personalized learning approaches in higher education successful. In these interviews, students discuss their positive and negative experiences with individualized learning.

This mixed-approaches strategy can triangulate data from numerous sources and verify conclusions using several methodologies, making it suitable for research issues of this study [25].

Semi-structured interviews and surveys help explain personalized learning strategies in higher education by addressing implementation details and context. Surveys provide a complete picture for statistical analysis and generalizations by collecting quantitative data from wide samples. They reveal the types, frequency, perceived efficacy, and impact

of personalized learning strategies on higher education learning objectives. However, semi-structured interviews capture perspectives and experiences of the students and add a qualitative dimension to the understanding of individualized learning strategies in higher education. These two methodologies provide a comprehensive and diversified examination that enhances the conclusions on customized learning of the study in Saudi Arabian higher education.

3.2. Participants

Purposive sampling was used to recruit 390 undergraduates from three Saudi universities for this study. Selection was based on the willingness of colleges to participate and researcher accessibility. They also ensured size, geography, and academic program diversity among the selected universities. The researcher contacted university administrations to explain the goal, design, and ethics of the study during recruiting. Students got an informed consent form explaining the research endeavor and its expectations before participating. The researcher protected participant data by following human subject research ethics. Undergraduate students from several fields were selected for the study based on research objectives. Current undergraduate enrollment at one of the participating universities, voluntary involvement, and no other personalized learning studies in the past year were the selection criteria.

Randomly selecting 130 students from each university yielded 390 participants. This diverse group included academic fields, genders, ages, and cultures. The study included participants from several academic disciplines to provide a broad view of the implementation and impact of personalized learning strategies across fields, assuring the generalizability of the study. The researcher sought a large sample size to assure statistical power and validity. For the interview process, six students from each university were selected, totaling 18. The sample represented a wide range of Saudi undergraduate students, proving the relevance and application of the study.

3.3. Data Collection

The study gained insights using quantitative and qualitative methodologies. For statistics, surveys provided quantifiable data. Qualitative interviews reveal opinions, experiences, and insights of participants. This mixed-methods study integrates quantitative and qualitative data to understand the issue. Synergy enhances exploration, analysis, and interpretation.

3.4. Survey

A well-designed survey was utilized to ask higher education students about individualized learning. The poll covered personal learning preferences, self-regulated learning practices, perceived learning outcomes, tailored learning strategy efficacy, and potential barriers to adoption. Participants were asked about customized learning tactics and associated topics. Studying personalized learning methods and higher education student learning inspired the survey. All survey components measured participant opinions. Personalized learning preferences questions measured how well teaching and learning suited requirements of the students. Self-regulated learning questions examined how much students were encouraged to take charge of their learning, make independent decisions, and create goals. Participant opinions of personalization and learning autonomy were assessed.

A panel of education and evaluation specialists carefully reviewed and verified the survey items to ensure their validity and reliability. A pilot study tested the survey's operation, identified question ambiguities, and made appropriate changes based on pilot input. The survey used proven instruments and measurement scales whenever possible to ensure dependability. Internal consistency was measured by Cronbach's alpha coefficient to assess survey reliability. Most dimensions, including personalized learning preferences, self-regulated learning, learning outcomes, and perceived effectiveness of personalized learning procedures, had high coefficients, indicating excellent internal consistency. Barriers to effective personalized learning strategy adoption had moderate internal consistency. These findings support the validity and credibility of the study by demonstrating consistency and reliability of the survey in measuring the desired constructs. The study used a comprehensive technique to provide detailed insights for impressions of personalized learning tactics into the students in higher education.

Table 1. Cronbach alpha coefficient

Construct	Number of items	Cronbach's alpha coefficient
Personalized learning preferences	10	0.82
Self-regulated learning	8	0.78
Learning outcomes	9	0.83
Perceived effectiveness of personalized learning strategies	7	0.75

Construct	Number of items	Cronbach's alpha coefficient
Barriers to effective implementation of personalized learning strategies	6	0.70

3.5. Semi-Structured Interview

A comprehensive survey and semi-structured interview were used to explore personalized learning strategies in higher education. The survey was carefully designed to assess preferences, self-regulated learning practices, perceived learning outcomes, the efficacy of personalized learning strategies, and potential barriers to implementation of participants. The poll used these constructs to analyze participant views on personalized learning strategies and related determinants. Existing research on personalized learning strategies and higher education student learning results informed the creation of a survey. Multiple items assessed participants perceptions of each survey construct. Questions measured how much teaching and learning were customized to individual student needs to quantify personalized learning preferences. However, self-regulated learning was examined by asking students about their autonomy and self-direction in learning. These constructs sought participant views on essential features of personalized learning in school.

Education and assessment specialists have reviewed and verified survey items to improve validity and reliability. A pilot study tested the survey operation, identified question ambiguities, and made appropriate changes based on pilot input. Wherever possible, established measuring scales and verified instruments were used to examine the constructs of interest, ensuring dependability. Internal consistency Cronbach's alpha coefficient measured construct reliability and internal consistency. Internal consistency was confirmed by high coefficients across numerous dimensions, reinforcing validity and reliability of the study. Personalized learning preferences, self-regulated learning, learning outcomes, perceived effectiveness of personalized learning strategies, and barriers to effective implementation had high Cronbach's alpha coefficients, indicating consistent and reliable measurement. The survey and semi-structured interviews were used to explore participant views on personalized learning tactics. Based on survey results, purposive sampling was used to identify people with strong favorable or negative views towards personalized learning methodologies.

For analysis, the 30-45-minute face-to-face interviews were audio-recorded and transcribed verbatim. The interview questions were designed to explore participant firsthand experiences with personalized learning tactics, including pros and cons and suggestions for improvement. Expert review and a pilot test improved questions for clarity and relevance to improve interview validity. A consistent interview technique was used to promote consistency in questioning among individuals, reducing administration variances and improving reliability. The transcribed interviews were analyzed thematically to find patterns. Coding helped participants identify similarities and variations in their experiences and perceptions of personalized learning tactics. This study better understood participant views on personalized learning tactics by combining interviews and questionnaires. Interviews were more nuanced and extensive than surveys, which gave quantitative data about participant experiences. Both data sources triangulated findings and provided multiple views on the research issues, strengthening validity of the study. This complete technique enhanced analysis, result interpretation, and higher education personalized learning strategy understanding.

4. Results

This section presents the results of the study. The results are divided into two parts: quantitative analysis to examine the impact of personal learning strategies on student learning outcomes through descriptive statistics, while the qualitative analysis explores effectiveness conditions for personalized learning strategies.

Table 2. Themes and subthemes

Theme	Subthemes
Individualized instruction	1.1 Tailoring instruction to individual needs and preferences
	1.2 Providing one-on-one support and guidance
	1.3 Allowing for student choice and autonomy
Flexible pacing	2.1 Allowing for self-paced learning
	2.2 Providing opportunities for acceleration or remediation
Adaptive assessment	3.1 Providing immediate and targeted feedback
	3.2 Allowing for multiple

Theme	Subthemes
attempts or alternative forms of assessment	4.1 Encouraging self-reflection and goal setting
Learner agency	4.2 Fostering a growth mindset and self-efficacy
	4.3 Providing opportunities for student voice and choice

Table 2 provides an overview of the different aspects of personalized learning, empowering students to own their learning which is stressed in these subthemes. They stress the necessity of encouraging kids to evaluate their development and set goals to boost self-confidence. They also emphasize giving students a voice and choice to manage their learning. Blackboard can help adopt personalized learning tactics in numerous ways. Blackboard's adaptive release tool lets teachers manage when and how content is distributed to students based on performance or progress. Self-paced, personalized learning tools are available from Blackboard. The course may incorporate adaptive learning modules or personalized pathways so students can work at their own pace. These tools let students learn at their own pace and level. Blackboard also offers adaptive tests and personalized feedback features to let instructors give students personalized feedback. Table 3 shows how often themes and subthemes appeared in participant responses. Under the theme of individualized instruction, 14 participants mentioned the subtheme "tailoring instruction to individual needs and preferences" the most. This emphasizes the necessity for customized instruction to fit student needs and preferences. The learner agency theme subtheme, "encouraging self-reflection and goal setting," was also noted by 12 participants. This suggests that students are interested in personalized learning practices that encourage self-reflection and goal-setting, making them responsible for their learning. The adaptive assessment theme subtheme, "allowing for multiple attempts or alternative forms of assessment," was noted by six individuals less often. While relevant, this shows that alternate assessment methods may be less important than other themes. A supportive learning environment that fosters student self-confidence and success is important. Eight individuals mentioned "providing opportunities for student voice and choice," implying that students embrace personalized learning that gives them a say in their education. They stressed the necessity of expressing preferences, interests, and learning styles and having

options for learning content and activities. This subtheme emphasizes student agency and empowerment in learning.

Table 3. Frequency of themes and subthemes

Theme	Subtheme	Frequency
Individualized Instruction	Tailoring instruction to individual needs and preferences	14
Learner Agency	Encouraging self-reflection and goal-setting	12
Adaptive Assessment	Allowing for multiple attempts or alternative forms of assessment	6
Flexible Pacing	Allowing for self-paced learning	10
	Providing opportunities for acceleration or remediation	8

Next, Table 4 shows a matrix assessing personalized learning strategies in different contexts, emphasizing themes and subthemes. This matrix explains the complex links between personalized learning strategies and their optimal settings. Under the theme of individualized instruction, the subtheme "tailoring instruction to individual needs and preferences" is rated highly, suggesting its efficacy. The same subtheme is scored as low under flexible pacing, implying a weaker impact in this condition. Under flexible pacing, the subtheme "allowing for self-paced learning" is also high, as expected. In learner agency, it is low, suggesting a mismatch. The matrix shows how participants rank personalized learning tactics across conditions, providing significant data for educators and institutions looking to implement or improve them. In conclusion, the study results section provides a diverse mix of quantitative and qualitative evaluations on the impact and efficacy of personalized learning strategies in Saudi higher education. The quantitative analysis positive association between personalized learning components and student results matches the qualitative analysis extensive study of themes and subthemes, offering a complete grasp of the subject. This detailed understanding can help educational practitioners, policymakers, and academics adjust personalized learning tactics to match the diverse requirements and preferences of higher education students in Saudi Arabia.

Table 4. Matrix assessing personalized learning strategies

Theme/Subtheme	Individualized instruction	Flexible pacing	Adaptive assessment	Learner agency
1.1 Tailoring instruction to individual needs and preferences	High	Low	Low	High
1.2 Providing one-on-one support and guidance	High	Low	Low	Medium
1.3 Allowing for student choice and autonomy	High	Medium	Low	High
2.1 Allowing for self-paced learning	Low	High	Low	Medium
2.2 Providing opportunities for acceleration or remediation	Low	High	Low	Low
3.1 Providing immediate and targeted feedback	Low	Low	High	Low
3.2 Allowing for multiple attempts or alternative forms of assessment	Low	Low	High	Low
4.1 Encouraging self-reflection and goal setting	Medium	Low	Low	High
4.2 Fostering a growth mindset and self-efficacy	Medium	Low	Low	High
4.3 Providing opportunities for student voice and choice	Medium	Low	Low	High

Table 5. Descriptive statistics for personalized learning strategies

Construct	Mean	Standard Deviation
Personalized learning preferences	3.85	0.78
Self-regulated learning	3.71	0.89
Learning outcomes	3.92	0.76
Perceived effectiveness of personalized learning strategies	3.63	0.88
Barriers to effective implementation of personalized learning strategies	2.98	0.76

Table 6. Quantitative analysis results

Construct	Learning Outcomes
Personalized learning preferences	0.537
Self-regulated learning	0.481
Perceived effectiveness of personalized learning strategies	0.604
Barriers to effective implementation of personalized learning strategies	0.352

The qualitative research found that empowering students to take ownership of their learning was a prominent theme. This subject includes self-reflection, goal-setting, growth mindset, self-efficacy, and student voice and choice. These subthemes emphasize the necessity of creating an atmosphere where students actively participate in their education, take responsibility for their advancement, and tailor their learning experiences to their requirements. The study examined how these personalized learning tactics relate to Blackboard, a popular learning management system, in addition to these thematic aspects. Technology like Blackboard helps higher education implement and improve personalized learning practices. Blackboard can help execute these methods in several ways, delivering a smooth and successful learning experience for students. Blackboard's adaptive release feature can help individualize lessons. Adaptive release lets educators customize information to student performance or progress, ensuring each student receives resources that meet their needs. This feature supports the subtheme of "tailoring instruction to individual needs and preferences," as it lets teachers customize student learning.

Table 7. Qualitative analysis - thematic pillars

Thematic Pillar	Subthemes
Individualized Instruction	Adapting instructions to individual needs and interests, one-on-one support, student choice, and autonomy
Flexible Pacing	Self-paced learning, Acceleration/remediation
Adaptive Assessment	Immediate and tailored feedback, multiple attempts, or alternative assessments
Learner Agency	Self-reflection, goal planning, growth mindset, self-efficacy, student voice, and choice
Thematic Pillar	Subthemes
Individualized Instruction	Adapting instruction to individual needs and interests, one-on-one support, student choice, and autonomy
Flexible Pacing	Self-paced learning, acceleration/remediation
Adaptive Assessment	Immediate and tailored feedback, multiple attempts, or alternative assessments
Learner Agency	Self-reflection, goal planning, growth mindset, self-efficacy, student voice, and choice

Self-paced learning solutions like adaptive learning modules and personalized pathways from Blackboard support variable pacing. This feature lets students work at their own pace to learn difficult topics or advance swiftly in their strengths. Offering pacing flexibility helps Blackboard enable "allowing for self-paced learning" and "providing opportunities for acceleration or remediation." Blackboard can help with adaptive evaluation by delivering adaptive quizzes and personalized feedback. These capabilities allow teachers to give students specific feedback and support, improving evaluation. Blackboard's adaptive assessment tools help students receive timely and appropriate feedback, supporting the subtheme of "providing immediate and targeted feedback." Table 5 in the study shows the frequency of themes and subthemes in the data. Participant views on personalized learning tactics in Saudi higher education are shown in the table. In particular, 14 individuals cited "tailoring instruction to individual needs and preferences" under the theme of individualized instruction, demonstrating a strong student demand for personalized instruction. Accordingly, students value personalized instruction. Under the learner agency theme, 12 participants stated "encouraging self-reflection and goal setting" frequently. This highlights the importance of personalized learning practices that encourage self-reflection and goal-

setting, giving students a sense of responsibility and agency in their learning. Ten individuals emphasized the subtheme "allowing for self-paced learning," which emphasizes pacing flexibility. These students want personalized learning with unique pacing so they may work at their own pace and explore difficult topics. Though less often than customized teaching, the subtheme of "providing one-on-one support and guidance" under individualized instruction nevertheless emphasizes the need for personalized help and guidance.

Nine participants cited "providing immediate and targeted feedback" in an adaptive assessment, showing a preference for fast and relevant input. However, six people stated "allowing for multiple attempts or alternative forms of assessment" less often, suggesting that while personalized assessment is appreciated, flexibility in assessment methods may be less important. Nine participants indicated "fostering a growth mindset and self-efficacy" under learner agency, showing a good response to personalized learning approaches that promote growth and resilience. Eight participants also highlighted "providing opportunities for student voice and choice." This emphasizes the necessity of expressing preferences, interests, and learning styles while encouraging personalized learning. Table 5 shows that Saudi Arabian higher education students have various views on personalized learning methodologies. These insights help educators and organizations tailor personalized learning to student needs and expectations. In Table 6, a matrix evaluates personalized learning strategies in different contexts, showing how participants score them across themes and subthemes. This matrix shows how multiple factors interact while helping build and implement personalized learning solutions. Under the theme of individualized instruction, the subtheme "tailoring instruction to individual needs and preferences" is rated highly, suggesting its efficacy. This demonstrates a strong link between tailored and individualized education, supporting participant emphasis on personalized instruction that meets their requirements and preferences.

In contrast, flexible Pacing has the same subtheme identified as low, suggesting that adapting education to individual requirements may be less important. For educators and institutions to apply personalized learning strategies, they must understand the relative value of subthemes across themes. The subtheme "allowing for self-paced learning" under flexible pacing is also high, reflecting participants' need for personalized learning that supports individual pacing. In learner agency, the same subtheme is low, indicating a perceived misalignment. This nuanced view emphasizes the importance of context

and interaction in personalized learning tactics. In conclusion, matrix presented in Table 6 provides a detailed insight into how participants evaluate personalized learning tactics across conditions. This information helps educators, institutions, and policymakers optimize personalized learning in Saudi Arabian higher education. Understanding subtheme relative value in different contexts helps stakeholders make educated decisions to improve personalized learning tactics. The examination of personalized learning methodologies in Saudi Arabian higher education provides useful insights into student preferences. Both quantitative and qualitative analyses revealed the importance of individualized instruction, flexible pacing, adaptive assessment, and learner agency through self-reflection, goal setting, and student voice and choice. The report stresses equipping students to take control of their learning, encouraging positivity, and giving students voice and choice. These findings enhance scholarly understanding of personalized learning in Saudi Arabia and have practical consequences for educators and institutions. The study is enhanced by using Blackboard tools to demonstrate how technology may promote personalized learning practices. Blackboard's adaptive release, self-paced learning tools, and adaptive evaluation support the subthemes, showing how technology may improve personalized learning. The study provides a solid foundation for higher education personalized learning research and development. As technology continues to shape education, exploring and refining personalized learning approaches will promote student-centered education in Saudi Arabia and abroad.

The study examines quantitative and qualitative aspects of personalized learning strategies in Saudi Arabian higher education. These findings highlight the complexity of individualized learning and its effects on student outcomes. Two sections of the study illuminate different aspects of individualized learning.

How quantitative analysis affects student learning: A thorough quantitative investigation of individualized learning strategies' effects on student learning outcomes underpins the study. The method uses participant survey data and descriptive and inferential statistics. SPSS shines, enabling detailed analysis. Descriptive statistics use means, standard deviations, and frequencies to explain data. Table 2 shows participant views on individualized learning tactics and student learning results.

Table 5 provides descriptive data for personalized learning strategy constructs to help our understanding of participant perceptions. Mean ratings above 3 indicate that participants liked the

constructs. Learning outcomes led with the highest mean score of 3.92, indicating participant conviction that individualized learning tactics improve education. Inferential statistics, shown in Table 3, reveal the links between individualized learning strategies and student learning results. The perceived effectiveness of individualized learning strategies has a moderate positive correlation (0.604) with student learning results. The quantitative research strongly supports the positive effects of individualized learning strategies on higher education student learning outcomes. Statistics show that participants think individualized learning tactics improve education.

Qualitative analysis: finding effectiveness conditions: qualitative analysis adds a rich tapestry of themes and subthemes to personalized learning tactics. Table 4 shows how these themes support different individualized learning methodologies. The first thematic pillar, individualized instruction, emphasizes adapting instruction to individual needs and interests. This theme extends to one-on-one support and student choice and autonomy. These subthemes emphasize the need for tailored training to each student learning profile. Flexible pacing emphasizes self-paced learning and acceleration/remediation. This theme recognizes the different learning speeds and preferences of the students and recommends tailoring learning materials. With its immediate and tailored feedback and opportunities for many attempts or alternative assessments, adaptive assessment shines. This theme emphasizes the importance of personalized feedback and the freedom to demonstrate comprehension through various assessment methods.

The final thematic frontier, learner agency, promotes self-reflection, goal planning, growth mindset, self-efficacy, and student voice and choice. These subthemes emphasize the necessity of empowering students to actively participate in their education, creating control and autonomy. Table 5 highlights the importance of these subthemes using frequency. The most commonly expressed subtheme, "tailoring instruction to individual needs and preferences", emphasizes the value of personalized instruction for the students.

Combining Blackboard and personalized learning, Blackboard integration connects customized learning theory to practice. This intersection allows educators to customize training, promote self-paced learning, and use adaptive evaluation. Releasing content based on performance or progress: Blackboard's adaptive release function is crucial for tailoring instruction to individual needs. This technology effortlessly fits the subtheme of personalized education. Self-paced learning tools:

Blackboard's adaptive learning modules and customizable pathways are powerful. These technologies allow students to learn at their own speed, promoting individualized learning. Blackboard supports adaptive quizzes and individualized feedback with adaptive assessment tools. These tools allow teachers to provide focused feedback, meeting the personalized evaluation needs of the students.

Views of participants: frequency matrix insights in Table 5 show the prevalence of subthemes across the four main themes through participant perceptions and a frequency matrix. It helps instructors and institutions discover unique learning preferences of the students. The frequency matrix visualizes efficacy by showing how importance of each subtheme changes with conditions. Individualized education emphasizes "tailoring instruction to individual needs and preferences" as the key to effective learning. As a lighthouse for variable pacing, "allowing for self-paced learning" aligns with learning speed flexibility. A nuanced frequency matrix helps educators identify optimal settings of each subtheme. In adaptive assessment, "providing immediate and targeted feedback" emphasizes the needs to fast and particular input for the students. This sophisticated understanding helps educators improve assessment.

Supporting learning: student voice and choice: The learner agency theme "providing opportunities for student voice and choice" subtheme empowers students. It shows student strong desire to influence their education by expressing preferences, interests, and learning styles. This topic stresses the need for a helpful learning environment beyond education. Students gain confidence, self-belief, and control over their learning through it. The frequency matrix in Table 6 shows "providing opportunities for student voice and choice," ranking medium to high under the learner agency theme. This alignment reinforces the importance of student agency in tailored learning effectiveness.

Wholesome effects on teachers and institutions: in conclusion, the study provides a holistic view of individualized learning in Saudi higher education beyond quantitative and qualitative assessments. Creating a supportive learning atmosphere that fosters self-confidence and self-belief is the main emphasis. Students want personalized learning tactics that cross boundaries, as the subthemes show. This educational tapestry includes learner autonomy, self-reflection, goal setting, growth mindset, self-efficacy, and student voice and choice. The frequency matrix helps educators and organizations customize learning tactics to diverse student preferences. It encourages a dynamic approach because each subtheme is important under

different settings. As education evolves, ramifications of the study go beyond Saudi Arabia. Technology, like Blackboard tools, enhances personalized learning. This synergy between teaching and technology creates environments that fit different needs of students and empower them to participate in their education. The report guides educators and institutions through changing terrain of personalized learning. It provides unique insights into Saudi Arabian education and has global significance for individualized learning strategy formulation and execution.

In the ever-changing higher education landscape, personalized learning that emphasizes student agency and holistic development is essential. With its thorough examination, the study guides educators and institutions in creating a helpful and empowered learning environment. Educators lead the transformation of individualized learning due to technical and pedagogical advances. According to the report, they are navigators with the knowledge to plan a course that meets the needs of the students. The study deepens our understanding of individualized learning and encourages educators to take a dynamic, student-centered approach. Blackboard tools demonstrate how pedagogy and technology can transform education. The future of education is shaped by collective voices and choices of students as they evolve toward individualized learning.

The complete study on personalized learning strategies in higher education in Saudi Arabia reveals complex relationships between subthemes and specific aspects of personalized learning. This sophisticated study helps adjust instructional techniques to Saudi Arabian student needs and interests. The intimate relationship between flexible pacing and self-paced learning and adaptive assessment with immediate and focused feedback provides a blueprint for thoughtfully designing and implementing tailored learning strategies.

Understanding personalized learning: navigating associations; the study findings underlie efficient individualized learning. Flexible pacing and self-paced learning match participants demand for a customized educational experience that meets their learning speeds. This shows that students benefit from pacing flexibility, allowing them to go deeper into difficult topics or accelerate in areas they excel in. The link between adaptive evaluation and rapid, targeted feedback is also crucial. It shows how evaluation strategies and feedback loops work together. Participant emphasis on individualized assessment that gives timely and relevant feedback coincides with adaptive assessment, reflecting a nuanced knowledge of how assessment procedures might improve learning.

4.1. *Personalized Learning Relies on Learner Agency*

Under the learner agency theme, "encouraging self-reflection and goal setting," "fostering a growth mindset and self-efficacy," and "providing opportunities for student voice and choice" take center stage. These subthemes are frequent, highlighting the importance of learner agency in individualized learning. Encourage self-reflection and goal setting: participants desire for personalized learning approaches that empower them to actively engage in their learning journey through self-reflection and goal setting shows a deep aspiration. This subtheme calls for proactive learning methods that go beyond standard methods. By encouraging students to reflect on their accomplishments and develop personal learning goals, educators may foster deeper, more introspective learning. The subthemes "fostering a growth mindset and self-efficacy" emphasize participant awareness of the mindset transforming ability. Participants wanted tailored learning tactics that inspire confidence in their ability to learn and improve beyond academic accomplishment. This recognizes impact of education on knowledge, attitudes, and self-image.

Student choice and voice: the strong demand for more voice and choice in schooling shows a desire for autonomy and ownership. This subtheme emphasizes the need to abandon one-size-fits-all schooling. Participants want to shape their learning experiences and appreciate their unique opinions and preferences. In personalized learning, learner agency matters: these findings demonstrate the importance of learner agency in individualized learning. Learner agency includes customized instruction and holistic student development as engaged learners. Self-reflection, growth mindset, voice, and choice are crucial to effective tailored learning.

Learning agency: adding learner agency aspects is a deliberate step to boost student engagement and motivation. Student investment in education increases when they create personal goals, actively participate in learning, and make decisions. This increased involvement leads to meaningful and effective learning. Empowering students in learning: the call for learner agency reflects the social movement toward treating students as active learners rather than passive recipients. It fits the modern view of education as a collaborative process where empowered students co-create knowledge and design their learning experiences.

Impacts on education: the study findings go beyond data analysis and provide educators and institutions with meaningful insights for individualized learning. Understanding intricate relationships between subthemes and themes, helps

build educational tactics that meet the needs and preferences of the students. Educational procedures must change to emphasize learner agency. Teaching self-reflection, growth mindset, and student voice and choice requires a change from old systems. Teachers can now facilitate personalized learning journeys by adjusting to changing expectations of the students.

4.2. *Future Plans: Building on Insights*

The study findings establish the groundwork for Saudi Arabian higher education individualized learning research. The relationships revealed new ways to study flexible pace, adaptive evaluation, and learner agency. Future research can examine how these connections change over time and across educational contexts. The use of Blackboard tools shows how technology is changing individualized learning. Future research can examine how specific technological tools improve flexible pace, adaptive evaluation, and learner agency. This dynamic pedagogy-technology nexus offers a rich tapestry for investigation and improvement.

4.3. *Final Thoughts*

Personalized learning discourse is elevated beyond theoretical frameworks by the study. It promotes individualized learning as a dynamic, student-centered strategy that goes beyond education to develop students holistically. The associations of the study help instructors develop individualized learning experiences intentionally. As Saudi Arabian higher education evolves toward individualized learning, educators face a revolutionary path. The study findings urge them to navigate educational experiences that match the goals of the students. The combination of pedagogy and technology shapes the future of education, where students are active participants, architects of their own fates, and contributors to the ever-changing environment of knowledge.

5. Discussion

The Saudi Arabian study on personalized learning tactics in higher education illuminates the methods used and their efficacy. The study emphasizes customized instruction, which involves adapting teaching to individual needs and preferences (1.1), offering one-on-one support and guidance (1.2), and encouraging student choice and autonomy (1.3). These tactics, repeatedly shown to be successful for individualized learning [28], [29], demonstrate the Saudi Arabian higher education system's persistent use of recognized practices. Unique instruction,

variable pace (2.1 and 2.2), and learner agency (4.1, 4.2, and 4.3) are essential to personalized learning, according to the study. These were essential strategies, but tailored instruction was used more. This supports research on flexible pace and learner agency in individualized learning [26], [27]. These solutions may be less common because they require more complex coordination.

Adaptive assessment procedures (3.1 and 3.2) were the least popular personalized learning strategies in this study, unexpectedly considering their importance in earlier studies [28], [29]. This discrepancy suggests that adaptive evaluations may still be in their infancy in Saudi higher education, suggesting a future acceptance. In conclusion, Saudi Arabian higher education emphasizes individualized instruction and learner autonomy in a diverse landscape of personalized learning methodologies. The study shows that adaptive assessment procedures are underutilized, suggesting that this is an area for growth and integration.

Effective implementation conditions: the study goes beyond identifying popular personalized learning systems to reveal their optimal implementation settings. The findings suggest numerous ways to integrate personalized learning strategies seamlessly:

Sufficient resources: technology, instructional materials, and staff are essential for implementing individualized learning methodologies. To foster personalized learning, these resources must be adequately funded. Training and support: teachers and students need continuing training and assistance to use personalized learning initiatives. To prepare educators for implementation, professional development and technical assistance should be provided. Collaboration and communication: teachers, students, and other stakeholders must collaborate and communicate for effective implementation. Creating knowledge exchange and support platforms helps share best practices and improve implementation. Flexibility and adaptability: personalized learning solutions should accommodate the different requirements and preferences of the students. Individualized education requires teachers to adapt their approaches and materials to student needs.

Assessment and feedback: personalized learning tactics require ongoing assessment and feedback. A variety of evaluation methods and rapid feedback allow students to track their progress and improve, creating a dynamic learning experience. Goals and expectations: personalized learning solutions should have defined goals and expectations to guide execution. Effective personalized learning requires teachers and students to agree on learning objectives and success criteria. Educational institutions and

educators can improve student learning outcomes by embracing these implementation criteria for individualized learning methodologies.

Consistency with previous research: the data supports past research that shows tailored learning tactics improve higher education student learning [8], [30]. The credibility and relevance of the highlighted solutions in Saudi Arabian higher education are strengthened by their alignment with the broader trend toward student-centered and individualized education [31].

Context and future research: the study conclusions are limited to Saudi Arabian higher education and may not apply elsewhere. The results are specific to Saudi Arabia's cultural, educational, and institutional environments. Further research is needed to examine the implementation and impact of personalized learning strategies in different areas and educational levels to better understand their subtleties and efficacy. As individualized learning evolves, educators and researchers should address the dynamic interaction of cultural, technological, and pedagogical elements. This ongoing investigation will improve individualized learning tactics to meet students and the educational landscape's changing needs. The study is a foundational resource for practitioners and researchers to navigate the complexities of personalized learning strategies and contribute to transformative education in Saudi Arabia and beyond.

6. Conclusion

The study analyzed Saudi higher education's customized learning methods to meet three research objectives. Identification of personalized learning strategies was the key objective. The second study explored how these methods affected student learning. Finally, the study analyzed what makes tailored learning methods perform best in Saudi higher education. Individualized learning was moderately used in the study. Higher education mostly uses individualized instruction and flexible pacing. This dominance fits the effective personalized learning discussion. These data reveal different strategies and shared practices of institutions. Importantly, the study indicated that customized learning practices boost student learning. Self-regulated learning, personalization, and efficacy improved. Individualized learning can transform Saudi higher education learning experiences of students, as shown by these data. Beyond identifying common approaches and their effects, the study examined complex variables that permit personalized learning strategies. Technology integration and teacher training made these methods

successful. The study provides a peek at current practices and actionable information for institutions and governments to maximize individualized learning.

This study provides a complete view of Saudi Arabia, adding to higher education research on tailored learning methodologies. The study illustrates personalized learning strategies outside theoretical frameworks. The findings impact higher education policy and practice outside academics. Saudi Arabian pedagogy has changed to embrace individualized learning, especially targeted instruction and flexible speed. An integrated strategy using these methodologies, technology infrastructure, and training is recommended by the report. Saudi Arabian universities may adopt personalized learning when the study proves its benefits. Technological integration and pedagogy are interdependent, so increasing technology and training investments suit the evolving education scene.

Additionally, the report recommends further research. The long-term consequences of personalized learning strategies need more research. The invitation to interview students, teachers, and administrators shows a commitment to obtaining a whole narrative beyond quantitative figures. Finally, the Saudi Arabian higher education study on personalized learning methods exposes transformational pedagogy. The study examines popular strategies, their impacts, and their optimal conditions to improve academic discourse and inform institutions navigating the changing education landscape. The focus of the study is on individualized learning which motivates a reevaluation of educational approaches and a desire to improve and tailor learning environments for students in Saudi Arabian higher education.

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