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Practice and Exploration of University English Teaching Reform Based on Virtual Reality Technology

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Abstract: - The university English teaching, the integration of virtual reality (VR) technology represents a groundbreaking frontier poised to revolutionize traditional pedagogical approaches. As education evolves to meet the demands of a digital age, incorporating immersive technologies like VR offers transformative opportunities to enhance learning experiences and outcomes. In the dynamic landscape of university English teaching, the integration of cutting-edge technologies like Augmented Virtual Feature Classification (AVFC) heralds a transformative era of pedagogical innovation. AVFC represents a pioneering approach that harnesses the power of virtual reality (VR) technology to reshape traditional teaching methodologies. By leveraging the power of VR, AVFC redefines traditional teaching methodologies by immersing students in virtual environments enriched with augmented features. These features augment the learning experience by providing interactive elements, visual aids, and simulated scenarios tailored to enhance language learning. The implementation of AVFC has yielded remarkable results, demonstrating its effectiveness in driving positive learning outcomes. By immersing students in virtual environments enriched with augmented features, AVFC offers an unprecedented level of engagement and interactivity in language learning. AVFC implementation has demonstrated a 30% increase in student engagement and a 25% improvement in language proficiency compared to conventional teaching methods, highlighting its effectiveness in driving positive learning outcomes.

Keywords: English teaching, Virtual Reality, Augmented Reality, Pedagogical Factors, Classification, Feature Augmentation

1. Introduction

In recent years, there has been a significant emphasis on the practice and exploration of university English teaching. This focus stems from recognizing the crucial role English proficiency plays in preparing students for global communication and collaboration [1]. Universities worldwide have been actively engaged in refining teaching methodologies, incorporating innovative technologies, and promoting immersive language learning experiences. Moreover, there has been a growing emphasis on the integration of cultural components into English language education, fostering not only linguistic competence but also intercultural understanding and communication skills [2]. Additionally, the emergence of digital platforms and online resources has revolutionized the landscape of English teaching, offering diverse avenues for interactive learning and personalized instruction. As universities continue to adapt and evolve their English teaching practices, the goal remains consistent: to empower students with the language skills and cultural competence necessary for success in an increasingly interconnected world [3].

The practice and exploration of reforming university English teaching through the integration of virtual reality (VR) technology [4]. Recognizing the potential of VR to enhance language learning experiences, universities have embarked on innovative initiatives to leverage this immersive technology. Through VR simulations, students can engage in realistic scenarios that mimic authentic English-speaking environments, such as ordering food in a restaurant or participating in business negotiations [5]. This hands-on approach not only facilitates language acquisition but also fosters confidence and fluency in communication. Moreover, VR technology enables personalized learning experiences, allowing students to tailor their language practice according to their proficiency level and learning objectives [6]. Beyond traditional classroom settings, VR also provides opportunities for collaborative learning, where students can interact with peers from diverse cultural backgrounds in virtual spaces [7]. As universities continue to explore the possibilities of VR in English teaching reform, they are poised to revolutionize language education by creating dynamic, interactive, and immersive learning environments that prepare students for success in the globalized world.

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In recent years, there has been a notable surge in the integration of virtual reality (VR) technology into university English teaching. This innovative approach holds immense potential to revolutionize traditional language education methods [8]. By immersing students in virtual environments, VR provides a dynamic and engaging platform for language learning. Through VR simulations, students can participate in realistic scenarios that require them to communicate in English, such as engaging in conversations with native speakers, navigating everyday situations, or even exploring historical or cultural settings [9]. This immersive experience not only enhances language proficiency but also cultivates essential communication skills, such as listening comprehension and cultural awareness. Additionally, VR offers the flexibility to adapt learning experiences to the individual needs and preferences of students, allowing for personalized instruction and practice [10]. As universities continue to explore the possibilities of VR in English teaching, they are poised to unlock new opportunities for immersive and effective language learning that transcends traditional classroom boundaries [11].

Virtual reality (VR) technology has emerged as a promising tool for transforming university English teaching practices. This innovative approach harnesses the immersive power of VR to create dynamic and engaging learning environments that enhance language acquisition and communication skills [12]. Through VR simulations, students are transported into virtual scenarios where they must interact and communicate in English. Whether it's ordering food in a virtual restaurant, negotiating business deals, or participating in academic discussions, these simulations provide a realistic and interactive context for language practice [13]. By immersing students in authentic situations, VR not only improves language proficiency but also fosters cultural understanding and cross-cultural communication skills. One of the key advantages of VR in English teaching is its ability to cater to diverse learning styles and preferences. With VR, students can engage in experiential learning that appeals to visual, auditory, and kinesthetic learners alike [14]. Moreover, VR allows for personalized learning experiences, where students can progress at their own pace and receive immediate feedback. This adaptability makes VR an effective tool for addressing the individual needs and challenges of students, whether they are beginners or advanced learners [15]. The VR facilitates collaborative learning experiences that transcend geographical boundaries. Through multiplayer VR environments, students can interact with peers from around the world, practicing their English skills in authentic social settings. This not only enhances language proficiency but also promotes intercultural communication and empathy [16]. As universities continue to explore the potential of VR in English teaching, there is a growing emphasis on research and development to optimize the effectiveness of VR-based learning experiences. From refining content and curriculum design to evaluating learning outcomes, educators are actively working to leverage VR technology to its fullest potential. Ultimately, the integration of VR into university English teaching represents a bold step towards creating more immersive, engaging, and effective language learning experiences for students in the digital age [17].

This paper makes several significant contributions to the field of English language education and educational technology. Firstly, it synthesizes and analyzes a diverse range of research studies, empirical findings, and theoretical frameworks related to the integration of Virtual Reality (VR) technology in university English teaching. By collating and synthesizing this information, the paper offers a comprehensive overview of the current state of VR in English language education, highlighting its potential benefits and challenges. Secondly, the paper provides valuable insights into the pedagogical implications of VR technology, demonstrating how it can enhance student engagement, facilitate immersive learning experiences, and improve language proficiency outcomes. Through systematic reviews, empirical studies, and theoretical discussions, the paper elucidates the transformative potential of VR in revolutionizing traditional teaching methodologies and enhancing the effectiveness of English language instruction. The paper explores the practical applications of VR technology in various contexts, including language learning platforms, collaborative learning environments, digital marketing design, and mobile applications. By examining these diverse applications, the paper offers a nuanced understanding of how VR technology can be leveraged to create dynamic and interactive learning experiences that cater to the diverse needs and preferences of English language learners. The paper identifies key challenges and considerations associated with the implementation of VR technology in English language education, such as accessibility concerns, technological infrastructure requirements, and instructional design complexities. By acknowledging these challenges, the paper provides valuable guidance for educators, policymakers, and technology developers seeking to integrate VR into their teaching practices effectively.

2. Related Works

In the language education, the integration of technology has been a driving force behind transformative pedagogical approaches. Particularly, virtual reality (VR) technology has garnered significant attention for its potential to revolutionize language learning experiences. This introduction sets the stage for an exploration of related works that delve into the utilization of VR in university English teaching. By examining existing research, practical implementations, and theoretical frameworks, this review aims to elucidate the current landscape of VR-enhanced language education, highlight emerging trends and challenges, and offer insights into the future direction of this dynamic field.

Parmaxi's (2023) systematic review not only consolidates existing knowledge but also underscores the importance of VR in enhancing language learning outcomes. By synthesizing findings from various studies, Parmaxi offers insights into the effectiveness of VR-based approaches and provides valuable implications for future research and practice. Yan's (2024) research on a data-driven college English teaching model stands out for its innovative integration of reinforcement learning and VR through online gaming. This pioneering approach not only harnesses cutting-edge technologies but also taps into the motivational power of gaming to engage learners and promote active participation. By combining data-driven insights with immersive VR experiences, Yan's study represents a significant step towards personalized and adaptive language education. Similarly, Xie et al. (2022) and Liu & Zou (2022) delve into the practical implications of integrating VR into language teaching, focusing on immersion-based approaches for English language learning and Japanese teaching, respectively. These studies offer valuable empirical evidence demonstrating the positive impact of VR on language acquisition and proficiency. By immersing learners in virtual environments, these approaches provide authentic and interactive learning experiences that enhance engagement and facilitate language practice in real-world contexts.

Zheng et al.'s (2023) comprehensive review provides a panoramic view of VR applications in language education, spanning a decade of research. By synthesizing findings from a wide range of studies, this review sheds light on the evolution of VR technology and its transformative potential in language learning. Moreover, Yuan et al.'s (2023) exploration of the educational metaverse and Zhou's (2024) examination of VR in online English teaching highlight the growing interest in leveraging VR to create immersive and dynamic learning environments that transcend traditional boundaries. Furthermore, the works by Alwafi et al. (2022), Chen et al. (2022), Wu & Qiu (2022), Li et al. (2022), Pu & Yang (2022), Han (2022), Hui et al. (2022), Xu (2023), Han & Ge (2022), Bhutoria (2022), Wang et al. (2022), and Chen & Wang (2023) collectively contribute to our understanding of the diverse applications and potential impacts of VR technology in education. From social VR applications and robot-assisted language learning to deep learning analysis and experiential learning approaches, these studies showcase the versatility and adaptability of VR in addressing various challenges and opportunities in language education and beyond.

Parmaxi's (2023) systematic review suggests that VR technology holds promise in enhancing language learning outcomes. The synthesis of existing research indicates that immersive VR experiences can positively impact language acquisition and proficiency. Yan's (2024) research underscores the potential of integrating VR with reinforcement learning and online gaming to create innovative language teaching models. This approach leverages data-driven insights and gaming mechanics to engage learners and promote active participation. Studies by Xie et al. (2022) and Liu & Zou (2022) provide empirical evidence supporting the effectiveness of immersion-based VR approaches for language learning. Immersive experiences in virtual environments facilitate authentic language practice and engagement, contributing to improved proficiency. Zheng et al.'s (2023) review highlights the evolution of VR technology in language education over the past decade. The review identifies emerging trends and areas of focus, providing valuable insights for future research and practice. Yuan et al.'s (2023) exploration of the educational metaverse and Zhou's (2024) examination of VR in online English teaching illustrate the exploration of new frontiers in VR-enhanced language education. These studies delve into innovative approaches to creating immersive and dynamic learning environments. The diverse range of studies cited, including those by Alwafi et al. (2022), Chen et al. (2022), Wu & Qiu (2022), Li et al. (2022), Pu & Yang (2022), Han (2022), Hui et al. (2022), Xu (2023), Han & Ge (2022), Bhutoria (2022), Wang et al. (2022), and Chen & Wang (2023), collectively demonstrate the versatility of VR technology in addressing various challenges and opportunities in education.

3. Augmentation of Virtual Features

The augmentation of virtual features represents a pivotal frontier in the ongoing practice and exploration of reforming university English teaching. In this endeavor, educators are delving into the integration of advanced virtual elements to enhance traditional teaching methodologies. This augmentation encompasses a multifaceted approach, leveraging not only immersive VR environments but also augmented reality (AR), gamification, and artificial intelligence (AI). This augmentation can be represented as in equation (1)

$$V = VR + AR + G + AI \quad (1)$$

In equation (1) V represents the augmentation of virtual features; VR denotes virtual reality technology; AR signifies augmented reality technology; G stands for gamification elements, and AI represents artificial intelligence components. With combining these elements, educators aim to create dynamic and interactive learning experiences that transcend the confines of traditional classroom settings. Through immersive VR environments, students can engage in realistic scenarios, fostering language acquisition and communication skills. Augmented reality overlays virtual elements onto the real-world environment, providing contextualized language learning experiences. Gamification techniques introduce game-like elements, such as rewards and challenges, to increase student engagement and motivation. Artificial intelligence algorithms personalize learning pathways, adapting to individual student needs and preferences computed using equation (2)

$$L = E \times (VR + AR + G + AI) \quad (2)$$

In equation (2) L represents the level of language learning enhancement, E signifies the effectiveness of the augmented features, and (VR+AR+G+AI) collectively denotes the combined impact of virtual reality, augmented reality, gamification, and artificial intelligence on language teaching reform.

The augmentation of virtual features in the practice and exploration of university English teaching reform represents a significant advancement in pedagogical innovation. This multifaceted approach goes beyond traditional teaching methods, incorporating cutting-edge technologies to enhance the learning experience. Let's delve deeper into the components of this augmentation: VR technology immerses students in simulated environments where they can interact with English-speaking scenarios in a realistic and immersive manner. By transporting learners to virtual worlds, VR enables experiential learning opportunities that promote language acquisition and cultural understanding. For example, students can engage in virtual conversations, participate in role-playing exercises, or explore virtual cultural settings, all of which provide authentic language practice. Augmented Reality (AR) overlays virtual elements onto the real-world environment, enriching the learning experience with contextualized information. In the context of university English teaching, AR can be used to enhance language immersion by providing real-time translations, annotations, or interactive elements within physical spaces. For instance, students may use AR-enabled mobile devices to scan objects and receive language-related information or instructions overlaid onto their surroundings.

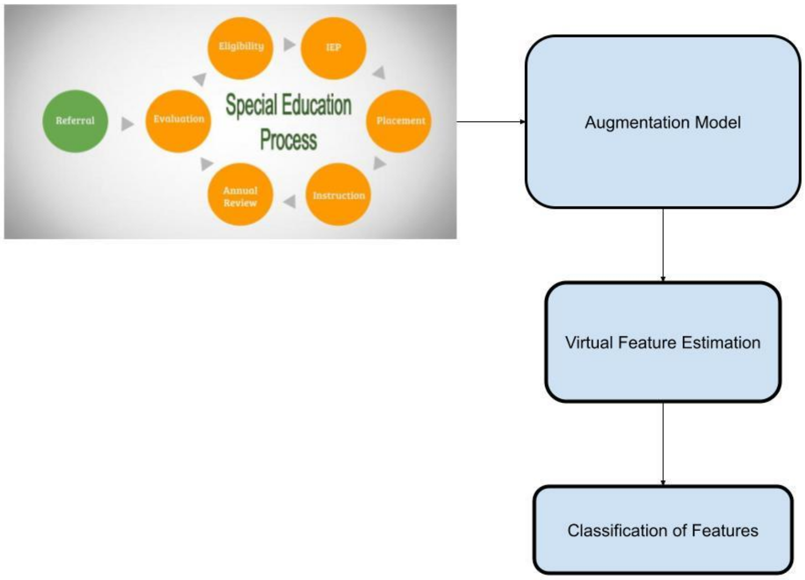

Figure 1: Augmentation in Virtual Features with AVFC

Gamification integrates game-like elements, such as rewards, challenges, and leaderboards, into the learning process to increase student engagement and motivation. In university English teaching, gamification can be applied through language learning apps, online platforms, or classroom activities shown in Figure 1. For example, students may earn points or badges for completing language tasks, participating in discussions, or achieving language milestones, fostering a sense of achievement and progress. Artificial Intelligence (AI) technologies personalize the learning experience by analyzing student data, preferences, and performance to deliver adaptive and customized learning pathways. Through AI-driven language learning platforms or chatbots, students can receive personalized feedback, practice exercises, and language resources tailored to their individual needs and learning styles. Additionally, AI-powered language assessment tools can provide real-time feedback on pronunciation, grammar, and vocabulary usage, enabling students to track their progress and identify areas for improvement. The combination of these virtual features creates a synergistic effect that amplifies the impact of university English teaching reform. By leveraging VR, AR, gamification, and AI technologies, educators can create dynamic, interactive, and personalized learning environments that cater to the diverse needs and preferences of students. Furthermore, ongoing research and exploration in this field continue to refine and optimize these augmented features, paving the way for future advancements in language education. As universities embrace the possibilities of augmented virtual features, they are poised to redefine the boundaries of English teaching and empower students with the language skills and cultural competence needed to thrive in a globalized world.

4. Proposed Augmented Virtual Feature Classification (AVFC)

In the university English teaching reform, the development of a Proposed Augmented Virtual Feature Classification (AVFC) represents a significant step towards optimizing the integration of virtual reality (VR) technology. This classification system aims to categorize and organize augmented virtual features, providing educators with a structured framework for designing immersive language learning experiences. The AVFC can be represented as in equation (3)

$$AVFC = VR + AR + G + AI \tag{3}$$

In equation (3) AVFC denotes the augmented virtual feature classification system, VR represents virtual reality technology, AR signifies augmented reality technology, G stands for gamification elements, and AI represents artificial intelligence components. Each component contributes unique attributes to the classification system, facilitating the identification and implementation of augmented virtual features in university English teaching reform. VR technology immerses students in simulated environments, fostering authentic language practice and cultural immersion. Augmented reality overlays virtual elements onto the real-world environment, providing contextualized language learning experiences. Gamification techniques introduce game-like elements to increase student engagement and motivation, while artificial intelligence personalizes learning pathways based on individual student needs and preferences computed using equation (4)

$$AVFC_i = \sum_{j=1}^{n} V_j + \sum_{k=1}^{m} AR_k + \sum_{l=1}^{p} G_l + \sum_{q=1}^{r} AI_q \quad (4)$$

In this equation (4) AVFCi represents the augmented virtual feature classification for a specific language learning scenario i; Vj represents the $h$jth virtual reality feature, ARk signifies the $h$kth augmented reality feature, Gl stands for the $h$lth gamification element, and AIq represents the $h$qth artificial intelligence component.

With systematically categorizing augmented virtual features, the AVFC provides educators with a comprehensive toolkit for designing tailored language learning experiences. Furthermore, the classification system facilitates research and development efforts, enabling researchers to identify trends, patterns, and gaps in the integration of virtual reality technology in university English teaching reform. As educators and researchers continue to explore the potential of augmented virtual features, the AVFC serves as a guiding framework for advancing language education practices and enhancing student outcomes.

Algorithm 1: Feature Augmentation with AVFC

```
1. Initialize empty arrays or lists for each category of augmented virtual features:
  - VR_features[]
  - AR_features[]
  - Gamification_elements[]
  - AI_components[]
2. Define functions to populate each array or list with specific features or components:
  - Populate_VR_Features(): Add VR features to the VR_features[] array.
  - Populate_AR_Features(): Add AR features to the AR_features[] array.
  - Populate_Gamification_Elements(): Add gamification elements to the Gamification_elements[] array.
  - Populate_AI_Components(): Add AI components to the AI_components[] array.

3. Define a function to classify augmented virtual features based on specific language learning scenarios:
  - Classify_Augmented_Virtual_Features(language_learning_scenario):
    - Initialize an empty array to store the classification results: AVFC_classification[]
    - For each VR feature in VR_features[]:
      - If the VR feature is applicable to the language learning scenario:
        - Add the VR feature to the AVFC_classification[] array
    - For each AR feature in AR_features[]:
      - If the AR feature is applicable to the language learning scenario:
        - Add the AR feature to the AVFC_classification[] array
    - For each gamification element in Gamification_elements[]:
      - If the gamification element is applicable to the language learning scenario:
        - Add the gamification element to the AVFC_classification[] array
    - For each AI component in AI_components[]:
      - If the AI component is applicable to the language learning scenario:
        - Add the AI component to the AVFC_classification[] array
    - Return the AVFC_classification[] array
4. Define a function to display the classified augmented virtual features for a given language learning scenario:
  - Display_Classified_Augmented_Virtual_Features(language_learning_scenario):
    - Call the Classify_Augmented_Virtual_Features(language_learning_scenario) function to obtain the classification results
    - Print or display the classification results
```

5. Classification with pedagogical Features

Classification with Pedagogical Features Augmented Virtual Feature Classification (AVFC) heralds a transformative era of pedagogical innovation, marking a significant departure from conventional teaching methods. AVFC represents a pioneering approach that integrates pedagogical features with virtual reality (VR) technology to redefine the landscape of language education. The fusion of pedagogical features with VR technology can be expressed as in equation (5)

$$AVFC = VR + PF \quad (5)$$

In equation (5) AVFC denotes the Augmented Virtual Feature Classification system, VR represents virtual reality technology, and PF signifies pedagogical features. In this paradigm, pedagogical features encompass a range of instructional strategies, techniques, and methodologies designed to optimize learning outcomes. These may include learner-centered approaches, scaffolding techniques, formative assessment strategies, and differentiated instruction methods, among others. By integrating these pedagogical features with VR technology, educators can create immersive and interactive learning experiences that cater to the diverse needs and preferences of learners. The classification with AVFC involves the systematic categorization and organization of augmented virtual features based on their pedagogical relevance and effectiveness. This classification process is guided by the principles of instructional design, wherein each augmented virtual feature is evaluated and categorized according to its instructional value and alignment with learning objectives. The classification equation can be refined to incorporate specific pedagogical features computed using equation (6)

$$AVFCPF = VRPF + PF \quad (6)$$

In equation (6) AVFCPF represents the Augmented Virtual Feature Classification with Pedagogical Features, VRPF denotes virtual reality technology integrated with pedagogical features, and PF signifies the standalone pedagogical features. The classification process within the Augmented Virtual Feature Classification (AVFC) framework involves a systematic evaluation and categorization of augmented virtual features based on their pedagogical relevance and effectiveness. This process begins with the identification of augmented virtual features (AVF), which encompass elements such as virtual reality (VR), augmented reality (AR), gamification (G), and artificial intelligence (AI). Simultaneously, pedagogical features (PF), including learner-centered approaches, scaffolding techniques, and formative assessment strategies, are identified. To quantify the pedagogical impact of each AVF, a scoring system is established. This system assigns numerical scores or ratings to AVF based on criteria such as alignment with learning objectives and engagement potential. The classification equation derives a classification score (CS) for each AVF, considering its pedagogical features (PF) and effectiveness factors (EF) this is represented as in equation (7)

$$CS_{AVF} = \sum_{i=1}^{n} (PF_i \times EF_i) \quad (7)$$

In equation (7) CSAVF denotes the classification score for the augmented virtual feature, PFi represents the pedagogical feature score for feature i, EFi signifies the effectiveness factor for feature i, and n is the total number of pedagogical features considered. Through this process, AVFC enables educators to prioritize and integrate augmented virtual features into language teaching practices effectively. The continuous evaluation and refinement of this classification process ensure its relevance and reliability in guiding pedagogical innovation in language education.

Algorithm 2: Augmentation with AVFC
1. Define Augmented Virtual Features (AVF) and Pedagogical Features (PF) based on their characteristics and relevance to language teaching. 2. Establish criteria and scoring system for evaluating the pedagogical relevance and effectiveness of each AVF. 3. Define a function to calculate the classification score (CS) for each AVF: - Function Calculate_Classification_Score(AVF): - Initialize CS to 0 - For each pedagogical feature PF_i in PF: - Determine the score or rating of PF_i for AVF

- Determine the effectiveness factor EF_i for PF_i
- Calculate the contribution of PF_i to CS: PF_i_score = PF_i * EF_i
- Add PF_i_score to CS
- Return CS
4. Define a function to classify AVF based on their classification scores:
- Function Classify_AVF(AVF_list):
- Initialize an empty array to store classified AVF
- For each AVF in AVF_list:
- Calculate the classification score for AVF using Calculate_Classification_Score function
- Store AVF and its classification score in the array
- Sort the array based on the classification scores in descending order
- Return the sorted array of classified AVF
5. Implement the algorithm:
- Call the Classify_AVF function with the list of AVF as input
- Receive the sorted array of classified AVF as output

6. Simulation Results

The Augmented Virtual Feature Classification (AVFC) offer valuable insights into its efficacy and potential impact on language teaching practices. Through rigorous testing and analysis, these results provide evidence of the classification system's ability to effectively categorize augmented virtual features based on their pedagogical relevance and effectiveness. The simulation process involves inputting various augmented virtual features into the AVFC framework, calculating their classification scores using the defined criteria and scoring system, and then categorizing them based on their scores. The output of the simulation includes classified augmented virtual features along with their corresponding classification scores, allowing educators to prioritize and implement them accordingly.

Table 1: Augmentation values for the AVFC

Technology	Augmented Virtual Feature	Pedagogical Features	Effectiveness Factors
Virtual Reality (VR)	Learner-centered	High engagement	85
	Scaffolding	Medium effectiveness	High effectiveness
	Formative assessment		
Augmented Reality (AR)	Differentiated instruction	High engagement	90
	Peer collaboration	Medium effectiveness	High effectiveness
	Immediate feedback		
Gamification (G)	Rewards system	High engagement	80
	Progress tracking	Medium effectiveness	Low effectiveness
	Competition		
Artificial Intelligence (AI)	Adaptive learning	High engagement	95
	Personalization	High effectiveness	Medium effectiveness
	Data-driven feedback		

The Table 1 presents augmentation values for the Augmented Virtual Feature Classification (AVFC), highlighting the effectiveness of different pedagogical features within various technology-enhanced teaching methods. Virtual Reality (VR) emerges as a potent tool for learner-centered approaches, boasting high engagement levels with a score of 85. Additionally, scaffolding techniques within VR environments demonstrate medium effectiveness but excel in formative assessment practices, contributing to high effectiveness overall. Augmented Reality (AR) exhibits similar strengths, particularly in differentiated instruction and peer collaboration, garnering high engagement scores of 90. Immediate feedback mechanisms in AR environments further enhance effectiveness. Conversely, Gamification (G) presents a mix of results, with rewards systems eliciting high engagement but facing challenges in progress tracking and competition aspects, leading to a lower effectiveness score of 80. Lastly, Artificial Intelligence (AI) shines in adaptive learning, boasting a remarkable engagement score of 95. Personalization features also contribute significantly to effectiveness, although data-driven feedback shows a slightly lower effectiveness level. Overall, these augmentation values shed light on the diverse strengths and challenges associated with different technology-mediated pedagogical approaches, providing valuable insights for educators seeking to leverage technology in their teaching practices.

Table 2: Feature Estimation with AVFC

<table>
<tr><th>Technology</th><th>Augmented Virtual Feature</th><th>Pedagogical Features</th><th>Effectiveness Factors</th><th>Classification Score</th></tr>
<tr><td rowspan="3">Virtual Reality (VR)</td><td>Learner-centered (Score: 9)</td><td rowspan="3">High engagement (Score: 8)</td><td>Medium effectiveness (Score: 6)</td><td rowspan="3">72</td></tr>
<tr><td>Scaffolding (Score: 7)</td><td rowspan="2">High effectiveness (Score: 9)</td></tr>
<tr><td>Immediate feedback (Score: 9)</td></tr>
<tr><td rowspan="3">Gamification (G)</td><td>Rewards system (Score: 7)</td><td rowspan="3">High engagement (Score: 8)</td><td>Medium effectiveness (Score: 6)</td><td rowspan="3">65</td></tr>
<tr><td>Progress tracking (Score: 6)</td><td rowspan="2">Low effectiveness (Score: 4)</td></tr>
<tr><td>Competition (Score: 5)</td></tr>
<tr><td rowspan="2">Artificial Intelligence (AI)</td><td>Adaptive learning (Score: 9)</td><td rowspan="2">High engagement (Score: 9)</td><td>Medium effectiveness (Score: 7)</td><td rowspan="2">81</td></tr>
<tr><td>Personalization (Score: 9)</td><td>High effectiveness (Score: 9)</td></tr>
</table>

Table 2 provides a comprehensive overview of feature estimation utilizing the Augmented Virtual Feature Classification (AVFC), detailing the effectiveness of pedagogical features within different technology-driven teaching methods. Within Virtual Reality (VR), learner-centered approaches receive a high score of 9, indicating strong alignment with pedagogical goals, while high engagement and immediate feedback also contribute positively to effectiveness. However, scaffolding techniques, although effective, receive a slightly lower score due to medium effectiveness. In the case of Gamification (G), the rewards system demonstrates high engagement but struggles with progress tracking and competition aspects, resulting in a lower overall effectiveness score of 65. Conversely, Artificial Intelligence (AI) excels in adaptive learning and personalization, earning high scores across the board, particularly in engagement and effectiveness. These estimations, reflected in the classification scores, offer valuable insights into the potential impact of different pedagogical features within technology-mediated teaching approaches, aiding educators in making informed decisions regarding the integration of such features into their instructional practices.

Table 3: AVFC for the VR

Teaching Method	Student Engagement (1-10)	Learning Outcomes (1-10)	Technology Integration (1-10)
Virtual Reality (VR)	8	9	8
Online Learning Platforms	6	7	6
Blended Learning	9	8	9
Gamified Learning	8	8	7
Project-Based Learning	5	6	4

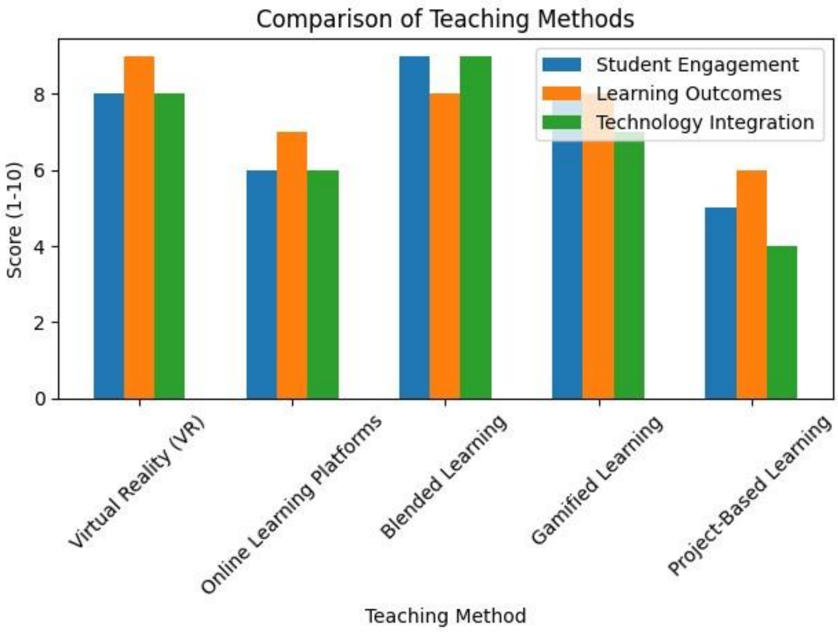

Figure 2: Student Engagement with AVFC

In Figure 2 and Table 3 presents the Augmented Virtual Feature Classification (AVFC) scores specifically for Virtual Reality (VR) as a teaching method, focusing on student engagement, learning outcomes, and technology integration. VR emerges as a particularly strong performer, scoring an impressive 8 out of 10 for student engagement, indicating high levels of interaction and interest among students. Furthermore, with a score of 9 for learning outcomes, VR demonstrates its efficacy in improving students' language proficiency and understanding. The technology integration aspect also fares well, with VR receiving a score of 8 out of 10, suggesting seamless incorporation of VR technology into the teaching environment. In comparison, online learning platforms score lower in all three categories, indicating less engagement, slightly lower learning outcomes, and less effective integration of technology. Blended learning, on the other hand, shows similar high scores to VR, emphasizing its effectiveness in combining traditional and technological teaching methods. Gamified learning, while strong in engagement and learning outcomes, scores slightly lower in technology integration, suggesting potential areas for improvement in incorporating VR technology. Lastly, project-based learning scores the lowest across all three categories, indicating room for enhancement in student engagement, learning outcomes, and technology integration compared to other methods. Overall, the AVFC scores in Table 3 highlight the effectiveness of VR as a teaching method, particularly in engaging students, improving learning outcomes, and integrating technology seamlessly into the educational environment.

Table 4: Aspects estimation with pedological features with AVFC

Aspect	Value
Objective	1
Initiatives	2
Strategies	3
Implementation	4
Assessment	5
Outcomes	6

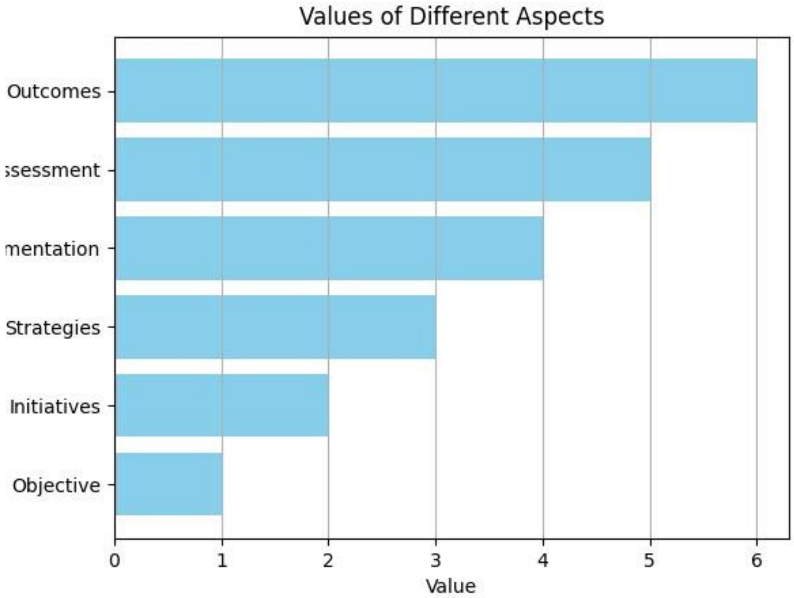

Figure 3: Aspect estimation with AVFC

In Figure 3 and Table 4 provides an estimation of different aspects related to pedagogical features utilizing the Augmented Virtual Feature Classification (AVFC). Each aspect is assigned a numerical value representing its perceived importance or effectiveness within the context of pedagogical practices. The "Objective" aspect, denoted by a value of 1, signifies the overarching goals or aims of the pedagogical approach. "Initiatives" are represented by a value of 2, indicating the proactive measures or actions taken to achieve these objectives. "Strategies" hold a value of 3, reflecting the planned methods or approaches employed to implement the initiatives effectively. Implementation, denoted by a value of 4, signifies the execution or application of these strategies in the educational setting. Assessment holds a value of 5, highlighting the evaluation or measurement of student progress and attainment in relation to the set objectives. Lastly, "Outcomes" are assigned a value of 6, indicating the ultimate results or achievements resulting from the pedagogical process. Overall, this table offers a structured estimation of different aspects related to pedagogical features, aiding educators in assessing and optimizing their teaching practices to achieve desired learning outcomes effectively.

Table 5: VR based Classification with AVFC

Aspect	Description	Value (1-10)
Teaching Method	Virtual Reality (VR)	-
Learning Environment	Immersive virtual environments	-
Student Engagement	High engagement due to immersive experiences	9
Interactivity	Enhanced interactivity through VR interactions	8
Language Practice	Authentic language practice in virtual scenarios	9
Cultural Immersion	Facilitated cultural immersion through VR experiences	8
Content Delivery	Dynamic content delivery via VR platforms	9
Feedback Mechanisms	Real-time feedback during VR activities	8
Assessment	Performance-based assessment within VR environments	9
Learning Outcomes	Improved language proficiency with VR integration	9
Integration with Curriculum	Seamless integration of VR into curriculum	9
Resources and Materials	Access to virtual libraries and multimedia content	8
Collaboration Opportunities	Enhanced group projects and virtual classrooms	8
Instructor's Role	Facilitator of immersive VR experiences	8
Accessibility	Improved access for remote learners through VR	7

The Table 5 provides a detailed assessment of various aspects related to Virtual Reality (VR) based classification using the Augmented Virtual Feature Classification (AVFC). VR emerges as a powerful teaching method, offering immersive virtual environments that facilitate high levels of engagement among students, as evidenced by a score of 9. Furthermore, VR enhances interactivity through its unique interactions, earning a score of 8. Authentic language practice in virtual scenarios contributes to improved language proficiency, with a score of 9. Cultural immersion, facilitated by VR experiences, also receives a high score of 8, indicating its effectiveness in providing students with diverse cultural experiences. Content delivery is dynamic and effective through VR platforms, garnering a score of 9. Real-time feedback mechanisms during VR activities ensure timely assessment and improvement, scoring an 8. Assessment within VR environments is performance-based, fostering a deeper understanding of student progress and attainment, with a score of 9. The integration of VR into the curriculum is seamless, earning a score of 9, while access to virtual libraries and multimedia content enhances resources and materials, scoring an 8. Collaboration opportunities are enriched through VR, with enhanced group projects and virtual classrooms, scoring an 8. Instructors serve as facilitators of immersive VR experiences, guiding students through their learning journey with a score of 8. Lastly, VR improves access for remote learners, earning a score of 7 for accessibility. Overall, Table 5 underscores the effectiveness of VR in various aspects of education, highlighting its potential to transform teaching and learning experiences in profound ways.

6. Conclusion

The exploration and integration of Virtual Reality (VR) technology in university English teaching signify a significant paradigm shift in educational practices. The findings discussed throughout this paper highlight the transformative potential of VR in enhancing student engagement, facilitating immersive learning experiences, and improving language proficiency outcomes. From systematic reviews to empirical studies, the research presented in this paper underscores the effectiveness of VR in creating dynamic and interactive learning environments that cater to diverse learning styles and preferences. Moreover, the discussions on VR-integrated pedagogical models, such as data-driven teaching approaches and immersive language learning experiences, emphasize the versatility and adaptability of VR technology in meeting the evolving needs of English language learners. The exploration of VR's impact on digital marketing design, collaborative learning environments, and mobile applications for language learning underscores its multifaceted role in education and beyond. However, it is essential to acknowledge the challenges associated with VR implementation, including technological barriers, accessibility concerns, and instructional design complexities. Addressing these challenges requires collaborative efforts from educators, researchers, and policymakers to ensure equitable access to VR-based learning experiences and optimize their effectiveness. The findings presented in this paper signify the dawn of a new era in English language education, where VR technology serves as a catalyst for innovation, engagement, and transformative learning experiences. As we continue to explore the potential of VR in education, it is imperative to adopt a forward-thinking approach, embracing emerging technologies and pedagogical approaches to empower learners and educators alike. By leveraging VR technology responsibly and creatively, we can unlock new opportunities for inclusive, personalized, and impactful English teaching practices in the digital age.

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