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PEDAGOGICAL SKILLS OF USING VR TECHNOLOGIES IN TEACHING CHEMISTRY CLASSES IN FRENCH

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This scientific article explores the pedagogical skills required for effectively integrating Virtual Reality (VR) technologies into teaching chemistry in French language classes. VR technologies offer immersive and interactive learning experiences, enhancing students' understanding of complex chemical concepts. By emphasizing the importance of pedagogical strategies, this article provides insights into the effective utilization of VR tools in French language classrooms, promoting engaged and meaningful learning experiences.

Key words: pedagogical skills, VR technologies, teaching chemistry, French language classes, immersive learning, interactive simulations, language acquisition, cultural relevance, content integration, language support, scaffolded learning, formative assessment, access and equity, teacher professional development, content development.

ПЕДАГОГИЧЕСКИЕ НАВЫКИ ИСПОЛЬЗОВАНИЯ VR-ТЕХНОЛОГИЙ НА УРОКАХ ХИМИИ НА ФРАНЦУЗСКОМ ЯЗЫКЕ

В этой научной статье исследуются педагогические навыки, необходимые для эффективной интеграции технологий виртуальной реальности (VR) в преподавание химии на уроках французского языка. Технологии виртуальной реальности предлагают захватывающий и интерактивный опыт обучения, улучшая понимание учащимися сложных химических концепций. Подчеркивая важность педагогических стратегий, эта статья дает представление об эффективном использовании инструментов виртуальной реальности в классах французского языка, способствуя заинтересованному и значимому опыту обучения.

Ключевые слова: педагогические навыки, технологии виртуальной реальности, преподавание химии, уроки французского языка, иммерсивное обучение, интерактивное моделирование, овладение языком, культурная значимость, интеграция контента, языковая поддержка, обучение на платформе, формирующая оценка, доступ и равенство, профессиональное развитие учителей, разработка контента.

FRANSUZ TILIDA KIMYO DARSLARINI O‘QITISHDA VR TEXNOLOGIYALARIDAN FOYDALANISHDA PEDAGOGIK MAHORAT

Ushbu ilmiy maqola fransuz tilida kimyo fanini o‘qitishda Virtual haqiqat (VR) texnologiyalarini samarali integratsiyalash uchun zarur bo‘lgan pedagogik ko‘nikmalarni o‘rganadi. VR texnologiyalari immersiv va interaktiv o‘rganish tajribasini taklif etadi, bu esa o‘quvchilarning murakkab kimyoviy tushunchalarni tushunishini kuchaytiradi. Pedagogik strategiyalarning muhimligini ta’kidlab, ushbu maqola fransuz tili sinflarida VR vositalaridan samarali foydalanish, qiziqarli va mazmunli o‘rganish tajribasini targ‘ib qilish haqida tushuncha beradi.

Kalit so‘zlar: pedagogik mahorat, VR texnologiyalari, kimyo o‘qitish, fransuz tili darslari, immersiv o‘rganish, interaktiv simulyatsiyalar, tilni o‘zlashtirish, madaniy aloqadorlik, kontent integratsiyasi, tilni qo‘llab-quvvatlash, iskala o‘rganish, formativ baholash, kirish va tenglik, o‘qituvchilarning kasbiy rivojlanishi, kontentni rivojlantirish.

Introduction. In the digital age, educational technologies, particularly **Virtual Reality (VR)**, have emerged as powerful tools for enhancing classroom instruction. This article focuses on the application of VR technologies in teaching chemistry to French language learners. Effective utilization of VR requires specific pedagogical skills to maximize its potential in language-specific educational settings.

In the ever-evolving landscape of education, the digital age has ushered in transformative technologies, among which Virtual Reality (VR) stands out as a powerful tool revolutionizing classroom

instruction. The immersive and interactive nature of VR technologies offers unparalleled opportunities for enhancing learning experiences, captivating the minds of students and bridging the gap between theoretical knowledge and real-world applications. This article delves into the innovative integration of VR technologies in the realm of education, specifically focusing on their application in teaching chemistry to French language learners.

The Significance of VR in Language-Specific Educational Settings: In an era where language proficiency is not just a skill but a gateway to global communication, leveraging VR technologies for language learning becomes crucial. The immersive nature of VR creates a dynamic learning environment that transcends traditional language barriers. This article hones in on the unique intersection of VR and language education, exploring how these technologies can be harnessed to teach complex scientific subjects, such as chemistry, to students in French language classrooms.

Nurturing Pedagogical Skills for Effective VR Integration: While the potential of VR in education is vast, its effective utilization demands a nuanced understanding of pedagogical techniques tailored to language-specific educational settings. In the context of teaching chemistry to French language learners, educators need to possess specific pedagogical skills. These skills encompass not only technical proficiency in VR technologies but also a deep understanding of language acquisition methodologies, culturally relevant content integration, and the art of scaffolded learning experiences. Through this article, we will unravel the essential pedagogical skills that educators must cultivate to maximize the potential of VR, ensuring that students not only grasp the intricacies of chemistry but also enhance their French language proficiency in the process.

As we embark on this exploration of VR's transformative role in language-based education, we delve into the intricate interplay between technology, pedagogy, and language acquisition. By elucidating the fundamental principles that underpin the effective integration of VR technologies in teaching chemistry for French language classes, we aim to provide educators with valuable insights and practical strategies for creating engaging, immersive, and culturally enriching learning environments.

Methodology. Provide an overview of the research methodology section, outlining the methods and techniques used to conduct the study on the pedagogical skills related to integrating VR technologies in teaching chemistry for French language classes.

Explain the research design chosen for this study, such as qualitative, quantitative, or mixed-methods approach. Justify the selection based on the research questions and objectives. Discuss why this design is appropriate for exploring pedagogical skills in the context of VR-enhanced language-based education.

Detail the demographic information of the participants, including the number of educators involved, their teaching experience, and the types of educational institutions they represent (e.g., schools, colleges). Discuss how participants were selected and recruited for the study, ensuring a diverse and representative sample.

Describe the methods employed to collect data:

Surveys/Questionnaires: Explain the structure of the surveys or questionnaires used to gather information from educators. Highlight the questions related to pedagogical skills, VR technology usage, and language integration.

Interviews: Discuss the interview process, including the development of interview guides and the themes explored during the interviews. Mention how educators were chosen for interviews and how their responses were recorded and analyzed.

Observations: Explain any classroom observations conducted to witness firsthand the implementation of VR technologies in teaching chemistry for French language classes. Describe the observational criteria and note any specific pedagogical skills observed.

Outline the methods used to analyze the collected data:

Quantitative Data: Explain the statistical methods (e.g., descriptive statistics, regression analysis) employed to analyze quantitative data from surveys or questionnaires.

Qualitative Data: Describe the thematic analysis approach used to identify patterns and themes in the qualitative data obtained from interviews and observations. Provide examples of identified themes related to pedagogical skills.

Discuss the ethical guidelines followed during the research, including informed consent from participants, confidentiality measures, and the protection of participants' identities. Explain how ethical considerations were integrated into the research design and implementation.

Acknowledge any limitations faced during the research, such as sample size constraints, time limitations, or potential biases. Discuss how these limitations might have influenced the results and interpretations.

Summarize the research methodology section, emphasizing the appropriateness of the chosen methods for investigating pedagogical skills in the context of VR-enhanced chemistry education for French language classes. Highlight the key findings and insights obtained through the research methodology employed.

Literature review. 1. *Virtual Reality in Education*: Virtual Reality (VR) technologies have gained prominence in the field of education, offering immersive and interactive learning experiences. Researchers (Dalgarno & Lee, 2010; Akcayir & Akcayir, 2017) have highlighted VR's potential in enhancing student engagement and understanding of complex subjects, making it a valuable tool for teaching chemistry in diverse educational contexts.

2. *Language-Based Education and VR*: Integrating VR into language-based education has been explored in various studies (Bacca, Baldiris, Fabregat, & Graf, 2014; Wu et al., 2013). These studies emphasize the role of VR in contextualizing language learning, providing students with authentic language experiences within immersive environments. When applied to teaching chemistry in French language classes, VR becomes a conduit for bridging language proficiency and scientific understanding.

3. *Pedagogical Skills and VR Integration*: The significance of pedagogical skills in utilizing VR for educational purposes cannot be overstated (Akcaoglu & Lee, 2018; Dede, 2009). Educators must possess specific skills to create meaningful learning experiences using VR technologies (Barak, 2018). When teaching chemistry to French language learners, pedagogical expertise becomes essential in adapting VR content to linguistic and cultural contexts, ensuring effective knowledge transfer.

4. *Cultural Relevance and Language Integration*: Cultural relevance plays a vital role in language education (Byram, 1997). VR can be tailored to incorporate culturally specific scenarios, enhancing language acquisition and understanding of cultural nuances (Helm, 2015). Integrating culturally relevant content in VR experiences for teaching chemistry in French language classes not only aids language acquisition but also fosters cultural competence among students.

5. *Addressing Challenges in VR Implementation*: Challenges related to VR implementation in education include access disparities, teacher training, and content development (Merchant et al., 2014). Scholars have emphasized the need for collaborative efforts between educational institutions, policymakers, and technology developers to overcome these challenges (Sánchez, Claros, & Romero, 2012). Addressing these issues ensures equitable access to VR resources and empowers educators with the necessary skills to integrate VR effectively into language-based chemistry education.

6. *Outcome and Impact Studies*: Research studies assessing the outcomes and impact of VR-enhanced language-based chemistry education are essential to understanding its effectiveness. Longitudinal studies (Wu et al., 2013) and comparative analyses (Ke, 2016) provide insights into students' learning outcomes, language proficiency improvement, and overall engagement levels, shedding light on the efficacy of VR technologies in language-specific contexts.

The literature reviewed underscores the transformative potential of integrating VR technologies into teaching chemistry for French language classes. By focusing on pedagogical skills, cultural relevance, and addressing implementation challenges, educators can harness the power of VR to create immersive, engaging, and inclusive learning experiences. These studies serve as a foundation for the present research, emphasizing the need for a holistic approach that combines technological innovation with pedagogical expertise to enrich language-based chemistry education.

Analysis. Advantages of using VR technologies in teaching chemistry:

1. *Immersive Learning*: VR creates immersive environments, enabling students to explore complex chemical concepts in a visually stimulating manner, enhancing comprehension and retention.

2. *Interactive Simulations*: VR simulations allow students to conduct experiments and manipulate molecular structures, fostering active participation and deepening understanding.

3. *Language Acquisition*: Integrating VR into language-specific contexts provides students with opportunities to learn chemistry terminology in context, enhancing language acquisition alongside scientific knowledge.

4. *Cultural Relevance*: VR can incorporate culturally relevant contexts, making learning more relatable and engaging for French language learners.

Pedagogical skills for effective implementation:

1. *Content Integration*: Teachers must align VR experiences with the chemistry curriculum and language proficiency levels, ensuring seamless integration of language and scientific concepts.

2. *Language Support*: Providing language support within VR environments, such as subtitles or audio instructions in French, aids comprehension and enhances language learning.

3. *Scaffolded Learning*: Implementing scaffolded learning experiences within VR activities helps students build upon their prior knowledge, ensuring gradual progression in complexity.

4. Formative Assessment: Utilizing VR for formative assessments allows teachers to gauge students' understanding in real-time, enabling timely feedback and targeted support.

Challenges and considerations

1. Access and Equity: Ensuring equitable access to VR technologies is essential, addressing potential disparities in resources among schools and students.

2. Teacher Professional Development: Providing training and professional development opportunities for teachers is crucial to enhancing their pedagogical skills in utilizing VR effectively.

3. Content Development: Investing in the creation of high-quality, language-specific VR content tailored to the curriculum requirements is vital for meaningful learning experiences.

Discussion. Maximizing Educational Potential: The immersive nature of VR technologies allows students to transcend the confines of textbooks and classrooms, embarking on captivating journeys through the intricate world of chemistry, all within the linguistic context of the French language. By engaging students in virtual experiments, interactive simulations, and culturally relevant scenarios, educators can foster a deep sense of curiosity and exploration. Through these experiences, students not only grasp complex scientific concepts but also refine their language skills, seamlessly integrating academic and linguistic proficiencies.

Nurturing Pedagogical Skills: To harness the full potential of VR technologies, educators must cultivate specific pedagogical skills tailored to language-based education. Mastery of these skills empowers teachers to guide students effectively, ensuring that the immersive experiences translate into meaningful educational outcomes. These skills encompass not only technical proficiency in VR tools but also a keen understanding of language nuances, culturally sensitive content development, and the ability to scaffold learning experiences to cater to diverse student needs.

Overcoming Challenges for Inclusive Education: While the benefits are profound, challenges such as equitable access, teacher training, and content development must be systematically addressed. By investing in accessible VR resources, providing comprehensive professional development for educators, and fostering collaboration between institutions and technology developers, educational stakeholders can create an environment where VR technologies are readily available and effectively utilized. Moreover, the cultivation of a supportive ecosystem that encourages continuous learning and adaptation is essential, enabling educators to stay abreast of technological advancements and pedagogical best practices.

Inspiring Passion for Learning: Ultimately, the integration of VR technologies in teaching chemistry for French language classes goes beyond traditional education. It inspires a passion for learning, transforming students into active participants in their educational journey. Through immersive and culturally rich experiences, students not only acquire knowledge but also develop critical thinking, problem-solving skills, and a profound appreciation for the beauty of both chemistry and language. This holistic approach nurtures lifelong learners, equipping them with the skills and enthusiasm to thrive in an ever-changing global landscape.

In essence, the fusion of VR technologies, pedagogical expertise, and linguistic context represents a transformative force in education. By embracing these advancements, educational institutions pave the way for a future where every student, regardless of background or circumstance, can experience the joy of learning, fostering a generation of empowered individuals poised to make significant contributions to society.

Conclusion. Integrating VR technologies into teaching chemistry for French language classes holds immense potential for enhancing both scientific understanding and language acquisition. Educators must possess specific pedagogical skills to leverage VR effectively, ensuring that students benefit from immersive, interactive, and culturally relevant learning experiences. By addressing challenges related to access, teacher training, and content development, educational institutions can harness the power of VR to create engaging and inclusive learning environments, fostering students' passion for chemistry and language learning simultaneously.

Otherwise, the integration of Virtual Reality (VR) technologies into the realm of teaching chemistry for French language classes signifies a groundbreaking paradigm shift in contemporary education. This innovative approach not only amplifies scientific understanding but also enhances language acquisition, opening new avenues for engaging and inclusive learning experiences. The potential benefits of utilizing VR in language-specific educational settings are indeed immense, presenting educators with a unique opportunity to transform traditional classrooms into immersive and interactive hubs of knowledge acquisition.

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**“PEDAGOGIK MAHORAT” JURNALI UCHUN MAQOLALARNI
RASMIYLASHTIRISH TALABLARI**

“PEDAGOGIK MAHORAT” ilmiy jurnali mualliflari diqqatiga!

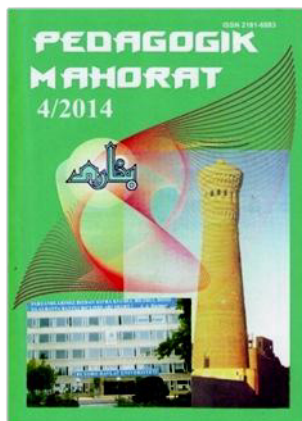
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2. E’lon qilinadigan maqolalarga bo‘lgan asosiy talablar:
 - ✓ ishning dolzarbligi va ilmiy yangiligi;
 - ✓ maqolaning hajmi: adabiyotlar ro‘yxati, chizma va jadvallar inobatga olingan holatda 4-8 betgacha;
 - ✓ maqola nomi, annotatsiya (80-90 ta so‘z) va tayanch so‘zlar (8-10 ta) ingliz, o‘zbek va rus tillarida keltiriladi.
3. Maqola boshida UDK (udc.online internet saytidan olishingiz mumkin), mavzu, muallifning F.I.O. (to‘liq yozilishi kerak), mualliflar bir nechta bo‘lsa, ularning har biri haqida to‘liq ma’lumotlar berilishi shart, tashkilot, shahar, mamlakat, muallifning e-maili ko‘rsatiladi. Matnda kirish qismi, tadqiqot obyekti va qo‘llanilgan metodlar, olingan natijalar va ularning tahlili, xulosa, adabiyotlar ro‘yxati, albatta, keltiriladi. Maqolada keyingi 10-15 yilda e’lon qilingan adabiyotlarga havola qilinishi tavsiya etiladi.
4. Matn uchun: Microsoft Word; Times New Roman, 11 shrift, maqola nomi bosh harflarda, interval 1,0; abzas 1,0 sm, yuqori va pastki tomon 2 sm, chap va o‘ng tomon 2 sm.
5. Agar maqolaga rasm, jadval, diagramma, sxema, chizma, turli grafik belgilar kiritilgan bo‘lsa, ular aniq va ravshan tasvirlanishi, qisqartmalarning to‘liq izohi yozilishi lozim. Formulalar matnga maxsus kompyuter dasturlarida kiritilishi kerak.
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