Language Learning Design in K-12 AR Classroom

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Milgram’s Reality-Virtuality Continuum

Real Environment  Augmented Reality (AR)  Augmented Virtual (AV)  Virtual Reality (VR)

VR/AR can be used to simulate learning objects, allowing learners to see and operate the generated virtual models and scenes in the real environment, providing a space for autonomous exploration in the most natural interactive form.
VR/AR teaching conforms to educational theory

行爲主義Behaviorism
学习是刺激-反应(S-R)联结公式，
由刺激得到反应而完成学习

具身认知理论Embodied cognitive theory
只有当学习者的认知、身体与环境三者
进行有效互动时才能进行学习

建构主义Constructivism
“把实验室搬到课堂中去”
children are encourage to discover themselves through spontaneous interaction with the environment
“学习是一种真实情境的体验”
humans construct knowledge and meaning from their experiences

蔡苏, 王沛文, 杨阳, 刘恩睿. 增强现实(AR)技术的教育应用综述[J]. 远程教育杂志, 2016, 05: 27-40
Figure 5. Game 1 being played with Portuguese (left image) and English (right image) words.

Figure 6. Game 2 being played. An incorrect match is performed on the left image and a correct match on the right image.
## Trends in Educational Technology 2009 - 2020

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<tbody>
<tr>
<td>1 year or less</td>
<td>Mobiles</td>
<td>Mobile Computing</td>
<td>Electronic Books</td>
<td>Mobile Devices &amp; Apps</td>
<td>BYOD</td>
<td>Makerspaces</td>
<td>Makerspaces</td>
<td>Analytics Technologies</td>
<td>Mobile Learning</td>
<td>Adaptive Learning</td>
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<td>2-3 years</td>
<td>Cloud Computing</td>
<td>Open Content</td>
<td>Mobiles</td>
<td>Tablet Computing</td>
<td>Learning Analytics and Adaptive Learning</td>
<td>Online Learning</td>
<td>Robotics</td>
<td>Makerspaces</td>
<td>Analytics Technologies</td>
<td>AI/Machine Learning</td>
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<td></td>
<td>Geo-Everything</td>
<td>Electronic Books</td>
<td>Augmented Reality</td>
<td>Game-Based Learning</td>
<td>Augmented and Virtual Reality</td>
<td>Robotics</td>
<td>Analytics Technologies</td>
<td>Adaptive Learning Technologies</td>
<td>Mixed Reality</td>
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<td>Simple Augmented Reality</td>
<td>Game-Based Learning</td>
<td>Personal Learning Environments</td>
<td>Makerspace s</td>
<td>Virtual Reality (include AR)</td>
<td>Virtual Reality (include AR)</td>
<td>Artificial Intelligence</td>
<td>Artificial Intelligence</td>
<td>Elevation of Instructional Design, Learning Engineering, and UX Design</td>
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<td>4-5 years</td>
<td>Semantic-Aware Applicatio ns</td>
<td>Gesture-Based Computing</td>
<td>Gesture-Based Computing</td>
<td>Augmented Reality</td>
<td>Affective Computing</td>
<td>Artificial Intelligence</td>
<td>Artificial Intelligence</td>
<td>Mixed Reality</td>
<td>Blockchain</td>
<td>Open Educational Resources</td>
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<td>Smart Objects</td>
<td>Visual Data Analysis</td>
<td>Learning Analytics</td>
<td>Natural User Interfaces</td>
<td>Robotics</td>
<td>Wearable Technology</td>
<td>The Internet of Things</td>
<td>Robotics</td>
<td>Virtual Assistants</td>
<td>XR(AR, VR, MR, Haptic) Technologies</td>
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http://www.nmc.org/publication-type/horizon-report/
"We must fully promote the deep integration of information technology and education and teaching. Comprehensive use of the Internet, big data, artificial intelligence and virtual reality technology to explore a new model of future education and teaching."
国家自然科学基金增设教育信息科学与技术

“围绕教育信息科学中的知识生产、认知规律、学习发展等方面的核心科学问题与关键技术，进行原创性、基础性、前瞻性和交叉性研究；鼓励在人工智能驱动教育的基础理论与方法、虚拟与增强现实学习等方向的理论与方法研究”
“VR/AR+ Education” Lab in Beijing Normal University is aimed to research on K-12 AR application in education, human-computer natural interaction, STEM education. The team also went to the primary and secondary schools in mainland China, Hong Kong, Malaysia etc. to conduct empirical case teaching, and continuously cycled iterations to explore how the AR learning environment can support teaching and learning.

Outstanding students in lab:

Wang Xu  
Harvard University

Chen Miao  
UCL

Zhu Gaoxia  
University of Toronto

Li Hao  
CMU

Cai Su, Director of VR/AR+Edu Lab
“AR+Education” K-12 Experimental Schools

天津南开外国语中学
北京五十中分校
北京师范大学朝阳附属小学
清华附小
安徽阜南一小

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北京海淀区培智中心学校
山东莱芜市花园学校
AR English Lessons in Primary School
——Solar System, Sun & Earth, Our Earth


实验学校：清华附小  Tsinghua University Primary School
https://mp.weixin.qq.com/s/uyBen3hvTr1mAtEipmSJ3Q
渐进式推进课堂教学变革

轻量的技术/设备  优秀的教学设计  技术赋能教育
不要笨重的专用设备  不要炫技式教学  不是取代教师
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