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USING VIRTUAL TOURS AND 3D MODELS TO TEACH ARCHITECTURE-RELATED ENGLISH VOCABULARY

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Abstract

The article discusses how virtual tours and 3D models can be used to teach English architectural terms to undergraduate architecture students. The research was carried out as part of the VTTSS (Virtual Technologies for Teaching Special Subjects) methodology at three universities of Uzbekistan: TAQU, SamDAQU and UrDU. In total 240 students took part. In the experimental groups new terms were introduced through guided virtual tours of buildings and work with 3D models, while the control groups studied the same terms in the usual way, with texts and glossaries. We assessed students' terminological competence with a drawing task, an oral test, a written test and a portfolio. On the post-test the experimental groups showed better results than the control groups. In our view, when students connect a term with the real object and its place in a building, they remember it longer and use it more readily in speech.

Keywords: ESP, architectural terminology, virtual tour, 3D model, VTTSS, terminological competence, visualization.

Introduction

In recent years English for Specific Purposes (ESP) has become an important part of training specialists in non-linguistic universities of Uzbekistan. Presidential Decree PQ-5117 of 19 May 2021 set the task of bringing foreign language learning to a qualitatively new level, and the Development Strategy of New Uzbekistan for 2022-2026 pays special attention to the use of digital technologies in education. For a future architect this means not just general English, but a large and quite specific professional vocabulary.

From our teaching experience, Uzbek students find architectural terms difficult for several reasons. Many of the terms name elements of a building that are hard to imagine from a definition. A student may read that a cantilever is "a beam fixed at only one end" and still not picture it. The same is true for buttress, clerestory or pediment. Some terms have no exact equivalent in Uzbek or Russian, so translation does not help much. And in a typical ESP class the terms are still given as a list with translations, separately from the objects they describe. As a result, students can often recognise a term in a test but do not use it when they have to describe a real building or their own project.

The theory of multimedia learning suggests a solution. According to Paivio's (1986) dual coding theory, information stored both in words and in images is remembered better. Mayer (2009) also showed that people learn more deeply from words together with pictures than from words alone. Nation (2013) reminds us that knowing a word means knowing its form, meaning and use, not only its translation. Virtual tours and 3D models allow the teacher to show each term on the real object, so the student sees what the word means and where it belongs.

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Virtual reality and similar tools are already studied in language teaching (Parmaxi, 2020). However, we found very few works on their use for teaching architectural English in Uzbek universities. Therefore, the aim of this study was to find out whether teaching architectural terms through virtual tours and 3D models, within the VTTSS methodology, improves students' terminological competence compared with traditional teaching.

Methods

The experiment involved 240 undergraduate students of architecture from three universities: Tashkent University of Architecture and Civil Engineering (TAQU), Samarkand State University of Architecture and Civil Engineering (SamDAQU) and Urgench State University (UrDU). At each university students were divided into experimental and control groups. The groups were similar in age, year of study and level of English, and the pre-test confirmed this.

For the experimental groups we used two kinds of digital materials. The first was virtual tours of buildings, viewed as 360 degree panoramas and on online museum platforms. We chose both local monuments of Samarkand, Bukhara and Khiva and well-known buildings from other countries, so that students could compare styles. The second was 3D models of building elements and structures, such as columns, arches, domes, roof systems and facades. Students could rotate these models, look at them in section and label their parts. The core terms were taken from the architecture curriculum and divided into thematic units: structural elements, architectural styles, building materials and urban space.

Lessons in the experimental groups followed the stages of VTTSS. Students first met the new terms during a guided virtual tour. Then they found the same elements on a 3D model and labelled them. After that they used the terms in short oral descriptions and written exercises, and at the end of each unit they prepared a small project, for example a presentation of a building they liked. The control groups worked with the same terms, but through texts, glossaries with translations and ordinary exercises.

To measure terminological competence before and after the experiment we used four instruments. In the drawing task students sketched building elements named in English and labelled them. In the oral test they described a building shown in a picture. The written test checked recognition of terms, their definitions and their use in context. Finally, students' project work was collected in a portfolio and assessed with an analytic rubric. The results of the two groups were compared using standard statistical methods: Welch's t-test, ANCOVA with pre-test scores as the covariate, and effect size (Cohen, 1988).

Results

Before the experiment there was no significant difference between the experimental and control groups, so both started from about the same level. After the experiment, the experimental groups achieved higher results on the post-test, and the difference between the groups was statistically significant. The ANCOVA, which took the pre-test scores into account, also confirmed the effect of the teaching method. However, one of its assumptions, the homogeneity of regression slopes, was not fully met, so we regard the t-test as the main evidence and the ANCOVA as additional support.

The improvement was visible in different types of tasks. In the drawing task, students of the experimental groups placed and labelled building elements more accurately. In the oral test, they more often used the exact term instead of explaining the object in other words. Their portfolios also showed a wider and more confident use of professional vocabulary. It seems that for these students a term was already linked to a clear picture of the object, and this made it easier to recall and use.

Discussion

The results support our hypothesis that virtual tours and 3D models help students learn architectural terms in English. This is in line with dual coding theory (Paivio, 1986) and with Mayer's (2009) multimedia principle. When a student meets a new word and at the same time sees the object it names,

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the word is stored in memory both verbally and visually. Architecture students are trained to think in space and images, so for them this visual support is probably even more important than for students of other specialties.

It is worth noting that the improvement was not only in recognising terms. Students in the experimental groups also used the terms more actively when speaking and in their projects. For ESP this is the main point, because the goal of the course is not to memorise a list of words but to be able to use them in professional situations (Hutchinson & Waters, 1987; Dudley-Evans & St John, 1998). Working with 3D models gave students a natural reason to speak: to explain how a dome or a roof truss works, they simply needed the right words.

The study also had certain limitations. The level of technical equipment was not the same in all three universities, and in some classrooms the internet connection was unstable. Preparing virtual materials also took the teacher a lot of time. In addition, one of the ANCOVA assumptions was not fully met. In the future it would be useful to test the method over a longer period and to try it with VR headsets.

Conclusion

The experiment showed that teaching architectural English terms through virtual tours and 3D models, as part of the VTTSS methodology, gives better results than traditional teaching with glossaries. Students connect each term with a real object and its place in a building, and this helps them both remember the term and use it. We believe this approach can be recommended for ESP courses at architecture and civil engineering universities of Uzbekistan, especially since most of the necessary tools are free. It could also be adapted for other specialties where terms describe physical objects, for example engineering, design or construction.

References

1. O'zbekiston Respublikasi Prezidentining 2021-yil 19-maydagi "Xorijiy tillarni o'rganishni ommalashtirish faoliyatini sifat jihatidan yangi bosqichga olib chiqish chora-tadbirlari to'g'risida"gi PQ-5117-son qarori.
2. O'zbekiston Respublikasi Prezidentining 2022-yil 28-yanvardagi "2022-2026-yillarga mo'ljallangan Yangi O'zbekistonning taraqqiyot strategiyasi to'g'risida"gi PF-60-son farmoni.
3. Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.
4. Dudley-Evans, T., & St John, M. J. (1998). Developments in English for specific purposes: A multi-disciplinary approach. Cambridge: Cambridge University Press.
5. Hutchinson, T., & Waters, A. (1987). English for specific purposes: A learning-centred approach. Cambridge: Cambridge University Press.
6. Mayer, R. E. (2009). Multimedia learning (2nd ed.). Cambridge: Cambridge University Press.
7. Nation, I. S. P. (2013). Learning vocabulary in another language (2nd ed.). Cambridge: Cambridge University Press.
8. Paivio, A. (1986). Mental representations: A dual coding approach. New York: Oxford University Press.
9. Parmaxi, A. (2020). Virtual reality in language learning: A systematic review and implications for research and practice. Interactive Learning Environments, 31(1), 172-184.
10. Sabirova, N. K. (2026). The conceptual framework and pedagogical affordances of VTTSS: A new paradigm for specialised instruction. Maktabgacha va maktab ta'limi, 3(1).

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