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The Connectivist Model of a Foreign Language Educational SMART Environment: from Design to Practice

The paper examines the development of the Connectivist model through the identification of key components of the foreign-language SMART environment. The study is based on the methodology of structural modeling for designing and developing a foreign-language SMART environment. The application of this methodology to modeling educational environments is related to the studied phenomenon, which is based on five fundamental components of the SMART domain: (Self-), (Media-), (Art-), (Re-), and (Trans-). Analysis of the literature review, regulatory and legal documents, as well as labor market requirements, helped to determine all structural components of the model and their content. The target, theoretical, and methodological components present basic conceptual approaches and principles; the leading content, functional, and technological components represent the conditions of operation of this model. The teacher and student are "divergent individualities" and the main actors of the proposed model, which contributes to its implementation and integration into the educational space. The article argues that the integration and interaction of all these model components will contribute to achieving its goal and help create a sustainable learning environment.

Keywords: Connectivist model, SMART environment, SMART components, "lifelong learning", framework, AI in education, reflective practices, translation students, "divergent individuality", sustainable learning environment.

Introduction

The Republic of Kazakhstan's education system has changed a lot in the last ten years. The curriculum, teaching methods, learning and child–rearing objectives, and the development of educational results (competencies) have all undergone significant changes. The reality of the changed times has also changed the job of the instructor, reflecting a change in opinions on the SMART competency of a teacher in documents of state and strategic importance of the Republic of Kazakhstan, including in the framework of the Sustainable Development Goals (SDGs), which defines the relevance and timeliness of finding ways to solve it [1]; in the UNESCO SDGs roadmap in the field of education, which advises, which states the need to transform every teacher into a facilitator in order to support student self–expression [2]; and in the content of the Standard Secondary School Curricula (grades 1–11) (SES), compiled with the support of the UNESCO Cluster Office in Almaty for Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan, which prescribes the need to create interdisciplinary spaces and to include students in conversations and discussions on the topics under consideration [3].

Our earlier research verified that the facilitator performs such roles as a leader, a citizen of the digital community, an organizer of learning in collaboration and connectivism, a specialist in pedagogical design and transmedia storytelling, and a strategist-analyst [4]. It also showed connectivism as a technological innovation in teaching foreign languages in a mixed format [4; 70]. Simultaneously, we discovered that connectivist technologies are quite underdeveloped in the Republic of Kazakhstan and that there are no educational initiatives grounded on connectivism whatsoever [5]. Also, the lack of sufficient local–level teachers and facilitators poses a significant obstacle to achieving the SDGs in education and foreign language instruction. Furthermore, there is ongoing discussion about the integration of connectivist technologies and facilitation strategies into Kazakhstan's multi–level educational system. Thus, evaluating the possibilities of our novel foreign language teaching SMART–environment model is the primary aim of this research.

Methods and materials

The research methodology is based on the synthesis of theoretical analysis of scientific literature and the design of our own model [6]. As a methodological basis for the research, the connectivist approach to learning is used, which is based on the formation of knowledge through interaction with communities, digital resources both in the network space and in the educational environment [7]. The connectivist approach is a relatively new idea that uses connectivity for learning and acquiring new information and ideas. Connectivity is an important concept in education for sharing our own knowledge and understanding. Educators may employ a connectivist approach, prompting learners to utilize the concept of "the wisdom of the crowd" for problem-solving, decision-making, and enhancing their productive skills. Connectivist theory draws on complexity theories to understand learning as a complex adaptive system in which students and teachers adapt to changing conditions, seek relevant information, and make decisions based on feedback received from other students.

Connectivism emphasizes social learning and collaboration in learning environments and networks. Learners and educators are active actors in learning communities and on group work platforms, sharing ideas, engaging in collective meaning-making and ideation activities to enhance their cognitive abilities and access relevant information.

The concept of connectivism emphasizes the need for learners to develop knowledge search and filtering skills to manage the vast amount of information available in the online environment. Learners should critically evaluate the validity, relevance, and reliability of information sources and manage their personal learning networks to access high-quality information.

Connectivist theory thus offers a contemporary view of learning that recognizes the transformative impact of digital technologies and networks on the acquisition and dissemination of knowledge. Following connectivist principles, educators can design curricula and courses that foster collaboration, creativity, and adaptability in today's digital society.

Thus, the key principles of connectivist theory were taken into account when designing the *Connectivist Model of a Foreign Language Educational SMART-Environment.*

In the first stage, the research literature is analyzed, which meets the criteria for a certain topic. At the same time, data collection should be as complete as possible for the validity of the presentation of the research findings [8]. Accordingly, scientific and methodological literature was searched in the following electronic databases: Springer, Scopus, and Google Scholar, the three most frequently used in the field of foreign language education according to criteria:

- Sources in the field of foreign language education that contain terms related to the topic in the title, abstract, and keywords.
- Empirical or theoretical research exclusively from the last 10 years (2015–2025).
- Restriction on the age of the target group.
- Studies published in both English and Russian.

Keywords and terms included "Design of learning environments", "SMART framework", "SMART education", "connectivist practice", "effective teaching approaches", "effective teaching practices", "21st century competences", and various combinations of these keywords and terms. The articles were analyzed and assessed for relevance. These concepts were systematically arranged into theoretical viewpoints that form the foundation of the analytical framework presented in this article.

The second stage involves designing the connectivist model of a foreign language educational SMART environment. At this stage of the research, the modeling method was applied, which is the basis for analyzing theoretical data [9]. The concept of "model" is widely used in various fields of science. In the broadest sense, a model is a sample, an ideal description of some object or system of objects. One of the main functions of a model is not only to study and analyze various phenomena (objects) under study, but also to predict their development. The study is based on the methodology of structural modeling, which allowed us to identify the structural components and elements of the foreign-language SMART environment and to establish the relationship between the components and elements. It is based on four key components that represent the integrity of this model. Figure 1 shows the procedure we followed before designing The Connectivist Model of a Foreign Language Educational SMART-Environment.

The next stage involved the design of The Connectivist Model of a Foreign Language Educational SMART-Environment. Using modeling as a research tool, here is an example of the design process of our proposed model based on the connectivist approach. The model design was not as easy as it looked and in-

cluded several stages. The first stage included a thorough study of experience related to the phenomenon under study and the analysis and generalization of this experience underlying the future model. The second stage consisted of drawing up a plan for the model development and implementation in practice in accordance with the developed plan. We made further adjustments based on practical experience. The third stage involved the creation of the final version of the model. If at the second stage the research group offered various versions of the constructed SMART model, at the third stage, on the basis of these variants, the final model was designed, including all the processes, which were based on the connectivist approach.

The method of modeling opens up for pedagogical science the possibility of systematization of pedagogical processes. The application of modeling is most closely connected with the increasingly deep understanding of the essence of educational phenomena and processes and the deepening of the theoretical foundations of research.

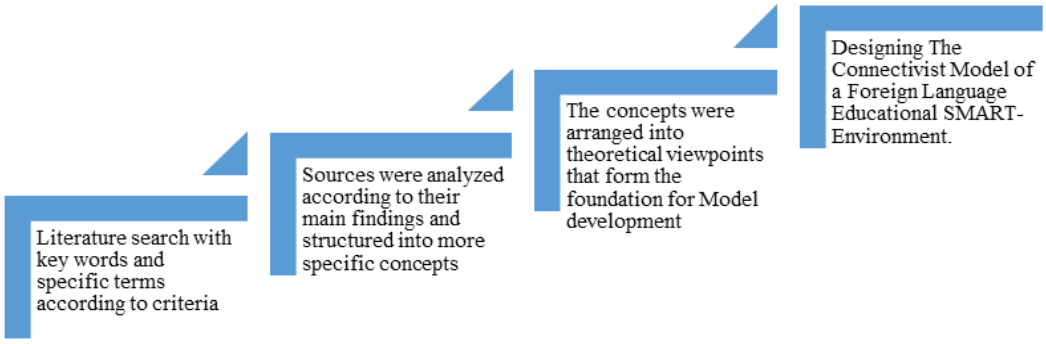

Figure 1. The procedure followed to reach to the Model components development

Results and discussion

In this section the connectivist model of a foreign language educational SMART environment is first described. The designed model is focused on studying the structural features of the components, as well as its integration and reproduction in new conditions. The main purpose of our research is to present fundamental components for the integration of the connectivist model of the foreign language SMART environment, which will help to realize the ideas of modern foreign language education in the stakeholders' interests, with an emphasis on "lifelong learning".

The designed model, presented in Figure 2, is based on the preliminary scientific literature analysis [10] and generalization of our own pedagogical experience, as well as on the results of research conducted by Kazakhstani and foreign scientists in the field of foreign language education. We emphasize the following key components of the proposed model:

1. Target block describing the requirements of social demand, state, employers regarding the level of foreign language training of university graduates.

2. Theoretical and methodological block includes methodological approaches and pedagogical principles aimed at the effective functioning of the connectivist model of foreign language SMART environment in the Kazakhstani context and outlines the main approaches to learning used in its implementation, as well as the principles of learning, according to which the learning process is organized. In pedagogical literature, the concept of "approach" is used as a set of ideasand methods underlying the solution of problems. The term "approach" is understood as an ideology and methodology of problem solving, and reveals its main idea.

3. Content, functional and technological blocks together with SMART components help to approach this issue comprehensively and create mechanisms for the development and improvement of foreign language SMART environment. The content component of the model determines the actual content of the educational process in which students' professional competence is formed and includes learning tools, organizational forms and teaching methods used in the process of SMART environment formation. Pedagogical conditions determine the mode in which the formation of professional competence will be effective.

4. Teacher and student roles are the main components and active participants in the construction and implementation of the foreign language SMART environment. Both teacher and student are characterized by their multifaceted nature with a set of key competencies to act as divergent individualities. The effectiveness of the connectivist model of foreign language SMART environment implementation directly depends on equal partnership interaction, which is aimed at mutual learning of both student and teacher.

The core block that interacts and integrates into each of the components of the presented model is the SMART component, so we will focus on its interpretation in more detail.

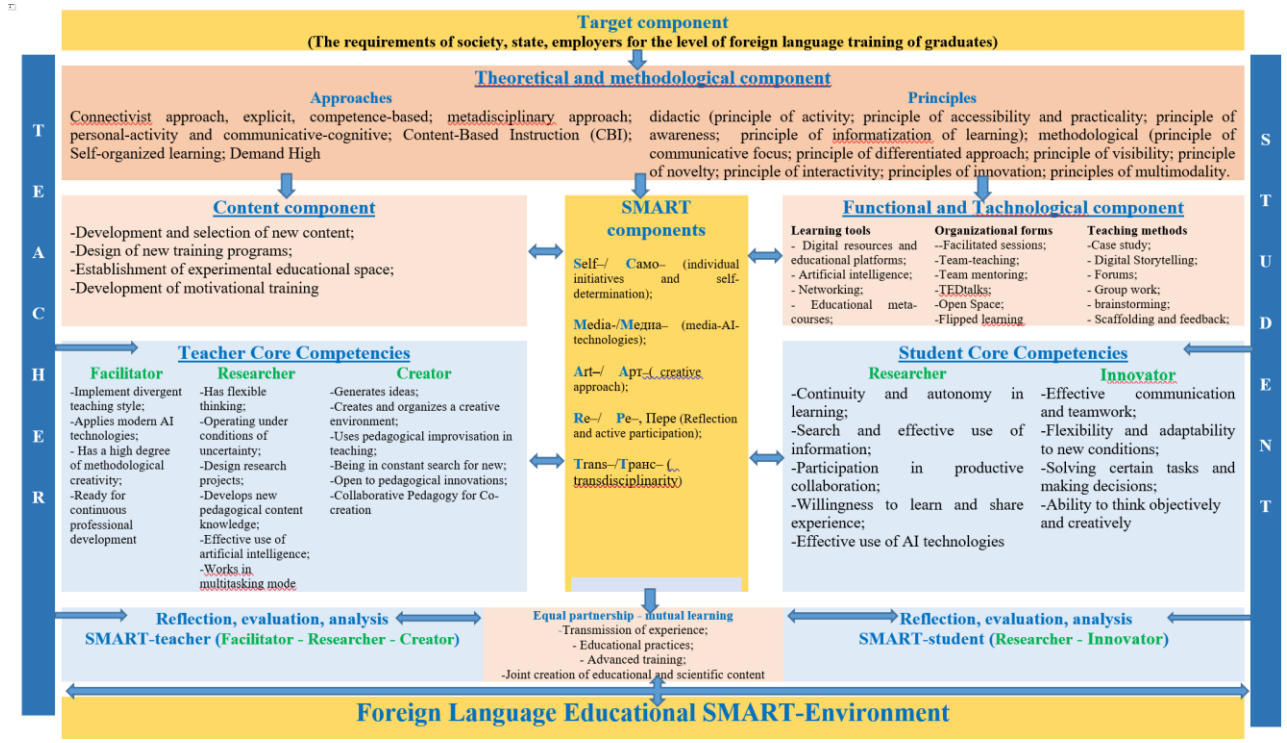

Figure 2. The Connectivist Model of a Foreign Language Educational SMART-Environment
(Source: created by the authors)

When elaborating on the research study, we aimed to determine the growing potential of the unique model of the SMART foreign language educational environment we present. The acronym "SMART" now refers to the development of SMART competencies in both teachers and students using universal connectivist technologies. This approach aims to promote lifelong learning and cultivate SMART teachers and learners in a digital global context.

Previously, the term "SMART" (adjective) has been defined as "smart", but it is also an abbreviation that may be viewed from two perspectives: managerial [11] or technical [12-13]. We interpret the structure of the "SMART" concept from a global perspective, reflecting a significantly advanced level of research. It reveals a collection of interconnected traits of personality in both teachers and students, as well as promising directions for their enhancement, particularly when they engage in connectivism (Table 1).

Table 1

The essence of the "SMART" concept

Managerial understanding	Technological understanding		Our Global understanding
• **S**pecific • **M**easurable • **A**chievable • **R**elevant • **T**imed	• **S**ocial / • **M**otivated / • **A**nywhere / • **R**esource enriched / • **T**echnology embedded /	**S**afe **M**itigating **A**ccountable **R**esilient **T**raceable	• **S**elf- • **M**edia- • **A**rt– • **R**e– • **T**rans–

(Source: created by the authors)

Table 1 shows several models for "SMART". One could argue that connectivist technology enables students and teachers to acquire global competence. Teachers and students apply global (SMART) competencies for self-awareness, self-development, self-education, and positive social experiences. This fosters community relationships by including all members in joint decision-making and the execution of important decisions. For example, it becomes possible to develop academic writing skills using digital tools such as "Quiz, Quiz Trade" or "Rally Coach" [14].

What's more, the media handling practices of all educational participants help foster media literacy, and freedom in online communities. For example, the creation of multimodal texts during the collaboration of a teacher and a student enables multimodal and transmedia content creation and improves speaking skills [15].

Additionally, teachers can construct and enhance an educational environment by learning from each other how to employ varied, adaptive, and promising arts pedagogy strategies if students assist in generating authentic educational resources. For example, it was the constructive feedback of first-year students about the content of museum podcasts during the experimental recording of their voices that forced us to completely rework all transcripts, which significantly improved the quality of both the final audio files and the educational part: the dialogue of the speakers became authentic and interactive, and there were facilitation scenarios for each episode [16].

Next, the connectivist approach enables the integration of transdisciplinary technologies, bringing together seemingly disparate fields such as paleontology and English [17].

Finally, the use of connectivist mobile technologies fosters transculturality by bringing together students from various countries to build strategic routes [18], allowing them to share their perspectives on each other's countries and leverage collective wisdom to enhance individual potential and educational outcomes through collaboration.

Therefore, the suggested solutions related to the worldwide interpretation of "SMART" focus on fostering professional and personal growth in the SMART network environment, where teachers and students can teach and learn from each other.

Here, we will thoroughly analyze each of these components within the framework of developing connectivist competence in teachers and learners. Additionally, we will present specific examples of how our model can be implemented in the Intercultural Communication, Translation Theory, and Basics of Research courses when training translation students (Table 2).

Table 2

Interpretation of the "SMART" components

Self —	This component encourages all participants in the educational process (teachers and students) to self-manage and evaluate their progress. As educators, we actively engage first- and second-year translation students to choose research topics that match their personal interests, personality types and hobbies within the framework of such disciplines as Intercultural Communication, Translation Theory, Translation and Interpreting Practice. The choice of topics is discussed in the course Basic of Research, where students learn to identify a research problem, choose appropriate research methods and find relevant scientific articles on their topic. We have given students the freedom to choose the specific types of texts they wish to translate, taking into account their intended professional field.
Media —	This component includes the use of various technologies in education to make learning more effective. Students and teachers actively use online forums, podcasts, video blogs, etc. to improve communication and teamwork. We find that the use of various tools in the classroom increases students' interest and engagement in the educational process and contributes to the development of their digital and media literacy.
Art —	The creative approach in teaching is focused on maintaining and developing the creative potential of all participants of the educational process. Within different disciplines, we motivated students to develop creative thinking through digital storytelling, cartoon or movie voice-over, questionnaires for research, tutorials and others. We were able to organize co-collaboration, co-cooperation and co-creation, which contributed to the students' global competencies development.
Re —	A key aspect of this component is engaging and providing feedback. By applying various mechanisms for organizing student-student, student-teacher(facilitator), teacher(facilitator)-teacher feedback, which included comments, evaluations, recommendations, reviews, online discussion forums, etc. we saw students' interest in receiving feedback and their involvement in giving their feedback to other students. This approach stimulated students' ability for self-reflection, self-improvement, and critical thinking.

Continuation of Table 2

Trans —	When planning a lesson, we included information from several scientific fields, ensuring transdisciplinarity. This approach significantly motivated students to find interdisciplinary connections, encouraging students and teachers to find non-standard solutions and develop divergent thinking. Within the Translation Theory course, we assigned students the task of translating materials from many domains of expertise, including law, medicine, commerce, tourism, and more. We instructed students in the Basics of Scientific Research course to utilize diverse ideas and concepts from various disciplines to evaluate their research findings.

Figure 3 shows the relevance of one student's research topic in terms of the above–mentioned concept. Consequently, we established a networked SMART space that fostered the growth of connectivist proficiency in both educators and learners, thereby enhancing the caliber and pertinence of their research. The study confirms the effectiveness of the proposed SMART concept, as evidenced by previous research [19] where the examples of assignments and assessment procedures were presented.

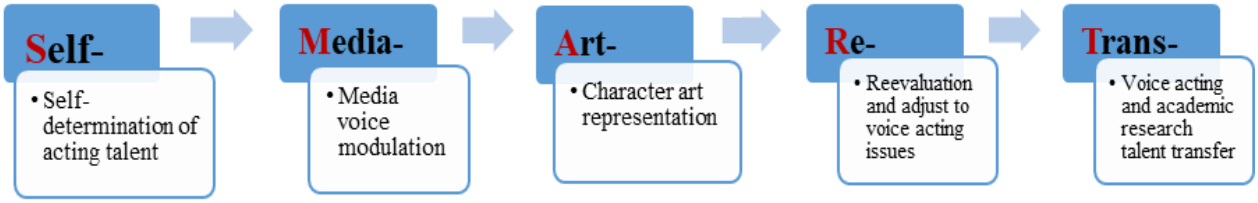

Figure 3. How student's research topic concerning voicing "JoJo's Bizarre Adventure" relates to the SMART concept (Source: created by the authors)

Since the proposed model is currently being piloted, the effectiveness of its implementation is being tested. However, there was an analysis of the results and dynamics of pretest and posttest scores. The pretest and posttest results, which serve as indications of students' progress in language competence, were analyzed and compared using the Wilcoxon Signed-Rank Test. Because it can be used for qualitative data measured on an ordinal scale, this approach is versatile. The variable in our study has at least three levels, which meets all the requirements for using this test. According to the CEFR, we employed the following levels of English language proficiency: A1-1, A2-2, B1-3, B2-4, C1-5. The following methods were used to acquire data. We tested participants' reading, grammar, and vocabulary at the beginning of the experiment to assess their level of English competence.

Then, throughout the term, the students concentrated on applying SMART components to develop their language skills in a practical, step-by-step manner. A pretest and a posttest were given before and after the experiment, respectively. After that, we determined how much each student's scores had changed from before the experiment to after. Absolute values were used to rank the differences. The ranks of the positive and negative differences were then added up separately. The critical value of the criterion was compared with the smaller sum of the ranks that were obtained.

The descriptive statistics revealed that the mean posttest score (M = 4.1) was higher than the mean pretest score (M = 3.4), indicating an improvement in language proficiency after the experiment. The results of the Wilcoxon Signed-Rank Test, as seen in Table 3 below confirmed a statistically significant difference between the pretest and posttest scores ($Z = -3.56$, $p < .05$).

Table 3

Result of the Wilcoxon-Singed Rank Test for the language proficiency Scores

Strategic_Post — Strategic_Pre	
Z	-3.561
Asymp. Sig. (2-tailed)	.000

Thus, statistical significance was achieved, the first null hypothesis was rejected, confirming that the suggested model had a significant positive impact on learners' language productive skills.

Our experience allowed us to define the core aspects to consider when creating connectivist models of a foreign language educational SMART environment based on blended forms of foreign language learning. Firstly, interaction and collaboration between topic areas and specialists are needed to establish training programs and assignments that incorporate linguistics, pedagogy, culture, and other subjects. Secondly, materials and assignments that represent other cultures and help students build cross-cultural competency will allow students to share experiences and appreciate cultural differences. Thirdly, community involvement in language learning, collaborative meetings, discussions, and activities to discuss SMART environment objectives and principles can assist in building a helpful and dynamic environment for learners. Additionally, the SMART environment will remain relevant and successful by actively monitoring foreign language teaching technology and research. Finally, periodic evaluation and review of the model developed and its effectiveness, comparing learners' results and achievements with set goals, and feedback from learners, facilitators, and other stakeholders will help improve the model.

Conclusion

The study identified structural components of the Connectivist model of a foreign language SMART environment. The theoretical and methodological literature review and the analysis of pedagogical experience allowed us to reveal the lack of complex pedagogical models of development in the foreign language SMART environment of the university. At the same time, Kazakhstani pedagogical science and educational practice have accumulated sufficient experience of pedagogical modeling, which allows for highlighting the appropriate teaching methods, organizational forms and learning tools for efficient integration and the conditions for its implementation.

The blocks of the Connectivist model developed by the authors (target, theoretical and methodological components, content, and functional and technological components) reflect pedagogical approaches, methods, didactic principles, and pedagogical conditions for its development and integration into the university space.

The proposed model addresses key pedagogical challenges concerning the requirements of society, the state, and employers for the level of foreign language training of graduates by categorizing learning principles and approaches, clearly defining teacher and student roles, and designating specific SMART spaces for diverse activities. The suggested principles and approaches, supported by teacher and learner roles, aim to create a more efficient, learner-teacher-centric system that enhances engagementand collaborative learning. The implementation of a detailed model demonstrates how these components can be compatible and interoperable within the university foreign language SMART environment.

Future research will focus on the complex validation of the proposed model in practice and then the analysis of the model's effectiveness when organizing teacher and student team interaction within foreign language training.

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Шет тілдік білім беру Smart-ортасының коннективистік моделі: жобалаудан практикалық іске асыруға дейін

Мақала шет тілдік білім беру Smart-ортасын анықтайтын негізгі компоненттерді айқындау арқылы коннективистік модельді әзірлеуге арналған. Зерттеу шет тілдік білім беру Smart-ортасын құру және дамыту үшін құрылымдық модельдеу әдістемесіне негізделген. Бұл әдістеме білім беру орталарын модельдеуге қолдану зерттелетін құбылыстың бағытына негізделген және SMART-ортаны дамытуға арналған бес негізгі компонентке сүйенеді: (Self–), (Media–), (Art–), (Re–) және (Trans–). Әдеби шолуды, нормативтік құжаттарды, сондай-ақ еңбек нарығының талаптарын талдау модельдің барлық құрылымдық компоненттерін толықтыруға және олардың мазмұнын анықтауға көмектесті. Модельдің мақсатты, теориялық-әдіснамалық компоненттерінде негізгі тұжырымдамалық тәсілдер мен қағидалар көрсетілген, ал мазмұндық және ұйымдастырушылық-технологиялық компоненттер оның жұмыс істеу шарттарын сипаттайды. Оқытушы мен студент те осы модельдің негізгі байланыстырушы буындары, олар оны іске асыруға және оқу кеңістігіне интеграциялауға қатысады және «divergent

individualities» ретінде қарастырылады. Мақалада модельдің барлық компоненттерінің интеграциясы мен өзара әрекеттесуі ғана оның мақсатына жетуге ықпал ететіні және тұрақты оқу ортасын құруға көмектесетіні атап көрсетілген.

Кілт сөздер: коннективистік модель, SMART-орта, SMART-компоненттері, «өмір бойы оқыту», білім берудегі ЖИ, рефлексиялық тәжірибелер, аудармашы-студенттер, «дивергентті даралық», тұрақты оқу ортасы.

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Коннективистская модель иноязычной образовательной SMART-среды: от проектирования к практической реализации

Статья посвящена разработке коннективистской модели через выявление ключевых компонентов, определяющих иноязычную образовательную SMART-среду. В основе исследования лежит методология структурного моделирования для построения и развития иноязычной образовательной SMART-среды. Применение этой методологии к моделированию образовательных сред связано с ориентацией на изучаемое явление, в основе которой лежит пять основных компонентов для развития SMART-среды: (Self–), (Media–), (Art–), (Re–) и (Trans–). Анализ литературного обзора, нормативно-правовых документов, а также требований рынка труда помогли заполнить все структурные компоненты модели и определить их содержание. В целевом и теоретико-методологическом компонентах представлены основные концептуальные подходы и принципы; ведущие содержательный и организационно-технологический компоненты представляют собой условия функционирования данной модели. Педагог и студент также являются основными связующими звеньями данной модели, которые участвуют в ее реализации и интеграции в учебное пространство и являются “divergent individualities”. В статье говорится, что только интеграция и взаимодействие всех этих компонентов модели будет способствовать достижению ее цели и поможет создать устойчивую среду обучения.

Ключевые слова: коннективистская модель, SMART-среда, компоненты SMART, «обучение в течение всей жизни», ИИ в образовании, рефлексивные практики, студенты-переводчики, «дивергентная индивидуальность», устойчивая среда обучения.

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