University environment today: problems and prospects of spatial organization. INRTU

O Ye Zheleznyak, M V Korelina
Smagin Department of Monumental and Decorative Painting and Design, Irkutsk National Research Technical University, 83, Lermontov str., Irkutsk 664074, Russia

E-mail: olgaej1@yandex.ru

Abstract. When it comes to advancing the higher education system, the Government’s priority is to create a state-of-the-art university environment with a one-of-a-kind innovation space. This paper analyzes the core factors behind this process: the specifics of the University’s life in the era of new technology; interpretation of the learning environment and its spatial organization as part of the University’s image; presenting the Campus as a progressive approach to embedding the University in the real world of today and its problems, as part of the University’s identity. The University herein means Irkutsk National Research Technical University, or INRTU. An important feature of this paper is that it addresses INRTU’s existence in the modern learning space as the learning environment is increasingly digitalized and the University needs to reorganize its environment to improve its quality, architectural and artistic value and significance. The author’s R&D efforts breathe new life into INRTU’s facilities to make them good for studies and research and suitable for commercial and cultural initiatives taken in the university environment; these efforts include creating a special entrance design for better image, designing innovative technology parks and communication spaces (coworking and creativity areas).

1. Introduction

Today, education is becoming the foundation of prosperity and well-being in any progressive country, as universities expand their functions and are getting an ever greater role to play in shaping people’s worldview and helping them integrate in the evolving labor market.

Beside the university status and education quality, the architecture and spatial environment of university facilities, their integration in the urban context, their significance and value are of increasing importance [1]. The one-of-a-kind university environment with its focus on the trends of the future, on interculturalism, social and market demands is what enables students to acquire the skills and experience the globalized world of today requires.

2. Research Relevance and Objectives

Education and learning environment is where modern human resources grow and develop; as such, it is the subject matter of relevant research and design. Today, a university is interpreted to represent a concentration of advanced intelligence and innovation development (S. Prokopenko, I. Dianova-Klokova, D. Metanyev, A. Sosnova, H. Chesbrough, V. Titov.), to drive economic growth (A. Karpov, R. Scott), to be a hub of local development, to provide space for “novel regionalization” (A. Belotserkovsky, T. Balmasova, M. Zobova, M. Puchkov); some researchers analyze the “third
mission” of universities (T. Balmasova, Ye. Kudryashova, S. Sorokin, I. Yemelyanova, Ye. Kolesnikova), etc.

The university environment of today is becoming an ever more relevant discourse of research as a source of healthy lifestyle, a center of environmental education and a creativity booster, a part of urban recreation, an image space, and a focal point of live communication [1–8]. The new functions of universities and the implementation of innovative teaching technologies necessitate a novel learning environment appropriate for a modern university’s mission and image to boost its investment attractiveness [7, 9–11].

In light of the above, the authors deem relevant their research into the existential specifics of modern university environment, problems and prospects of INRTU and its spatial organization; so is the presentation of R&D carried out for the Irkutsk National Research Technical University, which is the purpose hereof.

3. Theory

3.1. University in the Era of New Technology
Self-development over a lifetime is the definitive value of novel forms of education; as such, it is a strategic objective that shapes the ideology behind the university environment, as it combines research and education spaces where life grows in “the reality of the future”. Modern university models imply creating an innovative environment for research and development, to bring up future generations and inspire innovation and creativity.

The advancement and digitalization of today’s educational space induces its transformation into a platform for IT and communication development, smart technologies in education, and creating the E-campus model, all while embedding the universities in the “technosphere continuum”.

At the same time, education reforms focus on improving the quality of university environment, its spaces and furnishing to mitigate the effects of the aggressive homogeneous artificial environment, to instill culture and bolster tolerance in the university. To create a good barrier-free, health-saving university environment means to have a learning process in place that meets the sanitation requirements and provides better opportunities for motor activity to help students handle overwork, stress, fatigue, etc. [12–13]. A good and tolerant university environment has other significant aspects to it: the city-university interaction, publicity-privacy ratio, defined boundaries and state-of-the-art university entrances that serve as spaces where city dwellers and students communicate, a manifestation of environmental values, and the architectural images that affect human emotions and behavior [14].

3.2. State-of-the-Art Learning Environment as Part of the University Image
In the light of ever fiercer competition, universities in today’s education market are in dire need of a positive image. Image is a tool used to influence the popular thought; it is also a “cost-effective method for generation and recognition of a complex social reality, … a collapsed text” [15], a communication unit [16], and a virtual yet tangible object that does affect the values of human persons today while also defining their emotional response [17]. Image is what makes something (e.g., a university) easily recognizable and helps identify its carrier by a predetermined “set of values” [18] that generate an image programmed to promote positive recognition. Given how significant this process is for the university environment today, let us introduce the concept of “effective university image” built upon a set of positive and significant (value-wise) university traits “to create a strong association between a holistic image and its related PR subject” [19] and to help attain the core goals of the university. These components of the university image include, among other things, the visual image that builds upon the experiences of the subject-spatial environment, interiors, urban context, and landscapes of the university; at the same time, the visual image reflects the university’s brand identity.

University image and branding must be easy to recognize and remember, as both are not merely management tools; they are also subject to management as a component of economic success, a tool
for promotion in the competitive education market [20], which requires special communication with the target audience. The significance of creating a state-of-the-art iconic university environment calls for one-of-a-kind learning spaces appropriate for the specific context of the learning process as well as for the university’s image in general. The recreational system a university provides is a core part of its image, as it gives the audience an important insight into the quality of the learning environment and of the university’s branding. To design an educational institution and its positive image, one usually focuses on creating a microenvironment with a specific layout to provide outstanding esthetic value while also being transformable and open for further development [21].

3.3. Campus as a Relevant Form of Academic Life and Its Spatial Organization

Campus is recognized today as the most efficient method for arranging the university environment; as such, it provides a protected area, a public entrance with an urban accent on it, more privacy within the campus, active communication with the downtown, quality landscapes, etc. A campus is a cluster that integrates training facilities, research laboratories, experimentation and production shops, public and recreational areas as well as housing, all within walking distance [22].

Experts highlight a number of criteria that define a good, well-designed campus; the key emphasis is on a clear idea and a well-formulated concept behind the campus. The university must have a code and a set of identity-defining values, which is fundamental to the strategy behind having such a campus. The architecture, the environmental design, and landscape arrangement [23] must all follow the university’s ideology and be adaptable to its research and study programs. A campus is also expected to have attractive and well-designed architecture, urbanized and natural landscapes of high quality, all of which can be effectively provided by a well-developed system of public areas and rooms, a uniquely designed indoor space, and a one-of-a-kind public entrance in place. The center of a cluster inevitably has communication spaces such as halls, atria, covered terraces and winter gardens, leisure spaces for active recreation, etc. The recreation and communication area is often a part of the university’s image, a compositional centerpiece of the entire campus [22].

Being an important urban facility, a state-of-the-art campus must feature appropriate integration in the urban environment, the surrounding landscapes, and the natural context. The best and most advanced branded campuses feature expansive parks, water areas, woodlands, etc. Ecological trends and green design are often the core concepts behind the arrangement of the university environment.

3.4. INRTU in Learning Space Today. Problems and Prospects of Rearranging the Environment

Discussion of INRTU as a university that boasts state-of-the-art environment and promising learning space calls for a compromise between virtual (digital) space of academic life and the tangible (real-world) components of the environment.

By relying on the digital economy, innovation, and training specialists for Russia’s and APR’s high-tech business, the University is forced to prioritize Internet-based learning and digital education, to focus on novel software and developing universal business competencies. Many years of experience in advanced aerospace engineering, shipbuilding, car manufacturing, etc. enable the University to serve as a role model for engineering schools and to position itself as the regional leader for the deployment of the National Technology Initiative. The University’s strategic focus areas include research and development of virtual and augmented reality, Internet-based learning, economy reindustrialization technologies, green technologies, Internet of Things, computer science in material studies, nanotechnologies, etc.

General digitalization of education coupled with a focus on creating a smart campus for the University is what shapes the digital space for academic life; however, regardless of its relevance, such digital space cannot exist outside the material reality of the real world.

The University’s Spatial Development Concept is a document that focuses on upgrading the University’s environment; the Concept sets forth founding and opening an inter-university Palace of Youth, inaugurating multiple new laboratory and classroom facilities, a swimming and gym venue, a
library block, next-gen dormitories, a school, an outpatient hospital, and a kindergarten, all featuring a common advanced recreation system; some facilities will be situated on the banks of the Angara River.

Developing the Campus Development Concept was the key topic of the 20th session of the Winter University in Irkutsk. The participating teams analyzed proposals coming from different “consumers of the location” and presented their multifaceted interpretations of the common topic; thus, Team Business considered the location as a center for INRTU-municipality-business partnership; Team Campus presented it as the catalyst that drives the development of all aspects of the university environment while also improving its recognition and optimizing the land development; the next team based their concept on the idea of pedestrian connections, e.g. on creating safe and comfortable public spaces around pedestrian-only areas; the final concept focused on using the Angara River as a critical infrastructure for recreation [24].

In general, transforming the Irkutsk Campus into a state-of-the-art university location requires modernization and gentrification, creating spaces for (self)development, active creativity, new startups, etc.

4. Results
The author’s design proposals on rearranging the INRTU campus focus on modifying the environment and its identification systems; they address the University’s functioning as a university campus, on improving the recreational quality and comfort of living there. Research into the unique features of the university environment also covers colors as an image and information medium, and a method for individual self-representation.

4.1. INRTU Entrance: Rearranging the Area and Image Space
One problem is to create an entrance area that will serve as a centerpiece of image and a kind of buffer/border space to delimit the outside urban locations and the inner area of greater privacy; this can be done by creating a University Square—an iconic and yet strictly functional location. Fundamental to the project is an amphitheater that will face the University’s entrance and main facade. This design will protect (in its own way) the recreational and showcasing space from the roadway while also enlarging the square to match it to the University’s scale. The entrance structure will be made transformable so that it could function as a stage, an ad venue, and/or a decoration.

The roadway will be expanded slightly to increase the throughput; the design provides for a two-level parking lot where the pedestrian crossing is now, while the underground facility under the square will provide additional parking space to solve the University’s parking problem.

For traffic safety, we will build a set of footbridges; outfitted with observation decks, the bridges will be integrated with the amphitheater and the new parking building. The whole composition is designed to be an organic and integral part of the environment while also serving as the architectural backbone of the area, the axes bridging the university environment to the urban context. This holistic high-tech design will serve as the image of the state-of-the-art university of technology that INRTU is.

Besides, this concept places a greater emphasis on the boulevard by restoring its function as a recreation and leisure infrastructure, and using it to provide safe and comfortable movement to and from the University’s space-separated units.

4.2. Technology Park as Part of the Innovative University Concept and a Unique Subject-Spatial Environment
Another part of the project concerns the development and promotion of the technology park ideology that becomes relevant if the University’s R&D potential is to be unlocked and an innovative entrepreneurial environment is to emerge. The University’s Technology Park, its interiors and landscaping, the components of its style as part of the corporate brand have an important role to play in adding real-world content to the advertising concepts.
The second floor contains exhibition halls and conference rooms; its “show-off” interiors are made unique by using non-trivial, easy-to-remember visuals that combine elegant color schemes, one-of-a-kind equipment and interiors complemented with a complex lighting system, unique artworks, and paradoxical contexts surrounding real-world objects. For better exteriors, the outside area of the Park is split into multiple functional zones including a park alley, a fountain composition, an exhibition area, and an amphitheater with custom streetlamps and a series of artworks. Landscape arrangement, stylish facades and colored lighting complete the holistic image.

4.3. University Environment for Communication and Creativity

One of the challenges facing the digital society, including the academic world, is the lack of direct (non-gadget-mediated) communication. One way to add live communication to virtual life lies in the furtherance of various communication spaces; one good example is coworking, the today’s format of public learning space. In this regard, the authors hereof have project a coworking cluster concept for the University; the first coworking zone has been built by the authors’ design and has proven a success, as it features a thought-out presentation system, different zones for individual and team work, recreation, etc. Another coworking currently under design has creativity-boosting functions and is geared towards working on environmental initiatives. The University has a busy event schedule, with the occupancy rates of all rooms being record high today, all of which calls for getting a cluster of coworkings in place to serve as a learning hub.

The authors are currently designing their own modular equipment for the interiors of classrooms used by Design students; the focus is on developing a creative environment. The project is complete with scenario-based simulations of different game states that are the foundations of the modular design. Furniture uses a non-conventional material (Styrofoam): an important highlight, as such furniture is not only unique, but also has extra functions since it is suitable for daily recreation and for a variety of exhibitions alike. To underline the integrity and expressiveness of the interiors, they have outstanding graphics and a non-standard layout to boost creativity and communication.

5. Conclusions

State-of-the-art university environment, its spatial organization, and a special development-inducing atmosphere are all top priorities in the development strategies of educational institutions. The constituent ideas stem from a variety of factors: the emergence of innovation space, the implementation of digital technologies, the creation of a unique positive image, the rise of a comfortable environment of good quality and artistic value, the farming of eco-friendly resources and technologies, the improved safety of the university environment, and the expanded communication functions. Campus is an advanced form of spatial, architectural, and visual identity for universities that embeds them in the real-world problematics; as such, the campus seems to be the top priority for research and education centers.

The authors’ designs integrated in the University’s development concept will help create state-of-the-art university infrastructure to effectively address the challenges of today while also optimizing the University’s development. Comprehensive research of the Campus revealed its environmental potential and specific conditions to help create designs that revolve around a fresh vision of the situation to address a complicated set of local development challenges: creating a branded entrance, designing the technology parks and communication spaces such as coworking and creativity areas, etc.

References

[1] Zobova M G 2015 Modern aspects of architectural and urban planning of university campuses Bulletin of the Orenburg State University 3(178) 243–48
[2] Balmasova T A 2019 New regionalization: modernization of Russian universities and the experience of Germany Higher education in Russia 6(28) 86–96
[3] Dianova-Klokova I V and Metanyev D A 2015 China. Innovation Centers: Leadership Academia. Architecture and construction 2 9–19
[4] Puchkov M V 2011 Architectural and town-planning qualities of scientific and educational spaces Academic Bulletin URALNIIPROEKT RAASN 3 60–3

[5] Scott R 2009 Innovative strategy in the Great Britain Foresight 3 16–21

[6] Yagafarova E A 2010 The formation of the spatial environment: an analysis of university complexes in China Academic Bulletin URALNIIPROEKT RAASN 3 46–50

[7] Damyanova L T 2013 European countries experience in creating a new type of university Creative economy 12(84) 95–101

[8] Kolesnikova E Yu 2012 The idea of the university and its mission: classic and modern interpretations South Russian Forum 2(5) 63–70

[9] Belotserkovsky A V 2015 Universities as generators of regional development Higher education in Russia 1 5–10

[10] Melentyev A A, Shvets A V and Merenkov A V 2017 The concept of a modern educational space in the city of Yekaterinburg (on the example of a medical campus) New ideas of the new century 1 283–90

[11] Puchkov M V 2011 The principles of designing a new generation of scientific and educational centers: the architecture of modern educational technologies Academia. Architecture and construction 2 48–51

[12] Nasobina A A and Permyakov O M 2017 Health-saving technologies at the university Health saving as an innovative aspect of modern education: materials of the III Int. scientific and practical correspondence student Conf. (Ekaterinburg: RSPPU) 243–47

[13] Ivakhnenko G A 2012 Health-saving technologies in Russian universities Bulletin of the Institute of Sociology 6 100–7

[14] Day K 2000 Places where the soul lives (architecture and the environment as a remedy) Places where the soul lives (architecture and the environment as a remedy) (Moscow: Rook) p 283

[15] Pocheptsov G G 2002 Imageology (Kiev: Refl Book) p 656

[16] Slobodchikov V I 1996 New education as a way to a new society New values of education 5 24–8

[17] Bogdanov E N and Zazykin V G 2003 Psychological Foundations of Public Relations (St. Petersburg: Peter) p 208

[18] Dancheeva O V and Schwalb Yu M 1991 Loneliness: Socio - psychological problems (Kiev)

[19] Fimina M A 2011 Image of the university as a component of the education system Actual problems of pedagogy: materials of the INT. scientiffic Conf. (Chita: Young Scientist) pp 68–72

[20] Medvedev V Yu 2004 The role of design in the formation of culture (St. Petersburg: SPGUTD) p 108

[21] Shchherbakova T N 2013 The influence of the aesthetics of the educational environment on the development of students’ creative abilities Actual problems of pedagogy: materials III of the INT. scientiffic Conf. (Chita: Young Scientist) p 194

[22] Puchkov M V 2011 The experience of spatial organization of modern university complexes University Management: Practice and Analysis 2 30–9

[23] Hoeger K and Christiaanse K 2007 Campus and the city. Urban Design for the Knowledge Society (Zürich: GTA Verlag)

[24] Nuyanzina V, Kostrubova A and Kosolapova A 2019 Campus. Transformation of the campus in Irkutsk. Cultural, socio-economic and spatial development program Project Baikal 60 38–47