Innovative Spatial Solutions in Agriculture Education: Designing the Faculty of Agriculture Building, Eskişehir Osmangazi University

Ayşen Çelen Öztürk, Gökçe Ketzizmen Önal, Başak Güçyeter, Hakan Keleş

1 Eskişehir Osmangazi University, Department of Architecture, Bademlik Campus, Eskişehir, 26030, Turkey. acozturk@gmail.com
2 Eskişehir Osmangazi University, Department of Architecture, Bademlik Campus, Eskişehir, 26030, Turkey. gokceonal07@gmail.com
3 Eskişehir Osmangazi University, Department of Architecture, Bademlik Campus, Eskişehir, 26030, Turkey. basakgucyeter@gmail.com
4 Eskişehir Osmangazi University, Department of Architecture, Bademlik Campus, Eskişehir, 26030, Turkey. haakankeles@hotmail.com

Abstract

Aim: This study aims to present the design process of an education and administrative building for the Faculty of Agriculture, which was founded in 1995 and started education in 2002, in Eskişehir Osmangazi University, Eskişehir, Turkey.

Method: The design approach for the Faculty of Agriculture was discussed with respect to innovative spatial characteristics, ability to respond to the nature of scientific and academic work and the capacity to provide a future vision.

Results: Universities, as dynamic constructs, necessitate spatial designs that could keep up with current requirements and innovative scientific work. The present study provides an insight of spatial planning for academic buildings specifically designed for administrative and educational functions regarding the particular needs of the curricular formation of a specific faculty.

Conclusion: Universities are educational institutions that provide academic training, skills and proficiency for individuals while improving the country and the region in terms of economic and cultural perspectives. Participants of such institutions need enclosed areas, such as classrooms, offices and laboratories, for their scientific and academic work and open spaces where they could socialize, relax and perform their physical activities in their spare time. The physical characteristics and qualities of these areas significantly affect the sociological, psychological and academic development of individuals through a direct influence of utilization patterns.

Keywords: Agriculture education; Architectural Design; Faculty of Agriculture; Functional Design.

Introduction

The concept of agriculture encompasses the science, art of practice of soil cultivation, crop production, animal husbandry, and the preparation and marketing of the resulting products [1]. In other words, agriculture is “the totality of
activities regarding the care, nutrition, husbandry, preservation and mechanization of all kinds of agricultural-animal products for human nutrition and economic value and the fishing activities carried out in still or private waters” [2]. Agriculture, which is a concept that comprises the most significant and vital elements of human and social life, has a history dating back to 10,000 years. Agriculture emerged due to dropping the seeds of the vegetables and fruits in the soil while carrying these to the caves from the wild nature. Consequently, ancient people realized that they would be able to obtain nutrients on a permanent basis through planting instead of scavenging for food all day [2]. The discovery enabled the transition to collective life and inevitably the establishment of states. The agricultural activities, which continued for centuries, developed due to the technological advancements and became one of the most essential components that ensure the sustainability of societies. Agricultural education, therefore, became unquestionably essential in order to ensure the systematic development of agricultural activities.

The traditional way of conveying knowledge was always a priority in agriculture. Nevertheless, publication of books on husbandry techniques since the 16th century and a prominent increase in such publications in the 18th century led to the institutional development of the agricultural education [3]. In this respect, the agricultural education provided by the individual transfer of knowledge was first commenced in Cirencester, UK, in 1845, in agricultural colleges of private enterprises and sustained through a theory oriented, supervised and achievement-evaluating approach [3]. Thereafter, agriculture education was designed according to the requirements of the industry and everyday life. The remarkable increase in production after the Second World War in the 1939s caused significant changes in the content and formation of agricultural education, which could still be considered effective today. In accordance with these transformations in Europe, the first agriculture education in Turkey started in 1847 at Ayamama Farm in Istanbul and continued with the Halkah High Agriculture School in 1871 [4]. Towards the end of the 19th century, in line with the radical university reform under the leadership of Reşit Galip, PhD, higher education in agriculture was commenced via the Institute of Higher Agriculture even before Ankara University was established [5].

Currently, agriculture education holds two major objectives, that agriculture education should ensure the provision of skills and knowledge necessary in agricultural profession and should develop certain level of literacy in agriculture [6]. In order to attain these objectives agricultural education prioritizes four program components, namely, supervised experiences, student development, classroom instruction, and laboratory instruction [7]. These components could be regarded as important parameters for the design of education buildings for agriculture. The contribution of experienced professionals to education is acknowledged internationally; accordingly, it became essential that experts and companies share their experiences through the steps in education. The emerging significance of such parameter is regarded as the paradigm shift in the concept of agriculture [7].

Current mission of agricultural education is to create a system of integration for academic career and technical education, which aims to train experts for specific professions. This paradigm shift is regarded as “agriscience.” The concept of agriscience facilitated the approach of using agricultural experience and teaching in the classroom environment controlled by the learning system in the laboratory. In this respect, activities and activities in the curriculum are linked to classroom directions and problem-solving and learning experiences [7]. The concept of agriscience introduced a teaching approach controlled by utilization of the agricultural experience and learning in laboratory environment. In this respect, activities in the curriculum linked problem-solving and learning experiences, which are defined within the scope of the classroom directives [7].

Broyles [7], who classified the four parameters required for agricultural science education as classroom teaching, supervised agricultural experiences, the intra-curricular student organizations, and laboratory learning, emphasized that these four parameters should be properly integrated for a good education program. From such point of view, it becomes evident that the conditions for designing a contemporary agriculture education building should correspond to these concepts and their associations. Spatial designs associated with the training programs should be arranged in a manner that reflect the integration of academia and agriculture education, especially the laboratories should be modernized to reflect such relationship.

On the other hand, as declared by the national commission of agricultural education in the United States, the National Association of Agricultural Educators (NAAE) [8], agricultural education is based on basic theoretical and practical knowledge about agriculture, food and natural resources. Within such frameworks, agricultural educators should ensure that students acquire a broad range of skills, including science, mathematics, communication, management and technology [8]. In this respect, the National Association of Agricultural Educators emphasize three significant and interconnected components:

- Instruction in classroom and laboratory environment
- Experiential learning outside the classroom, supervised by the instructor
- Leadership education delivered through student organizations [8].

Volume 3, No. 1 available at https://www.scischolars.com/journals/index.php/sjrab
Successful integration of these agricultural training parameters became significant for a good education program. Pekel [9], who agrees with the NAAE [8] in terms of the importance of these parameters for agriculture education, mentions the content and aims of agriculture education in Turkey. According to Pekel [9], since the courses within the curriculum of an agricultural education program necessitates reinforcement via topics such as delivering projects for agricultural enterprises, managing and/or inspecting enterprises accordingly, acknowledging agricultural organizations and legislations, etc., making use of current information and technology in training programs should be addressed. Particularly, Pekel [9] emphasizes that practical and experimental content is considered a highly significant criterion in agricultural education.

Consequently, it could be established that agricultural education comprises research-oriented content besides the objectives of generating and sharing of theoretical knowledge and the training model should be fundamentally based on natural sources and their utilization. The requirements of current agriculture education emerged due to the acknowledgement of agriculture as a scientific field based on knowledge and experience. For a contemporary education building in line with the abovementioned wide-ranging concepts and topics, it becomes necessary to construct a structural pattern via the in-service activities organized by experienced educators and students and through the classroom and the laboratory environments. As Pekel [9] pointed out, agriculture faculties necessitating applied training content and facilities require adequate applied research facilities with modern and complex equipment.

**Aim of The Study**

In the light of abovementioned parameters in the Introduction, this study aims to present the design process of an education and administrative building for the Faculty of Agriculture, which was founded in 1995 and started education in 2002, in Eskişehir Osmangazi University, Eskişehir, Turkey. The study would contribute to discussions regarding architectural design of education and administrative buildings in terms of delivering a conceptual approach structured around the amalgamation of functional, systematic and expressionist dialects that construe the current requirements of agricultural education together with social and administrative units in order to produce a structural language that is sensitive to the natural environment and established within the present context of contemporary architectural approaches and discussions. The scope of this study is to design a building complex to accommodate administrative, educational and social functions for the 10 departments within the Faculty of Agriculture at Eskişehir Osmangazi University, Eskişehir / Turkey.

**Method of the Study**

Architectural design is a cognitive process that is assisted via different reasoning and intuitive practices of the designer(s). Often with respect to the creativity and knowledge of the architect or the team of architects, the methodological approaches to design process significantly vary. It is unlikely to define a strictly structured design methodology that encompasses the design process in a linear manner, rather the process has closed interrelated phases that are in constant feedback. Several phases in the design methodology include studying the site and programmatic necessities, the study of existing literature and examples, and facilitating architectural knowledge and experience. In this respect, this study attempts to present an insight of spatial planning for academic buildings specifically designed for administrative and educational functions regarding the constraints of the site, the user requirements and the particular needs of the curricular formation of Faculty of Agriculture.

**Problem of the Study**

The Faculty of Agriculture of Eskişehir Osmangazi University is located at Ali Numan Kıraç Campus on Ziraat, Eskişehir-Kütahya Road. Ali Numan Kıraç is one of the most important names in the field of agriculture in Turkey, as being the person who established the first Seed Breeding Station (İslah-i Buzr) in 1925 in Eskişehir. The aim of this first research institute in Turkey was to teach Turkish peasants to farm through modern methods and to facilitate the use of seeds that are appropriate to the conditions of Anatolian geography. In the same institute, Dry Farming Experiment Station was established in 1929 and work on dry farming was commenced as well [10]. Pioneering work regarding Turkish agriculture was initiated in Eskişehir and the effort was to spread these work throughout Turkey. The settlement of the Agricultural Faculty of Eskişehir Osmangazi University, which was named as Ali Numan Kirac Campus in 2011 due to his pioneering efforts, is preserved by the conservation committee as a 3rd degree nature conservation area with endemic vegetation and trees and several buildings in the campus are preserved due to the Republican era architectural characteristics.

The Faculty of Agriculture in Eskişehir Osmangazi University first started education at undergraduate and graduate levels in academic year 2002-2003 with the Crop Production Program, and continued as the Program of Agricultural Engineering since the 2003-2004 academic year [11]. Currently the Faculty includes the Departments of Field Crops, Horticulture, Agricultural Biotechnology, Animal Husbandry, Plant Protection, Biosystems Engineering, Soil Science and Plant Nutrition, Landscape Architecture, Agricultural Economics, and Food Engineering. The purpose of the faculty is to contribute the regional and national development by conducting research focusing on the country’s priorities, to
become a qualified education and research institution by cooperating with private and non-governmental organizations, and to train agricultural engineers who utilize scientific and technological methods in line with the needs of the society and who work in cooperation with different disciplines [11].

The campus area presented in Figure 1 is 125,000 m² and has applied agriculture fields of 300,000 m² and three greenhouses with a total of 850 m². In the existing settlement, the education is carried out in randomly located single-storey prefabricated structures, which cause problems and spatial insufficiencies. Thus, it became necessary to design a building which is capable of gathering new functions and all existing units in order to solve the abovementioned problems. Consequently, the Directorate of Construction and Technical Works of Eskişehir Osmangazi University requested support from the Department of Architecture for the preparation of the architectural design and the Design of the Faculty of Architecture Building process was commenced in 2015 with the assignment to the related faculty members via receiving services through the Circulating Capital Enterprise of the Faculty of Engineering and Architecture, ESOGU (Table 1).

Figure 1. Ali Numan Kıraç Campus, Faculty of Agriculture, Eskişehir Osmangazi University

Table 1. Design Information on the Faculty of Agriculture Building Complex at Eskişehir Osmangazi University, Eskişehir / Turkey

<table>
<thead>
<tr>
<th>Location</th>
<th>Eskişehir Osmangazi University, Ali Numan Kıraç Campus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employer</td>
<td>The Rectorate of Eskişehir Osmangazi University, Directorate of Construction and Technical Works</td>
</tr>
<tr>
<td>Design Team</td>
<td>Faculty members of Department of Architecture, Faculty of Engineering and Architecture, Eskişehir Osmangazi University (Assoc. Prof. Dr. Aysen Çelen ÖZTÜRK, Asst. Prof. Dr. Gökçe Ketzmen ÖNAL, Asst. Prof. Dr. Başak GÜÇYETER, Asst. Prof. Dr. Aysê Duygu KAÇAR, Res. Asst. Hakan KELEŞ)</td>
</tr>
<tr>
<td>As Built Drawings</td>
<td>Baloğlu Architecture</td>
</tr>
<tr>
<td>Design Period</td>
<td>2015-2016</td>
</tr>
<tr>
<td>Start of the Construction</td>
<td>2017</td>
</tr>
<tr>
<td>Total Construction Area</td>
<td>20,000 m²</td>
</tr>
</tbody>
</table>

The Design Process

Once the design problem was assigned to the design team composed of academic members of Faculty of Architecture, the design process was commenced through working on the program of the building complex via interviews with the
members of the Faculty of Agriculture, with the aim to respond the current discussions on agriculture education, and an approximate architectural program of 20,000 m² construction area, with 10 departments, was established.

Principally, the proposed design for the faculty building included three main programmatic elements, such as workspaces for the academic and administrative staff, agricultural education spaces and social spaces. The building, which has a central courtyard layout (Figure 2), was designed to replace two temporary greenhouse structures without an intervention to the existing flora, thus, was environmentally sensitive in terms of respecting the natural environment composed of dense and rich green areas. In addition, a building design approach was adopted to prevent the cutting of trees and to minimize damage to existing texture. In the design, which includes a complex function scheme according to architectural program requirements, the courtyard formation in Figure 2 facilitated the relationship between the programmatic differences, created a public space to be used by the students and faculty staff, and reduced the possible negative effects of a 20,000 m² single volume building on the existing green assets of the campus.

Figure 2. (a) Site plan on aerial photo and (b) color-coded block organization for Faculty of Agriculture, Eskisehir Osmangazi University (Yellow: Academic Units, Light Brown: Classrooms/Lecture Halls, Dark Brown: Communal Areas, Light Green: Administrative Units, Dark Green: Atrium Space)

Figure 3. Ground floor plan of the design for Faculty of Agriculture, ESOGU
Designed as a building that faces both the outside environment and the created inside, the courtyard, the design decision was shaped to alter the common introverted courtyard with open passages that connect the north and south sides of the plot. The courtyard was designed to adopt the characteristics of a public space through the design of social spaces facing the courtyard on the ground floor, such as the cafeteria (187 m²), library and study areas (250 m²), food hall (250 m²). As seen in Figure 3, these functions defining the communal/public courtyard represent the student-centred approach to design, allowing students to utilize the designed area more actively as a key element in education.

In the building complex composed of four major blocks, highest with five storeys, the education program includes 15 research laboratories, 10 applied laboratories, three lecture halls for 80 students, one lecture hall for 160 students, 15 classrooms for each department.

The lecture block, including lecture halls on the ground floor and classrooms on upper floors was located at the east side of the courtyard and the main entrance (Figure 3). These programmatic elements, in which theoretical courses would be conducted, were grouped vertically in order to explicitly define the function scheme of the different program elements in the design. Considering the number of users of the lecture block, a large atrium space was designed to provide visual and physical continuity of the lecture halls and classroom spaces and to offer an indoor communal space that facilitates the active interaction of students and faculty staff. Above the atrium was clad with reflective glass to allow daylight penetration and natural ventilation when necessary for each storey. The atrium space was as well designed to provide a potential for an indoor greenhouse which could be organized through the students and faculty staff to display plant varieties studied at the faculty.

![Figure 4. First floor plan of the design for Faculty of Agriculture, ESOGU](image)

In Figure 4, it could be noticed that the library space with a mezzanine floor and the flexible workspaces that start at the first floor of the lecture block were designed in visual, functional and spatial contact with both the indoor communal atrium and the exterior public courtyard. Such design decision was made with respect to increasing the functionally and efficiency of the atrium and by fostering the visual relationship of the students that use the library and workspaces with the courtyard. In addition, at each floor of the lecture block, there exists a computer laboratory. It was considered that these spatial design elements would be significant in meeting several needs of a campus life to a great extent, since such facilities were not available in the existing condition of the campus area.

Laboratories, which could be considered as the most important areas for the applied nature of agriculture education, were organized on the ground floor at the west wing of the designed building complex in a manner that the users could be in
direct access to the exterior environment while experimenting with the nature. Thus, reinforcing the use of laboratories for applied courses via providing direct contact with the soil, would facilitate the interaction between the applied nature and the theoretical knowledge within the agriculture education be. There existed other laboratories, which did not daylight in the architectural program requirements, and such laboratories were designed in the basement of the building complex. The laboratory spaces that required no daylight penetration necessitated large storage facilities as well, hence, the efficient use of basement spaces was supported with the design decision to organize all units that did not require natural light at the basement.

As seen in Figure 5, 90 faculty staff rooms, 10 head of the department office, 10 secretary offices and 10 meeting rooms were located for 10 different departments of the faculty of agriculture at the upper storeys of the west and north wings. Figure 6 illustrates that all departments have access to the lecture block through crossovers that facilitate the circulation between the faculty members blocks and the lecture block. In addition, a social space for faculty members was designed at the top floor of the north wing, which enables food and beverage and resting areas.

The most significant design decision for the faculty of agriculture building is the greenhouse concept on the flat roof of the lecture block (Figure 7). This conceptual decision provided an alternative spatial value regarding the applied nature of agriculture education and translated the acknowledged flat roof concept into a functional element and as well transformed the form/function balance of the proposed design. Remaining flat roof spaces were designed with access at different heights enabling their utilization by students and faculty members in case of further studies standalone plant growing equipment. In Figure 7, it is possible to observe that the roof greenhouse and flat roof utilization provide more efficient functions for different seasons, for the fifth facades, the roofs, thus contributed highly to the identity of the building.
Figure 6. Third floor plan of the design for Faculty of Agriculture, ESOGU

Figure 7. Fourth floor plan of the design for Faculty of Agriculture, ESOGU

Figure 8 illustrates the block relationships with different levels of outdoor communal spaces designed within the building complex. The south wing illustrated in Figure 8 provides a covered passage between the main courtyard and the entrance yard (the main approach to the building complex), as well as providing access to the south block (dean’s block) that
include administrative functions for the faculty. Such volumetric void created between the courtyard and the entrance yard provides visual and physical continuity for the users and enhances the accessibility to north, west and east blocks from the central courtyard. In addition, the void designed as a covered entrance creates an intermediate space which could be utilized for different functions such as outdoor exhibitions, meetings etc. Together with its abovementioned spatial qualities the south administrative block represents a bridge-like structure linking the lecture blocks and the office blocks designed for faculty members.

Findings and Discussion

The building complex designed for the Faculty of Agriculture, Eskisehir Osmangazi University was basically intended to constitute a functional, inventive, expressionist and environmentally sensitive architectural dialect. In the design of the faculty of agriculture building, the volumetric contrast and intensity of programmatic elements with diverse contents were resolved through a block organization around a central courtyard and continuous closed horizontal circulation elements were established between building blocks for ease of accessibility. In addition, the building design emphasizes the significance of a user-oriented approach through seamless organization of different programmatic elements.
In terms of environmental decisions, the building design provides a controlled use of daylight and solar gains via the solar shading elements on facades. Shading elements as well enhance the visual balance of the facades with the dense green texture around the structure as seen in Figure 9. In other words, besides their functional utilization, the solar shading elements contribute to the overall building character as a facade pattern.

The design team adopted a reflective design approach that facilitates loadbearing reinforced concrete walls both as the structural system elements and massive surfaces necessary for the related program elements. Therefore, a material dialect that does not necessitate any cladding/finishing materials, such as plaster, paint etc., could be achieved through this design approach. Exposed concrete structural wall system was used as one of the most important parameters of architectural dialect in terms of correspondence to the main architectural design approach.

The construction of the building was commenced by the Directorate of Construction and Technical Works, Eskişehir Osmangazi University due to the contracting processes after the as built drawings were completed by the subcontractor, Baloğlu Architecture and Engineering Company, under the supervision of the design team. The ongoing construction process could be seen in Figure 11, where the rough work for the administrative block and the atrium in the lecture block are almost complete.

**Conclusion**

Contemporary agriculture education is a discipline formed via the combination of academic studies and technical training and throughout the course of the agriculture education and research the theoretical knowledge should be fostered by the experimental knowledge. In this respect, spatial organizations that would ensure the sustainability of such feedback mechanisms should as well be considered as important paradigms. Currently, a building design for agriculture education should constitute a conceptual approach that focuses on communal and administrative activities in education and training processes as design criteria besides the advances in current knowledge production. Faculty of Agriculture Building Complex in Eskişehir Osmangazi University, which is designed within the framework of these parameters, was developed with a systematic, inventive, expressionist, functional and environmentally sensitive contemporary design.
approach for the education and administrative building programs and the programmatic, contextual and conceptual decisions were translated into design ideas that basically led the spatial organization, facade design and material selection.

The density of program elements with different dynamics, limitations of building approach and height in zoning plans in addition to the boundaries of the land with dense green areas were important parameters that guided the design of the building complex. On one hand, the aim to design a building that is conceptually in parallel with contemporary architectural discussions, on the other hand, the well-defined limitations regarding the siting and organization of the program elements emerged as the main drivers that determined the design decisions.

As a result, the building complex is expected to respond to the spatial requirements of the Faculty of Agriculture in Eskişehir Osmangazi University, both in terms of the limitations of the campus area and in terms of establishing an environmentally sensitive, inventive, functional and expressionist language as an education and administrative building. With such characteristics, the building design is expected to distinguish from its contemporaries.

Given the fact that the significance of agriculture industry increased due to the increasing industrialization, agriculture stands as the leading influence in the rural areas in Turkey despite the decreasing trend of rural population. In addition, food, textile and leather industries, which are based on agriculture, are also significant for the Turkish economy. Thus, the increase in the share of high productivity and value-added products in agriculture would allow Turkey to enter the league of countries such as Holland, New Zealand and Israel, where the share of agriculture in national income is high. In this respect, Faculty of Agriculture in Eskişehir Osmangazi University revised their development aims according to the agro-ecological conditions in Eskişehir and its vicinities, existing natural resources, agricultural structure, development plans for the region, developments in agriculture related industries in Turkey, and research and development. Consistent with these revised aims, the necessity for an educational and administrative building complex, which could respond to current state-of-the-art developments in agriculture, became inevitable. Designed through a meticulous study and decisions process, the Faculty of Agriculture Building Complex in Eskişehir Osmangazi University is expected to contribute both the future advancements in agriculture education and industry and the contemporary trends in educational and administrative building design.

References


