

The role of university museums in engineering education

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ABSTRACT: The subject of the article is the activity of museums that exist in many universities. Apart from collecting, protecting and propagating the heritage of a given university, their primary task is to enrich teaching by focusing on humanistic and educational facets, especially in relation to the promotion of the university, its history and selected aspects of science. These activities refer not only to the university community, but extend far beyond it. In this respect, university museums have a centuries-old tradition. The author presents the educational role of university museums based on the example of the activities of the Museum of Cracow University of Technology (CUT), Kraków, Poland. The Museum's mission was defined as heritage and identity protection. It collaborates with many museums, including university museums. Although the history of individual universities is different as are the contemporary profiles of their teaching and research activities, their museums conduct similar activities.

Keywords: University museums, Tadeusz Kościuszko, humanistic aspects, engineering education, university heritage, university promotion, exhibitions

INTRODUCTION

The Museum of Cracow University of Technology, in Kraków, Poland, was established in 2004, when the University had been in operation for almost 60 years. In 2016, the Museum's mission was defined as heritage and identity protection. The Museum documents issues related to the heritage of science in a historical context with a simultaneous reference to the present day. For example, educational processes, their scope and methodology are noted, and the registration process shows the progress and ongoing changes that are hardly noticeable, and sometimes even imperceptible, in the teaching of particular subjects. At the same time, activities are carried out in the field of education, popularisation of science and art, and broadening the non-scientific interests of employees, students and graduates of the University. In these endeavours, the Museum is supported by the entire academic staff of the University.

Some of the outcomes of the Museum's educational activities include the organisation of permanent and temporary exhibitions, and the publication of research papers. They both refer to the history of the University and the academic community that formed it. Through its activities, the Museum contributes significantly to the integration of the academic community that is comprised of several thousand people working in diverse areas and scientific disciplines. In addition to the academic community, the Museum's educational activities are aimed at a larger public, not only the inhabitants of Kraków, but also audiences from other regions of Poland and abroad. Above all, it endeavours to reach high school students and children.

AIM

The task of university museums is to collect and permanently protect the tangible and intangible heritage of a given university, as well as to disseminate the value of the history of science and culture. The museums' activity is therefore of significant educational importance, and their role in the educational process is noteworthy. The Museum of Cracow University of Technology is a case in point. It facilitates documentation and research on issues related to the heritage of science in a historical context and at the same time with reference to the present day, and is also involved in the process of educating students of Cracow University of Technology (CUT). Moreover, it works to popularise science and art, and helps to develop non-scientific interests of employees, students and university graduates. These activities are extremely important because they contribute not only to the integration of the entire academic community of the University, but also significantly impact on education in regard to the development of science, culture and art.

The aim of this study is to show that the University Museum with its activities significantly supports the educational mission of the University by supplementing the educational process with humanistic elements, and at the same time contributes to the broadly understood promotion of the University [1].

METHODOLOGY

The methodology adopted for this study stems primarily from the interdisciplinary nature of the topic. The discussed issues concern knowledge and scientific experience in the field of museology, history of academic education, but above all, the methods of education in technical sciences. Although the problem has been presented based on the activities of one museum, i.e. the Museum of Cracow University of Technology, it also applies to other museums established at universities in Poland and around the world.

The author has eight years of experience in managing the work of the Museum of the CUT. He has also conducted research on the preparation and documentation of collections in selected Polish and European university museums. In his research, he uses the literature relating to the subject matter. The sum of the acquired knowledge and experience and their analysis may constitute the basis for an attempt to present a wide range of issues related to the educational role of university museums.

UNIVERSITY MUSEUMS

University museums exist within the structures of many universities in the world. There are over 1,100 of them in the USA and many more in Europe. Soon after these museums started operating, advisory and other relevant organisations have been formed around them. One of the first was the Council of Australian University Museums and Collections, established in 1992. The University Museum Group was established in Great Britain. Associations of university museums have also been established in many other countries. In 2000, the International Committee of University Museums and Collections (UMAC) was set up. It is part of the International Council of Museums (ICOM).

There are currently over 100 university museums in Poland. The oldest is the museum of the Faculty of Medicine of Jagiellonian University in Kraków, founded in 1900. Some Polish universities have several or even a dozen or so museums, e.g. Jagiellonian University - 13, University of Wrocław - six, University of Warsaw - five. University museums are located both at faculties and within inter-faculty structures. They operate in accordance with the act on museology, but since they are part of the university structures, they are subject to statutory regulations of their universities.

In 2012, an initiative was launched to establish an organisation that would unite Polish university museums. Two years later, on 28 May 2014, the Association of University Museums was founded in Poland. The need for this organisation is evidenced by the fact that initially, the Association consisted of 13 museums, while three years later, it had more than 50 members. Its main goal is to promote the development of university museums and to care for the tangible and intangible historical heritage of Polish universities, to conduct scientific research, and to promote the idea of university museology in Poland and abroad.

The Association of University Museums has organised four national scientific conferences. The conference topics included organisational problems, research on the theory of university museology, activities in the context of the new Law on Higher Education and Science, as well as forms of integration with the university and its research facilities. A catalogue of university museums' collections has also been published.

University museums have an individual focus of activity. They assemble collections relating primarily to the heritage of universities and the development of Polish science. At the same time, they conduct activities largely related to education. These are the main tasks of these museums formulated in a very general way. The specific goals of their work result from the specificity and expectations of the universities in which they operate. University museums often have both limited financial resources and limited physical space for collections. This is due to the specific conditions that the university can offer its museum. Despite these limitations, all university museums carry out their basic tasks.

THE MUSEUM OF CRACOW UNIVERSITY OF TECHNOLOGY

The establishment of the Museum was approved by the University Senate on 4 June 2004, and five days later, on 9 June, confirmed by the Rector's ordinance. The Museum is located on the University's main campus on Warszawska Street (Figure 1).

The campus is situated on the site of the former Archduke Rudolf Infantry Barracks, which in 1918 changed their name to the King Jan III Sobieski Barracks. The building complex was erected in the years 1878-1882. The University has been located there since 1947. Since then, the entire campus has been expanded, modernised and adapted to new functional requirements, and the individual facilities of the former barracks have undergone a general transformation.

The Museum is housed in the former Austro-Hungarian barracks' prison building dating from around 1878 (Figure 2). It is the only campus facility that has been entered in the register of historical monuments.



Figure 1: An aerial view of the University's main campus including the Museum (Photograph by Paweł Ozimek).



Figure 2: The Museum of Cracow University of Technology (Photograph by Jan Zych).

The activities of the Museum are defined in the regulations approved by the University Senate. They state that the Museum conducts scientific, educational and service activities related to collecting items of historical value, storing, conserving and exhibiting museum collections associated with the CUT. The regulations also stipulate that the task of the Museum is to disseminate the knowledge of the university history, science, technology, and thus to support the education of future engineers.

The Museum collection falls into the following categories: documents, prints, photographs, graphics, scientific instruments, medallion art, decorations, university seals, architectural and construction projects, artistic craftsmanship, sculpture, fabric and others. All collections are available on site, and digitised copies and photographs can also be borrowed. Museum employees have the required museum qualifications in accordance with the regulation of the Minister of Culture and National Heritage. The immediate guardian of the Museum is the Vice-Rector for General Affairs. In addition, the Rector appoints the Council for a period of 4 years. The Council supervises the substantive side of the Museum's activities. The Council is composed of representatives from all university departments, two persons appointed by the Rector and one representative from each of the selected administrative units, i.e. the Libraries, CUT Archives and the CUT Graduates' Association.

In 2016, the mission of the Museum was defined as the protection of heritage and identity. Heritage is understood here as values created by the University community, including all that allowed for its creation and development. Identity concerns the mutual sense of connection between the University community and the relationship of the University with the economic and social environment. The implementation of the Museum's mission also involves propagating the intangible assets related to the history of the development of science at the university level, its outstanding academic teachers and graduates. Apart from collecting documentation and material evidence of the activity of outstanding academics and alumni, the Museum also publishes research papers. An important form of activity is the organisation of both permanent and temporary exhibitions.

The Museum actively participates in the work of the Association of University Museums whose member it has been since 2015. It collaborates with many museums, including university museums. Despite the different history of

individual universities and the diverse contemporary profiles of their teaching and research activities, their university museums conduct similar activities. The exchange of experiences among them is important, especially of best practice in regard to popularising Polish science and educating new staff.

THE ROLE OF THE MUSEUM IN ENRICHING THE EDUCATION OF FUTURE ENGINEERS

The Museum organises permanent and temporary exhibitions. The first, titled Cracow University of Technology in Photographs and Documents, was opened in 2005. It presented the history of the University since its inception, recorded in archival photographs and in documents. In the following years, one or two exhibitions were organised. Recently, the Museum has increased its activity and prepared several exhibitions. Currently, most of them are also available on the Internet. Events dedicated to the academic community are also organised outside the premises of the Museum, such as participation in the organisation of the Małopolska Nights of Scientists, European Heritage Days, philatelic exhibitions thematically related to the University, and the Kraków Nights of Museums. It is worth mentioning that the Museum also conducts scientific activities, and its employees publish articles and deliver lectures.

Publishing is an important aspect of the Museum's work. Initially, the Museum issued the Bulletin containing scientific studies, and catalogues of exhibitions. Since 2016, three publishing series have been issued in Polish and English: catalogues of all the exhibitions presented at the Museum, the Bulletin issued once a year reporting on the Museum's work in the previous year, and Historical Journals, which are scientific publications thematically related to the University. The publishing activity of the Museum is also focused on the educational aspects dedicated to both the University community, as well as to a wider circle of recipients from outside the University.

In 2015, on the 70th anniversary of Cracow University of Technology, a permanent exhibition was opened, presenting in a synthetic way the events from the establishment of the University in 1945 until 2015. The exhibition was arranged in three parallel rows. In the top row, there are copies of portraits of successive CUT rectors, starting from 1945, thus creating a kind of timeline (the original portraits are in the Senate Hall). In the middle row, there are boards with photographs illustrating the most important events from the periods corresponding to the terms of office of successive rectors. Showcases with original documents and items related to the events presented on the boards constitute the lowest row (Figure 3).



Figure 3: A permanent exhibition in the Museum (Photograph by Jan Zych).

This exhibition presents the history of the University campus on Warszawska Street. There are objects there that date back to the mid-19th Century. After Kraków was incorporated into Austria, the military authorities decided in 1848 to build a circular system of fortifications in Kraków, and in 1871, a decision was made to build barracks on Warszawska Street. In the years 1873-1878, their main part was completed. From the side of Warszawska Street, in the eastern part of the plot, there is an impressive headquarters building, and symmetrically on both sides of it, two battalion buildings with representative gardens at the front. The third battalion building was built at the far end of the plot parallel to the headquarters building. The building of a military detention facility was located on the northern side. In the years 1905-1907, the officers' casino was built on the south side. It was an artistically valuable complex of buildings in Kraków in the second half of the 19th Century. Stylistically, the architecture of these facilities referred to the Viennese Arsenal built in the years 1849-1856 by Teofil von Hansen and August Siccard von Siccardburg.

Cracow University of Technology was established in 1945. Initially, its departments were located in various facilities in Kraków. In 1948, the CUT took over the former headquarters building and two battalion buildings from the army. In the following years, the University received the remaining buildings of the former barracks. During over 70 years in use, the buildings have been adapted to the needs of the University.

The entire campus is located within the area entered in the register of historical monuments. The University, as an investor and user, makes sure that all construction works and necessary extensions are carried out with respect for the historical values of this architectural complex. The new buildings are made of modern finishing materials, which is intentionally visible in the shapes and façades of these buildings. The necessary extensions are made so as to reveal their original historical form and the subsequent layers.

The exhibition documenting the changes shows the development and adaptation of the University campus to the current conditions and requirements in an interesting way. In addition, it educates in terms of history, university history, history of architecture and monument conservation. The interest in these topics is evidenced by numerous questions addressed to the Museum employees and lively discussions. The exhibition, similarly to the mentioned-earlier publishing activity, has an educational aspect dedicated not only to the University community, but also to a wider audience from outside the University (Figure 4).



Figure 4. An interior view of the Museum (Photograph by Jan Zych).

On the centenary of the First World War's outbreak, the Museum prepared the exhibition *Ars Magna - Architectura Militaris, Kraków Fortress 1914-2014*. It was opened in December 2014. The vernissage attracted a very large group of people also from outside the University. There were representatives of many offices and state institutions. The history and the present state of the Kraków Fortress, which played a key role in the modern history of the city, were presented. The exhibits included numerous maps, photographs and artefacts. All of them were described in detail. It is worth adding that the informative aspect of this event also reached the youth of secondary schools not only from Kraków, but also from various towns and cities all over Poland.

During the tour, numerous groups had lively discussions with the employees of the Museum. It is hard to underestimate the educational aspect of this event. For young people, this way of learning about history and acquiring knowledge is very effective and contributes to consolidating the theoretical knowledge acquired while studying at school. The interest in the exhibition is evidenced by the fact that a few months after its opening, from 15 to 25 June 2015, the Museum conducted educational workshops *Architektura Militaris - Put up Fortress*. Many groups of young people took part in these workshops, organised as a result of a very high interest in the exhibition and teachers' demands for this form of education [2].

In 2017, the 200th anniversary of the death of General Tadeusz Kościuszko was celebrated all over the world under the patronage of UNESCO. Among others, three organisations made efforts to give the celebrations due importance. They were the Kościuszko Mound Committee from Poland, the Kosciuszko Foundation from the USA and the Kosciuszko Heritage Inc., a Polish-Australian social organisation from Australia. The aim was to promote not only the figure of this extraordinary and outstanding person, but also Polish culture, science and history around the world.

Cracow University of Technology was named after Tadeusz Kościuszko, and on this occasion the University had organised many events, which culminated in the International Conference *Tadeusz Kościuszko, History, Present, Future - Relationships and Dependencies*. It seemed that it would not be easy to arouse interest in such a topic among technical university staff. It turned out, however, that the academic community, interested in the phenomenon of Kościuszko, took up the topic and the conference presentations included articles from Poland and abroad discussing the person himself, as well as his achievements and commemorative monuments in Poland and abroad.

Special attention was drawn to studies from outside Poland by authors who maintain links with Poland and its history, such as those associated with the Polish communities in Switzerland, in Rapperswil and Solothurn. A study was sent

from Australia describing a group of Poles, as well as Aborigines collaborating within the Kościuszko Heritage Inc. to commemorate the 200th anniversary of the death of Tadeusz Kościuszko and the Year of Kościuszko. The aim was to support folklore festivals organised in the vicinity of Mount Kosciuszko and on the Mount itself, thus promoting the person of Kościuszko and the values proclaimed by him [3].

Jan Loryś, a historian and former director of the Polish Museum of America talked about the years Kościuszko spent in the USA. He knows the subject very well and presented the traces of Kościuszko in the USA in a professional manner, confirming that Tadeusz Kościuszko is remembered by Americans more than by Poles. It has been evidenced that his great military talent and his fortification engineering achievements in the American Revolutionary War are still highly regarded there [4].

In the USA, Kościuszko has been commemorated many times in the names of cities and places, such as the city of Kosciusko, Mississippi, Kosciusko County, Indiana, a bridge in New York, a park in West Point and eight monuments.

The Museum was actively involved in the celebrations of the 200th anniversary of Tadeusz Kościuszko's death by organising the exhibition Drawings by Tadeusz Kościuszko. The exhibition presented the drawings and watercolours created in the years 1769-1772 during his studies at the Royal Academy of Painting and Sculpture in Paris. The valuable originals from the Princes Czartoryski collection were made available by the National Museum in Kraków.

The exhibition was accompanied by a richly illustrated, extensive catalogue. After the exhibition was closed, many institutions and individuals from Poland and abroad requested the catalogue be still available. Such a high interest was understandable as prior to the exhibition, Kościuszko was little known as a draftsman or painter. In October 2017, the exhibition was also presented at the Polish Library in Paris and at the Kościuszko Mound Museum in Kraków.

At this point, it is worth adding that learning to draw significantly contributes to the stimulation and development of realistic, precise spatial imagination, objective in relation to the surrounding material world. For Tadeusz Kościuszko, it turned out to be extremely useful; for example, when choosing sites for the construction of earth fortifications or assessing the field of fire.

It is no coincidence that since 1976, the CUT has been named after Tadeusz Kościuszko. Apart from his undoubted merits for Poland, there is also a certain convergence between the interests and achievements of Kościuszko and the teaching and research conducted here. In addition to typically engineering issues, the CUT curricula also include drawing, painting and sculpture.

CONCLUSIONS

The relatively short time of the Museum's existence can be characterised as a successful entry into the structures of the University by the long-awaited, but effective implementation of its statutory tasks. The need to protect the values related to the history of the CUT and the achievements of its community, which constitute valuable cultural heritage, both in its tangible and intangible dimensions, has been recognised for a long time. This mission has been entrusted to the Museum, which is now concerned with its preservation and passing on to future generations.

The resulting educational activity is a permanent task, effectively combined with promoting the University, and enriching engineering education programmes with humanistic elements. This activity is directed not only to the University's own community, but also to a very wide audience from outside the University, which appeared soon after the Museum started operating.

It is easy to see that most of the events organised by the Museum are primarily educational in nature, but research work is also undertaken there. This applies to the published monographs presenting the activities and work of some outstanding figures of the academic community, such as Professors: Bronisław Kopyciński, Stanisław Rudnik, Ludomir Sleńdziński and Michał Życzkowski. Their achievements have received high scientific evaluation and recognition within their respective disciplines of science and art. The presentation of their achievements, very often based on source materials from the Archives of the CUT, is an extremely important aspect of the Museum's educational nature.

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BIOGRAPHY



Professor Andrzej Białkiewicz, Rector of Cracow University of Technology (CUT), has been affiliated with the CUT for almost 50 years. Since 2011, he has held the position of Chair and Head of the Division of Freehand Drawing, Painting and Sculpture in the Faculty of Architecture of CUT. In the years 2012-2020, he held the office of Vice-Rector for General Affairs of this University. The areas of his research and professional engagement include the following: architecture theory with special regard to the architecture of the 20th Century, theory and practice of architectural drawing, as well as engineering education. Prof. A. Białkiewicz is engaged in the design of contemporary architecture and preservation of monuments. He is the author and co-author of more than 160 completed projects in Poland and abroad. He has a particular fondness for the designs of sacred objects, and has created more than 40 of them, either independently or as a co-author.