Journal of Contemporary Educational Research, 2024, Volume 8, Issue 10
http://ojs.bbwpublisher.com/index.php/JCER
ISSN Online: 2208-8474
ISSN Print: 2208-8466

Research on the Construction of a Comprehensive Teaching Case Library for Ergonomics under the OBE Concept

Haiyan Tang*, Wenting Ni

Chongqing Institute of Engineering, Chongqing 400056, China

Corresponding author: Haiyan Tang, tanghaiyanxinxin@126.com

Abstract: In recent years, case-based teaching has become a hot spot in higher education reform, and the construction of case libraries has received increasing attention. The development of teaching case libraries not only promotes changes in talent training models but also enhances teaching effectiveness. Taking the ergonomics course as an example, this paper explores the construction of a comprehensive teaching case library for ergonomics under the outcome-based education concept, providing a reference for future ergonomics teaching case library development.

Keywords: Outcome-based education concept; Ergonomics; Comprehensive teaching case library

Online publication: October 22, 2024

1. Ideas for the construction of a comprehensive teaching case library for ergonomics under the outcome-based education concept

1.1. Establishing logical connections between the comprehensive teaching case library and environmental design professional

Firstly, this case library aligns with graduation design capability goal three, which emphasizes "having a solid professional foundation and design practical skills." One of the professional basic skills is mastering the sense of design scale. Dimensions have always been a difficult problem for students in accurately designing and drawing construction drawings. This case aims to cultivate students' cognition of commonly used indoor space dimensions, the rationality of space and furniture layout, and their control over the sense of scale. Addressing the issue of humanization in student design proposals enables them to use ergonomics-related knowledge to analyze and solve problems related to the relationship between space and people in design, laying a foundation for "human-centered design" in subsequent design courses. This, in turn, improves their professional design and practical skills, enabling them to solve problems in environmental design, scheme deepening, or engineering practice. Secondly, the case library should be highly comprehensive, covering not only spatial scale content but also design concepts, indoor decoration materials, indoor construction

techniques, and other content required for subsequent courses, to comprehensively enhance students' professional skills. Finally, the case library itself can serve as a source of ideological and political education in courses, allowing students to understand local design, and the influence of designers can also serve as a role model for students to learn from.

1.2. Sources of the comprehensive teaching case library

This case is derived from the design of a large flat residential model room under the Chongqing Times Center. The project is located in the iconic building project of Guanyinqiao business district, Jiangbei District, Chongqing—Chongqing Times Center. As the last developable residential land in the inner ring core position of the business district, Chongqing Times Center, with its unique geographical advantages and landmark influence, was ranked among the 894 key construction projects planned by Chongqing in 2021. The project covers an area of approximately 25,000 square meters, with a total construction area of 380,000 square meters. It consists of an 80,000-square-meter international commercial flagship shopping center, two 33-story towers, and a 249-meter-high luxury residential building. This not only draws a new coordinate on the city's skyline but also brings profound impacts on the quality and pattern of city life. The design was created by Bin Wu, the founder of the internationally renowned WS World Studio. Bin Wu has provided design services for top luxury residential projects such as "Shanghai Tangchen Yipin" and has received widespread praise. He integrated his deep understanding and unique aesthetic appreciation of interior design art into the design of this case, adopting a modern oriental design style to create a unique private luxury residential living scene. This fully replicates and presents a residential space with high-end elegance and cultural heritage, making this case a model project in the real estate field in Chongqing and even the southwest region.

1.3. Characteristics of the comprehensive teaching case library

(1) Typicality: This case is a typical high-end real estate project model room with a relatively large area and complete functions. It serves as a guide for the design of similar layouts. The model room design is universal, focusing on the rational utilization of space rather than personal preferences. This type of design provides valuable insights for beginners.

(2) Comprehensiveness: The case encompasses various dimensions of ergonomics, as well as residential space design and construction organization. It covers the residential space dimensions involved in ergonomics courses, human body dimensions in introductory architectural design courses, interior space materials in environmental design materials and construction courses, and construction drawings of residential spaces in architectural decoration engineering technology courses.

(3) Timeliness: This case represents the latest design from 2020, featuring novel design concepts, cutting-edge materials, and dimensions that align with ergonomics.

(4) Innovativeness: The case content exhibits a certain degree of innovativeness. It challenges students to consider how to reasonably lay out furniture based on spatial dimensions that meet human body requirements. This provides students with opportunities for critical thinking and problem-solving.

2. Construction content of the comprehensive teaching case library for ergonomics under the outcome-based education concept

2.1. Content covered by the case library

Guided by the outcome-based education (OBE) concept and aligned with the required capabilities for

graduation design, we establish the capability targets for courses such as ergonomics. These targets are then decomposed into several tasks, and the knowledge objectives needed to complete these tasks are identified. Based on the outlined course tasks and objectives, the case library for the Chongqing Times Center's large flat model room design should include a complete indoor functional space. This encompasses interior space design, common furniture arrangement, interior decoration materials, and interior construction. It needs to support three main aspects of the ergonomics course: "Application of Human Measurement Data," "Ergonomics and Furniture Design," and "Application of Ergonomics in Residential Spaces." Additionally, it provides cases for two other core courses: Introductory Architectural Design and Environmental Design Materials and Construction. For instance, it covers human body dimensions in the architectural design course and interior space materials in the environmental design course. Simultaneously, it supports the content of residential space construction drawings in the professional elective course, Architectural Decoration Engineering Technology, enabling these courses to achieve their respective knowledge and capability targets (**Figure 1**).

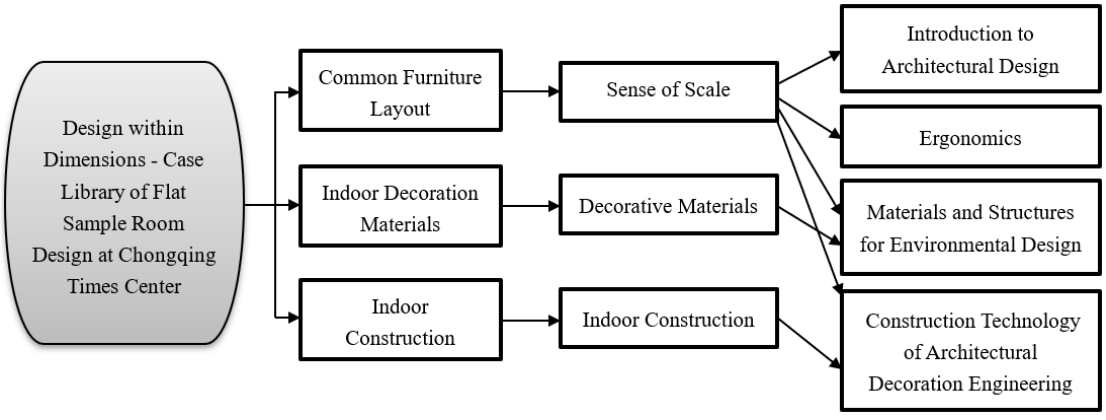

Figure 1. Relationship between the content of the design case library for the large flat model room at Chongqing Times Center and the courses

2.2. Design of the case library structure

The course "Ergonomics" is positioned as a "core professional course" in the professional talent training program. The case library for "Ergonomics" is suitable for second-year university students in this major. As students are just beginning to explore their field, many of them are more engaged in design-related courses and may not fully appreciate the importance of theoretical courses. Students often participate in teaching activities as "designers" and lack practical experience as "users." Relying solely on theoretical explanations from the "Ergonomics" textbook can make it difficult for students to develop a deep understanding and empathy. Therefore, it is necessary for teachers to clarify the significance of the course during instruction, aiming to enhance students' engagement and enthusiasm in the implementation of case-based teaching. Generally, cases are primarily narrative, with a focus on recording, and include discussion and explanation. The case writing for "Ergonomics" mainly consists of seven aspects: theme, background description, activity content, activity effect display, event analysis, experience sharing, and extended problem thinking [1]. The case structure is divided into two parts: the main body of the case and the instructions for case use. These two components together form the guidance for the case and its application in teaching (**Table 1**).

Table 1. Basic structure of the case

Serial number	Project name	Compilation instructions
1	Case name	It is advisable to use clear, concise, and easy-to-understand neutral language. The text should include the real names of relevant subjects/entities. If anonymization of real names is required, please provide a note in the footer of the first page.
2	Chinese abstract and keywords	The abstract should provide a brief description of the case content (including background, phenomena, key issues, and focal points). Generally, it should not include commentary analysis. A total of 3–5 keywords are included.
3	Frontpage notes (author and copyright information)	Please introduce the author's name, workplace, and case copyright information. Additionally, it should be noted that the case is intended for classroom teaching purposes only.
4	Case text	The content should be a true description based on objective facts, generally including necessary information such as time, place, main characters, key events, event processes, and results. The narrative should be complete, accurate, and clear, and highlight decision points, with authentic and reliable data. According to the requirements of case teaching, the entire case should be narrated in detail, including the process and results of the case, relevant data (technical parameters, source code), formulas, charts (engineering diagrams), and other information. The narrative should be objective, unbiased, and non-directive, with prominent decision points, and the content and related data should be complete and consistent.
5	Conclusion	Depending on the need, there are different writing styles, and three common ones are: first, a concise summary of the main body; second, posing decision-making questions to stimulate readers' thinking; and third, a natural fading out.
6	Reflection questions	The thought-provoking questions should be closely related to the facts in the case while also covering theoretical and practical knowledge that students should master. These questions should stimulate students' thinking, be discussable, and require students to learn from multiple sources and find information to complete, rather than being solved with simple biased answers.
7	Footnotes	Annotations for certain technical issues, proper nouns, new terms, and concepts in the main text should be attached at the bottom of the same page as the relevant content, separated from the main text by a horizontal line.
8	References	Other references or citations are listed.
9	Appendix	This includes data, charts, and relevant background information that are helpful for understanding but not convenient to present in the main text.

2.3. Instructions for writing case studies

The instructions for using the case study library should include the following aspects:

(1) Teaching purpose and usage: This includes teaching objectives, target audience, and applicable courses.

(2) Thought-provoking questions: Based on teaching objectives and case content, targeted classroom discussion questions are proposed, with 3–5 questions being appropriate.

(3) Analytical thinking: The logical structure of case analysis is demonstrated, highlighting the logical relationship between case issues, relevant knowledge points, and theories.

(4) Theoretical basis and analysis: Based on the thought-provoking questions, relevant theories, analytical methods, and tools required to analyze the case are selected.

(5) Classroom design suggestions: Suggestions on time allocation, teaching formats, and how to organize and guide discussions on the case are provided during the case teaching process. If necessary, a

blackboard plan can be attached. The suggestions should be reasonable, practical, and operable to ensure the effectiveness and quality of case-based classroom teaching.

(6) Summary of key points: The main teaching knowledge points, skill points, and implicit insights contained in the case are summarized.

(7) Other instructions: This includes recommended reading materials, auxiliary teaching materials (charts, software, video information, etc.), and follow-up developments of the case [2].

3. Difficulties encountered and solutions in the construction of a comprehensive teaching case library for ergonomics based on the outcome-based education concept

3.1. Difficulties encountered

The core of building a case library is selecting appropriate cases that meet both academic needs and talent training objectives. The quality and appropriateness of the case library directly affect the quality of case-based teaching. Currently, the main issue is the limited source of cases, which primarily come from projects that teachers have participated in during corporate internships. These projects do not always meet the requirements of the case library, leading to an insufficient number of cases and a lag in updating the library to match industry developments.

3.2. Solutions

To address the issue of insufficient cases during the construction of the case library, attempts can be made to collect targeted cases through channels such as case competitions and case journals. Forming a specialized development team with case experts and businesses to jointly develop cases and exploring the indexing of cases collected by relevant case institutions can help to achieve a more diverse, higher-quality, and broader range of case resources [3]. Additionally, collaborating with industry organizations and businesses, which are the source of cases, to regularly select representative, willing, and potential enterprises for case studies and establish a case study base can enrich the quantity of the case library and facilitate the selection of appropriate cases for teaching [4].

4. Conclusion

By building a comprehensive teaching case library and enriching teaching resources, the introduction of case-based teaching into the educational process can not only enrich classroom content but also allow students to stay informed about industry developments. This approach enhances students' enthusiasm and creativity during learning, effectively enabling them to master both theoretical knowledge and practical skills, and ultimately promoting the achievement of the school's overall teaching objectives [5].

Funding

2024 Chongqing Institute of Engineering Project Library and Case Library Construction Project "Design within Dimensions: Design of a Large Flat Model Room at Chongqing Times Center" (S202312608040)

Disclosure statement

The authors declare no conflict of interest.

References

[1] Wu J, 2024, Research on the Construction of a Case Library for the "Education" Course in Tourism Management and Service Education. Journal of Guizhou Normal University, 4(40): 46–53.

[2] Case Writing Guidelines for the MBA School of Zhongnan University of Economics and Law, 2015, viewed August 24, 2024, http://mba.zuel.edu.cn/_upload/article/files/9e/b6/72e0b4d248e1bd236b4ed11f89ee/258bd74f-95fa-40f7-86e5-418b04ec788e.pdf

[3] Li X, Xu P, Huang T, et al., 2024, Innovation and Practice Based on Case Library Teaching. Henan Chemical Industry, 1(8): 62–64.

[4] Huang B, Lin M, Han F, et al., 2022, Emphasizing the Construction of Chinese Main Case Studies and Building a New Model of High-Level Case Studies with Chinese Characteristics. China Higher Education, 11(3): 17–19.

[5] Xu L, Chen S, 2023, Construction of a Teaching Case Library for Environmental Design Majors in Applied Undergraduate Universities: Connotation, Value, and Implementation Path. Journal of Shandong University of Art and Design, 2023(5): 47–51.