

STUDENTS EDUCATION IN TERMS OF USING THE VIRTUAL VERSION OF INTEGRATED MANAGEMENT SYSTEM

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Purpose: The aim of the study has been to get to learn the opinions of the students in terms of the functionality of the virtual version of integrated management system.

Design/methodology/approach: Taking into account the literature on the subject and our own experience supported by the results of a preliminary (pilot) survey conducted among students, the need to use a virtual version of an integrated management system in conducting didactic classes in public higher education institutions was justified.

Findings: The results of the study justify the use of the virtual version of integrated management system in the process of education in management, management and production engineering (the first- and the second-degree programmes).

Research limitations/implications: The considerations included in this study determine further directions of theoretical and practical research. Interesting research problems include, for example, the benefits resulting from the use of the virtual version of integrated management system, the improvement of management systems and reporting of achievements.

Originality/value: Virtual Desktop Infrastructure delivers virtual desktops hosted on centralized servers, enabling remote access via various devices. VDI enhances flexibility, strengthens data security, and simplifies IT management. Its innovative approach modernizes work environments, enabling efficient resource allocation and seamless user experiences in diverse organizational settings.

Keywords: ERP systems, integrated management system, higher education.

Category of the paper: Research paper.

1. Introduction

Higher education institutions are increasingly recognizing the necessity for their integrated management systems to reflect the realities of contemporary educational demands. By aligning curricula with the skills and experiences sought by employers, these systems enhance students

employability, enabling them to compete successfully in the job market - even against individuals with several years of professional experience. A key driver of entrepreneurial growth is an education system designed to develop not only technical competencies but also the personal attributes essential for future entrepreneurs. To this end, higher education institutions are actively seeking innovative approaches that extend beyond traditional academic instruction, aiming to prepare graduates comprehensively for their professional careers. Such initiatives often incorporate practical elements, such as information technology education, which are tailored to meet the dynamic needs of the job market.

Effective instruction in enterprise resource planning systems (ERP), requires a well-structured teaching process. ERP systems are integral to the operations of medium- and large-scale enterprises, and equipping students with these skills ensures they are well-prepared to navigate professional challenges (Grochowski, 2022; Żółtowski, 2021). The delivery of ERP training, especially in computer laboratory settings, demands additional effort from educators. Despite this, such methods are highly beneficial. Hands-on instruction enhances not only the depth of students understanding but also their ability to apply this knowledge in real-world contexts. To support this process, Higher education institutions increasingly utilize advanced technical teaching aids, which enable them to adapt their educational offerings rapidly to meet the evolving demands of the external environment. These tools not only extend the scope of academic programs but also provide varied educational formats that cater to the needs of a diverse academic audience (Januszewski, Grochowski, 2016; Maditinos et al., 2012; Noamana, Ahmed, 2015).

The Faculty of Management at Bydgoszcz University of Science and Technology provides a compelling example of the integration of ERP education into higher education curricula. Within its programs in finance and accounting, management, and management and production engineering, the faculty includes dedicated computer laboratory classes focused on ERP systems (Januszewski, 2014). These courses utilize platforms such as Comarch ERP Optima and Work Manager ERP to provide students with practical training (Zwierzchowski, Graul, 2016). Depending on the specific major and degree program, students participate in ERP-related training across four courses, designed as hands-on tutorials in laboratory settings. This approach emphasizes experiential learning, bridging theoretical knowledge with practical application, and ensuring that students graduate with a comprehensive understanding of ERP system functionalities and their use in organizational contexts.

Higher education institutions are progressively offering courses that not only familiarize students with the conceptual foundations of integrated management systems but also equip them with the practical skills needed to use these tools effectively. Such courses address a critical need to align academic instruction with the technological advancements and operational requirements of contemporary business environments. By incorporating ERP education into their curricula, higher education institutions ensure that graduates are not only knowledgeable but also proficient in utilizing integrated management systems.

The study described in this article investigates students perceptions of the functionality and usability of virtual versions of integrated management systems. Understanding these perspectives provides valuable insights into the effectiveness of current teaching practices, offering guidance for the refinement of curricula. Students feedback is particularly critical, as it highlights the real-world applicability and potential shortcomings of the tools and methodologies employed in ERP instruction.

The integration of ERP training into higher education programs exemplifies a broader trend toward bridging the gap between academic knowledge and professional practice. By providing students with hands-on experience and technical competencies, higher education institutions equip them with the tools necessary to succeed in complex, dynamic organizational environments. The use of innovative teaching methodologies, supported by technical aids, further reinforces this objective, ensuring that graduates are not only prepared for the current job market but also capable of adapting to its future evolution. By continually aligning educational offerings with the demands of the external environment, Higher education institutions reaffirm their role as pivotal contributors to individual and societal progress in an increasingly competitive global economy.

2. E-learning in higher education

E-learning has emerged as one of the most versatile forms of distance education, encompassing a wide range of teaching and learning processes facilitated by modern information technologies. While often associated with online education, the term extends beyond mere Internet-based learning. E-learning includes any educational activity supported by diverse telecommunication technologies, offering dynamic and flexible solutions for learners. As Internet accessibility expands and time constraints intensify, the demand for remote learning solutions grows. E-learning has proven effective as both a complementary and alternative approach to traditional teaching methods (Bascis, 2005; Chrabąszcz, 2011; Sołtysiak, 2016). The benefits of e-learning are substantial and cater to diverse educational needs. Some of the key advantages include (Chrabąszcz, 2011):

- personalized learning pace: students can tailor their study schedules and learning speed to suit their individual needs and lifestyles,
- reduced anxiety and shyness: for students who may feel apprehensive about direct interactions with instructors in traditional settings, e-learning offers a less intimidating environment,
- multimodal content delivery: e-learning leverages various formats (text-based materials, presentations, and videos) enhancing engagement and catering to different learning preferences,

- accessibility for remote learners: for individuals facing geographic, financial, or other barriers, e-learning provides an opportunity to pursue education without the logistical challenges of attending on-site classes,
- accuracy of materials: digital resources are often rigorously reviewed and updated, reducing errors and ensuring quality,
- continuous system improvement: e-learning platforms evolve to remain engaging, incorporating innovative features and up-to-date content,
- support for learners with disabilities: e-learning systems are adaptable, enabling inclusive access for students with various disabilities,
- cost efficiency: compared to traditional classroom-based education, e-learning offers a cost-effective model for both institutions and students.

Despite its many benefits, e-learning also poses several challenges (Chrabąszcz, 2011):

- lack of direct interaction: the absence of face-to-face communication with instructors and peers can hinder the social and interactive aspects of learning,
- motivational barriers: self-discipline and intrinsic motivation are critical for success in e-learning, but not all students possess these traits,
- technical proficiency requirements: students must be comfortable using digital tools, which can be a barrier for some individuals.

Blended learning, which combines traditional classroom instruction with e-learning, is gaining widespread recognition as a balanced educational approach. This hybrid model allows students to benefit from direct engagement with instructors and peers while enjoying the flexibility and accessibility of online resources. Students can participate in discussions, collaborate on projects, and access materials at their convenience, creating a well-rounded learning experience. For higher education institutions striving to remain competitive and relevant, investing in e-learning and blended learning systems is imperative. However, this evolution must not come at the expense of direct interpersonal engagement, which remains a cornerstone of effective education. By integrating traditional and digital methods, universities can offer a modern, inclusive, and effective learning environment that meets the demands of today's diverse student body (Bubenets, 2023; Komańda, 2014).

The Faculty of Management at the Bydgoszcz University of Technology employs Virtual Desktop Infrastructure (VDI) as a key e-learning tool. This platform supports selected courses, providing students with access to virtual desktops and specialized software. In the initial phase of VDI implementation, students' motivation plays a crucial role in ensuring success. Comprehensive training sessions designed to overcome technical and psychological barriers are essential. Each institution should develop a tailored training system for platform usage. A recommended practice is mandatory training for first-year students, ensuring they are equipped to navigate e-learning tools effectively (Calle-Romero et al., 2020; Graul, 2016; Graul, Januszewski, 2015).

3. Using the virtual version of the ERP class systems; the opinion of the students

The classes aim at the students acquiring the knowledge of the principles of management in the contemporary enterprise when using the integrated management system. The students have a chance to develop their knowledge of the functional and structural properties of such systems further.

Depending on the major and the programme degree, the students surveyed were getting to know the integrated management systems in one of the following courses: information technology for management (Management - B.Sc. programmes), management information systems (Management - M.Sc. programmes) and integrated management systems (Management and production engineering - M.Sc. programmes). The classes were provided in a form of lectures and practical tutorials in computer labs.

The development of the article was preceded by empirical studies. In June 2024 a pilot survey was carried out among 127 students majoring in Management as well as Management and production engineering (a regular programme). An e-survey created in Google Forms has been used as a research tool. The survey questionnaire was addressed to 3 groups of students following the applicable courses in the 2023/2024 academic year (Table 1).

Table 1.
Characteristics of the respondents

Major	Management	Management	Management and production engineering
Level of studies	the first-degree programmes (B.Sc.)	the second-degree programmes (M.Sc.)	the second-degree programmes (M.Sc.)
Course	Information Systems for Management	Computer Science in Management	Integrated Management Systems
Profile of the studies	general academic	general academic	general academic and practical

Source: authors' own study.

The questionnaire included detailed questions to learn the opinions of the students in terms of the functionality of the virtual version of integrated management systems. For each question at least one answer had to be ticked as applicable. The results presenting the answers to the questions in the survey questionnaire to get to know the opinion of the students are discussed and presented in a graphic form.

With the students' evaluation of the class level, it can be noted that 70% of the respondents provided positive feedback on the class quality (Figure 1). Classes at the Faculty of Management were performed in a way as to present in detail, at the start, all the information related to the course to the class participants. An example can be provided by an virtual version of the integrated management systems available to the students. It is often the case that the students for the first time deal with virtual version (it mostly refers to the students of the first-degree programme and, less considerably, to the second-degree programme).

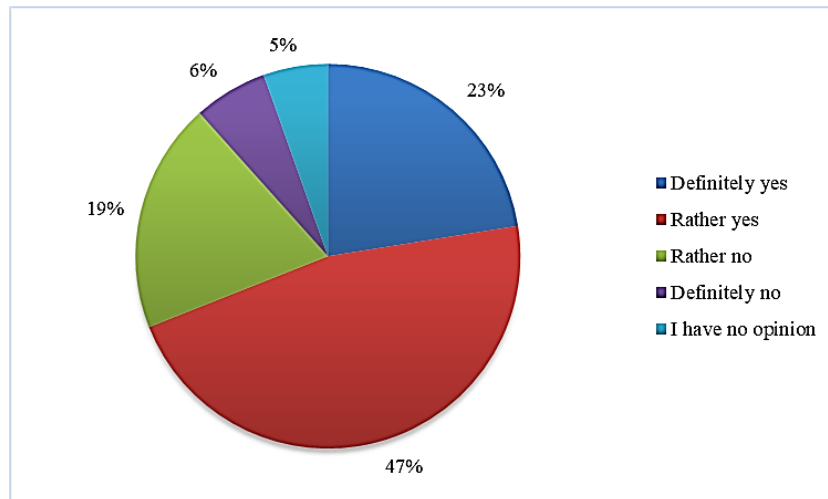


Figure 1. Question: How do you evaluate the level of the classes provided with virtual version of the integrated management systems?

Source: authors' own study.

The study concerned e.g. the functionality of the virtual version of the integrated management systems offered (Figure 2). The analysis of the results confirmed the justifiability of sharing and providing a full functionality of the ERP class systems with students. As many as 79% of the respondents consider it justified to deliver classes with a full system version in computer labs. The students are aware of the necessity of getting to know a full functionality of the integrated management systems.

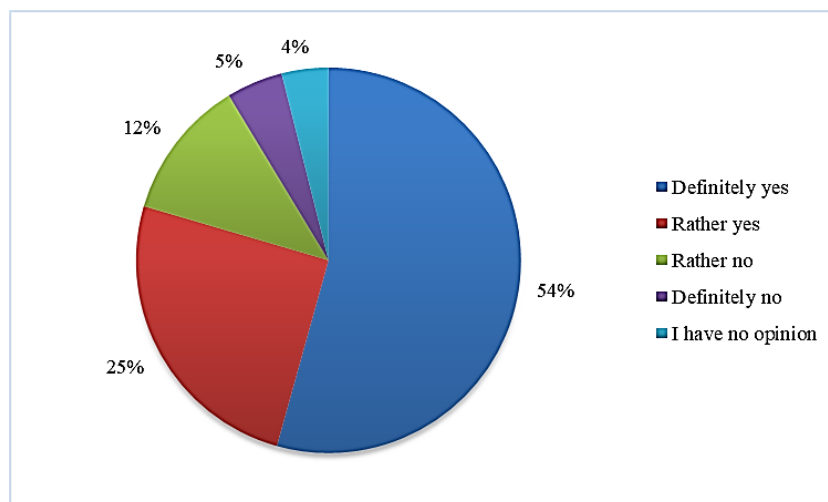


Figure 2. Question: Should the virtual version of the integrated management systems provide a full functionality?

Source: authors' own study.

The last question concerned the availability of the integrated management systems in the virtual version for students (Figure 3). As many as 71% of the students indicated the need of having access to the ERP class system at home. That result must have been due to the fact that the students in the future can verify the functionality of the integrated system even after completing classes in a given course.

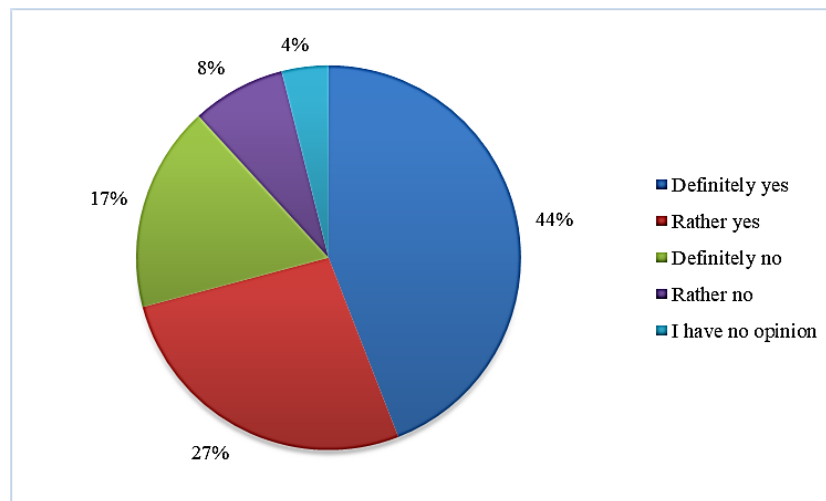


Figure 3. Question: Should the students have access to the virtual version of the integrated management system outside the higher education provider's computer lab?

Source: authors' own study.

4. Conclusions

Integrated management systems have become a standard for enhancing the efficiency and effectiveness of enterprises, offering a structured approach to managing resources, operations, and decision-making. Familiarity with these systems provides significant advantages for students, equipping them with in-demand skills that enhance their employability in a competitive job market (Chaudhry et al., 2021; Zwierzchowski, 2023). Recognizing the value of integrated management systems knowledge, higher education institutions are increasingly integrating these tools into their curricula. Moreover, partnerships between higher education institutions and information systems providers play a pivotal role in advancing these educational efforts. When providers identify high potential in students skills, they are more inclined to invest in developing educational offerings, creating a mutually beneficial relationship.

The academic phase of a students life is crucial for skill acquisition. During this time, students can gain hands-on experience with integrated management systems. These systems simulate real-world business processes, offering students the opportunity to understand and apply complex operational frameworks in a controlled environment. Such practical exposure is invaluable as it aligns with industry demands for graduates who bring both theoretical knowledge and practical expertise to their roles (Abugabah et al., 2015). Graduates who can demonstrate additional competencies, particularly in utilizing advanced technological tools like ERP systems, stand out to employers. As a result, higher education institutions must prioritize the inclusion of these systems in their academic programs. This approach ensures that students

are well-prepared to transition seamlessly into professional settings, contributing effectively from the outset of their careers.

Empirical evidence supports the integration of ERP systems into the academic curricula of economics and management programs. At the Faculty of Management at Bydgoszcz University of Science and Technology, for instance, students in majors such as finance and accounting, management, and management and production engineering have benefited from the inclusion of ERP tools in their courses. Pilot surveys conducted among these students reveal positive feedback, highlighting the relevance and effectiveness of ERP systems in enhancing their educational experience.

The survey results justify the application of ERP systems in higher education as a means to bridge the gap between theoretical knowledge and practical application. These systems enable students to develop a comprehensive understanding of integrated management, preparing them to meet the expectations of modern employers. Furthermore, the analysis underscores the importance of providing students with access to educational versions of integrated management systems, ensuring affordability and broad accessibility.

The integration of ERP systems, into academic programs represents a critical step in preparing students for the demands of the modern workforce. By fostering collaborations with system providers and continuously adapting curricula to industry standards, higher education institutions enhance students employability and contribute to the development of a technologically adept and competitive workforce.

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