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THE USE OF VIRTUAL REALITY IN MANAGEMENT AND BUSINESS ACADEMIC EDUCATION PROCESS – OPPORTUNITIES AND LIMITATIONS

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Purpose: The rapid growth of technology can be responsible for new approaches to teaching. The development of Virtual Reality facilities and technology can significantly reshape the academic education process. This paper aims to identify the opportunities and limitations to discuss the potential benefits and challenges of Virtual Reality (VR) for management and business academic education processes.
Methodology/approach: The method used was an in-depth literature study based on an electronic basis, e.g., SCOPUS, for theory background. In the empirical part, qualitative research using a case study with observation support was conducted. The study is exploratory in nature due to the uniqueness of the activities studied in VR provided by the Business Process Simulation Center situated at the Wroclaw University of Economics Campus. In the article, two research questions were asked: (RQ1) What are the opportunities of using virtual reality in the management and business academic education process? (RQ2) What are the limitations and barriers to using virtual reality in the management and business academic education process?
Findings: The research allows the author to identify that by using VR and making various decisions, the students can observe their impact on the simulated environment. Users can repeatedly attempt and refine their skills, allowing for continuous development and learning in a safe, simulated environment. This approach addresses one of the main challenges of modern education, especially higher education, and the gap between theory and practice. It is one of the reasons for the often difficult transition that graduates face when encountering the challenges of their early careers.
Originality/value: The main value and contribution is identifying the list of VR advantages and disadvantages as a potential challenge for management and business education institutions.
Keywords: Virtual Reality, management education, merchandising.
Category of the paper: Research paper.

1. Introduction

The last few years have shown that due to rapid technological development, the subject of Virtual Reality (VR) has been of great interest to researchers from various fields. VR has become a topic of great importance in industry, medicine, communications, and education. Teaching using virtual reality is associated with visualization through illustrative examples and the safety of teaching, as well as with experience and connection with didactic games in an online environment. Didactic games in virtual reality are a suitable motivational element for involving pupils or students in teaching. This VR technology can significantly reshape the academic education process. Didactic games primarily interest pupils and engage them voluntarily. The secondary benefit of these activities is learning and fulfilling the set of learning objectives (Pecina, Andrisiunas, 2023). Today, VR is based on the nature of presence, interactivity, and immersion, and understood as "VR leverages immersive technologies to simulate interactive virtual environments or virtual worlds with which users become subjectively involved and in which they feel physically present" (Wohlgenannt et al., 2020).

The article focuses on analyzing VR's theoretical and practical aspects as a tool in the education process. This paper aims to investigate the opportunities and limitations of using VR in the management and business education process. For the purposes of this article, a double bibliometric analysis of the SCOPUS electronic database was carried out (1 for keywords - Virtual AND Reality and 2 for keywords - Virtual AND Reality AND Higher AND Education) to determine the state of the art. The exploratory study was used to answer the research questions: (RQ1) What are the opportunities of using virtual reality in the management and business academic education process? (RQ2) What are the limitations and barriers to using virtual reality in the management and business academic education process? The type of qualitative research was selected, and a case study with observation support was chosen as the research method. The presentation and evaluation of the Merchandising course conducted at the Business Process Simulation Centre of the Wroclaw University of Economics provides a deeper and broader understanding of the potential of VR. This paper's main contribution is identifying attributes for the use of VR in higher/academic education and the future potential for Universities. By incorporating VR into the classroom, educational institutions may prepare their students to work professionally. This paper also highlights VR's capacity to engage, educate, and empower students in management fields, emphasizing its strengths and role as a catalyst for educational innovation as well.

2. Virtual Reality and its educational potential - theoretical background

Virtual reality (VR) is a technology already used and defined by Steuer (1992) as a "real or simulated environment in which a perceiver experiences telepresence" over 30 years ago (Song, 2024). There are many definitions in the literature regarding virtual reality, but despite VR having also been widely used in various areas, such as industry, medicine, architecture, meteorology, or aviation in the past decade, its definition is not unified. Virtual reality, augmented reality (AR), and their variations were identified as computer interface techniques that consider the tridimensional space. In this space, the user acts in a multi-sensorial way, exploring aspects of this space through viewing, hearing, and tact (Piovesan et al., 2012). Some scholars posit that virtual environments or worlds displayed on monitors are different from VR because presence and immersion as its characteristics are absent (Berg, Vance, 2017); Although the technology has changed drastically throughout the years, the similarities in definitions remain in current literature "VR is a three-dimensional computer-generated simulated environment, which attempts to replicate real world or imaginary environments and interactions" (Abbas et al., 2023).

Virtual reality is characterized by three basic ideas: *Immersion* (the user has the real sensation of being inside the virtual world of the computer. Devices that make this sensation: digital helmets and digital cave), *Interaction* (the user manipulates virtual objects. Devices that make this sensation: digital gloves), *Involvement* (exploring of a virtual environment, it's as if the user took part of the virtual world and he can interfere directly in result of the application, the user can navigate on the virtual environment in a passive or active way) (Piovesan et al., 2012).

VR can enhance the sense of presence, immersion, and interactivity (Makransky, Petersen, 2021; Wohlgenannt et al., 2020). According to Girvan, the VR environment allows multi-user interactions and provides "shared, simulated spaces which are inhabited and shaped by their inhabitants who are represented as avatars" (Girvan, 2018).

Today VR possesses multiple defining characteristics that make it a distinctive technology (Berkman, Akan, 2024): a key element of VR is its ability to induce a sense of presence (North, North, 2016), which can be described as a sense of 'being there' in the virtual environment (VE) (Bareišytė et al., 2024). Moreover, interaction is possible in VR and often achieved using hand-held controllers, 3D-tracked data gloves, or motion suits (Caserman, Garcia-Agundez, Konrad, Goobel, Steinmetz, 2019; Seo, Jung, Kim, 2024). These characteristics make VR a unique realistic technology, by combining user control and 360º immersion within a simulated environment (Bowman, McMahan, 2007). With the development of digital technologies, presence, and immersion can also be displayed in virtual worlds such as metaverses.

Most recently, Wohlgenannt et al. (2023), based on the nature of presence, interactivity, and immersion, understood VR as "VR leverages immersive technologies to simulate interactive virtual environments or virtual worlds with which users become subjectively involved and in which they feel physically present".

Due to rapid technological development, the subject of Virtual Reality has been of great interest to researchers from various fields. For the purposes of this article, the bibliometric analysis of the SCOPUS electronic database was performed (keywords – Virtual AND Reality). The results show a huge number of documents and an increase in the number of articles over the last four years - 204 674 between 1990 and 2024 (Figure 1).

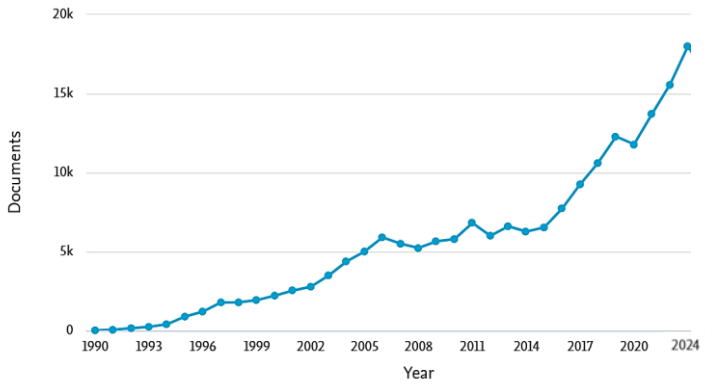


Figure 1. Documents by the year – keywords: Virtual AND Reality (1990-2024).

Source: SCOPUS base: https://www.scopus.com/term/analyzer.uri?sort=plf-f&src=s&sid=f0e13acfacb693bf591e79fd0aa5bb1e&sot=a&sdt=a&sl=34&s=TITLE-ABS-KEY%28virtual+AND+reality%29&origin=resultslist&count=10&analyzeResults=Analyze+results

Analyzing documents by subject area (Fig. 2) shows that articles in Computer Science (31,9%) and Engineering (20,5) dominate and reach over 52% total. However, it is more interesting that the analysis showed that the share of the business and management field was only 2.9%, and it was placed in the Other section.

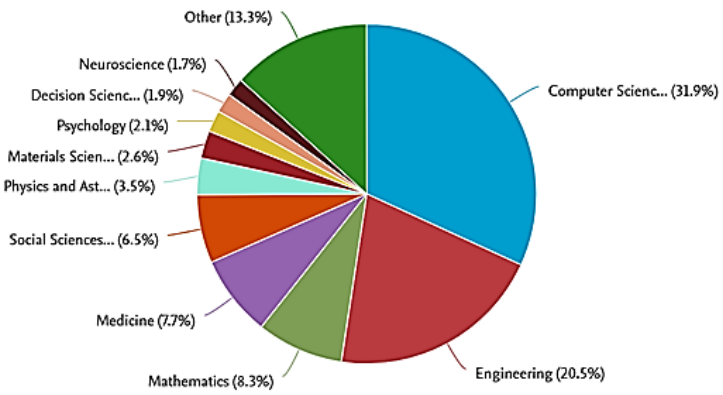


Figure 2. Documents by the subject area - keywords: Virtual AND Reality (1990-2024).

Source: SCOPUS base: https://www.scopus.com/term/analyzer.uri?sort=plf-f&src=s&sid=f0e13acfacb693bf591e79fd0aa5bb1e&sot=a&sdt=a&sl=34&s=TITLE-ABS-KEY%28virtual+AND+reality%29&origin=resultslist&count=10&analyzeResults=Analyze+results

Digital transformation has affected using VR in many areas, including the economy, industry, health, communications, and education as well. Virtual reality in higher/academic education has gained considerable importance, providing students and learners with immersive experiences. Students learn complex topics by entering a realistic virtual world where they can

talk, make decisions, and learn while interacting with 3D simulations and objects. Such applications have led to an increased demand for virtual reality in education (Fortune Business Insights, 2024) The global virtual reality in education market size was valued at USD 14.55 billion in 2023. The market is projected to grow from USD 17.18 billion in 2024 to USD 65.55 billion by 2032, exhibiting a CAGR of 18.2% during the forecast period. The U.S. Virtual Reality in Education Market is anticipated to grow significantly, reaching an estimated value of 11.36 billion by 2032, driven by Innovations in VR-based Assessment Evaluation and Personalized Learning Experiences (Fortune Business Insights, 2024).

To assess scientists' interest level in using VR in higher education, a second bibliometric analysis of the SCOPUS electronic database was carried out (keywords – Virtual AND Reality AND Higher AND Education). The results show only 3,429 documents in 1994-2024 (Fig. 3), and the 2% for Business and Education (Fig. 4).

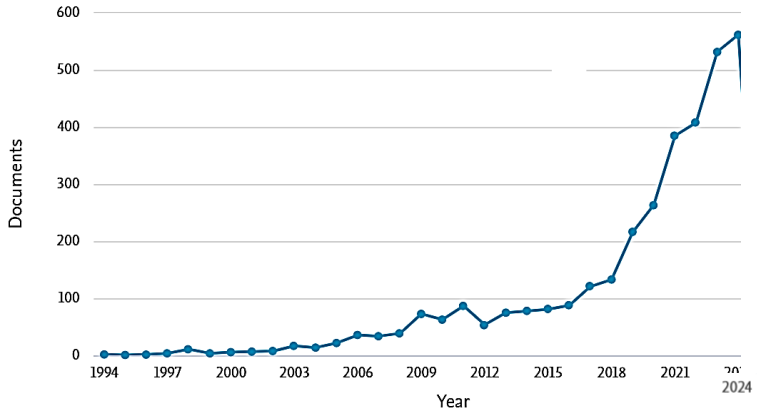


Figure 3. Documents by the year (for searching: virtual AND reality AND higher AND education).

Source: https://www.scopus.com/term/analyzer.uri?sort=plf-f&src=s&sid=f0e13acfacb693bf591e79fd0aa5bb1e&sot=a&sdt=a&sl=47&s=TITLE-ABS-KEY%28virtual+reality+higher+education%29&origin=resultslist&count=10&analyzeResults=Analyze+results

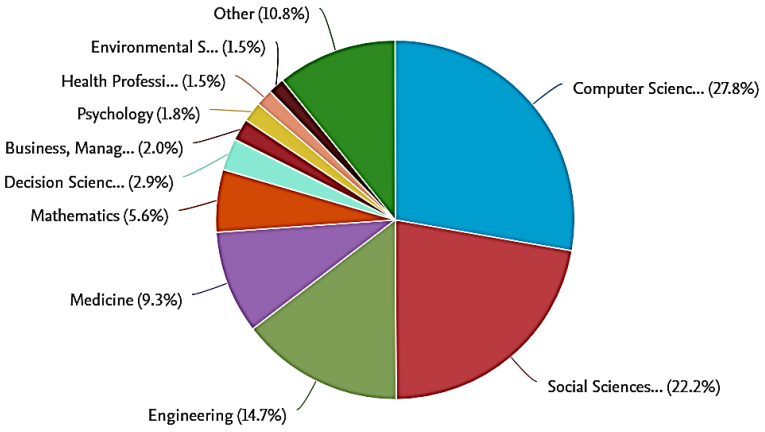


Figure 4. Results for searching - Documents by subject area (for searching: virtual AND reality AND higher AND education).

Source: https://www.scopus.com/term/analyzer.uri?sort=plf-f&src=s&sid=f0e13acfacb693bf591e79fd0aa5bb1e&sot=a&sdt=a&sl=47&s=TITLE-ABS-KEY%28virtual+reality+higher+education%29&origin=resultslist&count=10&analyzeResults=Analyze+results

The results of searching 1 and 2 were summarized and compared in Table 1, allowing us to identify the top five positions and determine the place of the field of Business and Management.

Table 1.
Comparison of bibliographic reviews results 1 and 2 - Ranking of subject areas

Ranking 1	Subject Area	Number of results Searching 1	%	Ranking 2	Number of results Searching 2	%
1	Computer Science	120148	31,9	1	1774	27,8
2	Engineering	77494	20,5	3	938	14,7
3	Mathematics	31191	8,3	5	594	5,6
4	Medicine	29220	7,7	4	1416	9,3
5	Social Sciences	24525	6,5	2	359	22,2
(…)				(…)		
12	Business, Management and Accounting	6017	2,9	7	126	2,0

Note: Ranking 1 (Results for Virtual AND Reality); Ranking 2 (Results for Virtual AND Reality AND Higher AND Education).

Source: Own by Scopus Base.

Although VR has proven its effectiveness in the field of general education, the scientific literature is scattered and still presents limited studies about its use in management and business academic education processes – only 126 (2%). For this reason, further research is needed to determine how VR technology can improve higher education in this field. Therefore, an exploratory research gap was identified.

The next step was a literature review to determine the current state of knowledge and formulate research questions. Considering the analysis of the literature and available research on VR in higher/academic education in management and business, it can be stated that the introduction of virtual reality in education has revolutionized learning and teaching practices by fostering interactive experiences that engage students and enhance their understanding of complex subjects (Fortune Business Insights, 2024). To address a wide range of educational objectives, higher-education institutions have been incorporating an emphasis on developing both hard and soft skills in addition to traditional learning practices (Vogler et al., 2018). These skills include problem-solving strategies, teamwork, and communication abilities. Pursuing hands-on experiential learning paradigms to go beyond traditional learning approaches is often the best strategy for higher education (Terkaj et al., 2024). Numerous researches evaluating the use of immersive training in education have shown encouraging effects in terms of learning; with VR in the classroom, keeping students interested throughout the lesson and making learning and their experiences unforgettable is significantly more straightforward. VR promotes communication, enhances cognitive abilities, including memory retention, and increases motivation in the learning process (Gudoniene, Rutkauskiene, 2019). In particular, the feeling of being immersed in a learning environment helps individuals concentrate and remember knowledge; thus, VR education is particularly advantageous (Javaid et al., 2024). In addition, VR enables experiential learning by allowing learners to participate

actively in simulated experiences, experiments, or simulations. Learners can engage in hands-on activities, experiments, and problem-solving tasks within virtual environments, gaining practical skills, insights, and knowledge through trial and error. This experiential learning approach fosters critical thinking, creativity, and problem-solving skills by encouraging exploration, experimentation, and discovery (Fortune Business Insights, 2024). Virtual laboratories based on virtual reality and other digital technologies offer a valuable means of immersing students in realistic scenarios (Terkaj et al., 2024).

The main advantages of using virtual reality in higher education can therefore be summarized through the following arguments in the individual assessed areas (Pecina, Andrisiunas, 2023):

- Safety. There is no danger of an occupational accident in virtual reality. Dangerous and risky actions and activities can be tried without endangering the health and life of participants and their colleagues. There are also no financial risks associated with damage to expensive equipment and tools in case of inappropriate handling during the teaching and learning process.
- Maximum visualization of teaching and learning. All senses can be engaged in virtual reality stimulating the learning process. Things and events can be shown literally from every possible point of view and in different situations and settings.
- Measurable progress in education. Virtual reality enables more effective acquisition of intellectual and psychomotor skills. It allows learning progress to be recorded in individual areas, providing invaluable feedback to the learners and allowing them to adapt their pace and learning style to obtain new intellectual and psychomotor skills.
- Use of gamification elements. Due to their technical design, simulation and interactive software for virtual reality can be considered like computer games that use the advantages of didactic games in an electronic environment. Thus, virtual reality provides information and develops learning in a funny way through funny activities in teaching while stimulating the learning process.
- Economic efficiency. There is no need for expensive consumables or the purchase of expensive gadgets and accessories in virtual reality. It can be argued that interactive learning software for virtual reality is expensive in itself, but once the educational institution acquires it, there is no need to purchase any additional accessories. Everything happens in virtual space.

Javaid et al. (2024) identify additional attributes for the use of VR in higher/academic education - by incorporating VR into the classroom, educational institutions may prepare their students to work professionally. The instructors may recreate professional conditions using VR for students in many fields like corporate management, engineering, aviation, medical surgeries, etc. Students may get used to a previously unknown professional setting with such

simulations - educators may use VR to train engineering students about different facets of their professions, and medical students may rehearse procedures without endangering patients using VR (Javaid et al., 2024).

Virtual reality also has its reserves and disadvantages. The main reserves or disadvantages of using virtual reality in education can be summarized using the following arguments (Pecina, Andrisiunas, 2023):

- Virtual reality is, in fact, an illustrative preliminary stage of professional training for the real performance of a given activity. It is still only a "faithful substitute for reality" for the purpose of more effective and economically efficient professional training for the performance of given expertise.
- Virtual reality does not solve everything; it simulates activities and actions. The real world looks and can behave differently. There are always situations and circumstances that cannot be simulated and pretended.
- If virtual reality is not linked to artificial intelligence, there will be no automatic evaluation of individual steps and actions of the learning subject nor any other form of active adaptation of the educational process to the learner based on the achieved educational progress. In that case, a trained expert (trainer or instructor; teacher) must be available to do it.
- The relatively high equipment cost and the necessity of training the teaching staff.

Innovations in VR-based assessment evaluation and personalized learning experiences are emerging as a result of increased market demand. With the integration of advanced technologies such as artificial intelligence and machine learning, VR platforms offer immersive and interactive assessment methods, enabling educators to evaluate students' knowledge and skills more comprehensively and engagingly. Moreover, the implementation of virtual reality in education also encourages active learning, critical thinking, and problem-solving skills, empowering students to take ownership of their education and develop a deeper understanding of the subject matter (PARP Report 2024).

Taking the above into account the following research questions were asked: (RQ1) *What are the opportunities of using virtual reality in the management and business academic education process?* (RQ2) *What are the limitations and barriers to using virtual reality in the management and business academic education process?*

3. VR in Management academic education process – Merchandising course in Wroclaw University of Economics - case study

3.1. Research method

In the literature review, Virtual Reality has been shown to offer promise in education and development, and as VR and other technologies become more mainstream in higher/academic educational institutions, students of business and management need opportunities to work with VR for not only their learning but also their future careers. Given the gaps identified and the research questions, the research project was prepared.

To achieve the aim of the article and answer the research questions, a qualitative research method was selected, using the case study technique. The study is exploratory in nature due to the uniqueness of the activities studied in VR provided by the Business Process Simulation Center situated at the Wroclaw University of Economics Campus. Secondary publications on BPSC and Flexsim software, interviews published with the Director of BPSC, and American creators of the software used were used as sources of information. Primary sources were also used in the form of participant observations, conversations with students, and the author's own experiences resulting from the work of the author of the article on the game Merchandising, of which she is the main author.

The primary study in the form of participant observation was based on Merchandising courses that were conducted in the academic year 2023/24 in the field of Business Management - 1 group of full-time students (English version) and Management (Polish version) in full-time and part-time studies (3 groups in total). Totally, approx. 80 people were observed.

3.2. Analysis of Case Study - Merchandising course in Wroclaw University of Economics and Business

According to Prof. K. Nowosielski, originator, and manager of the Business Process Simulation Center (BPSC) at the Wroclaw University of Economics and Business (WUEB) - "BPSC is an original, ultra-modern research and didactics facility designed for the interactive simulation of business processes. It was incorporated into the WUEB infrastructure in 2022. This facility goes far beyond the solutions applied at Polish or even European universities. It was specially designed to allow comfortable work with process models, both when it comes to process design and its visual simulation. In its own way, it meets the requirements of the Industry 4.0 concept but is applied in an academic environment. In addition to the aforementioned virtual decision-making games, which in themselves are a novel and original use of FlexSim software, BPSC is a unique facility" (fig. 5a and 5b).

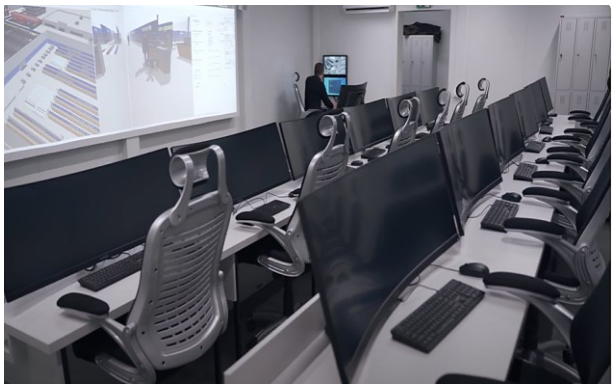
a  b 

Figure 5. Business Process Simulation Center at the Wroclaw University of Economics and Business. Source: WUEB web page.

The Merchandising course was designed for the 3rd year of Bachelor's studies. The classes at BPSC consist of half of the exercises intended for students, i.e. 8 hours. The simulation for this course, together with the Virtual Reality version, includes taking on one of three available roles: Store Manager, Sales Representative, or Customer. The player makes decisions regarding merchandising and checks the results by observing changes in KPIs or in Virtual Reality. As the Store Manager, the player's task is to design the store. This involves determining the size of the store and other parameters, such as the layout of the doors and the number of windows. The player can also implement one of the predefined shelf layouts or arrange them independently. They can also decide whether certain goods will be on sale. The goal of the player is to maximize profits by increasing sales. The Sales Representative, on the other hand, must ensure that their brand of products sells as well as possible. Therefore, they must decide where in the store to place their products to maximize sales.

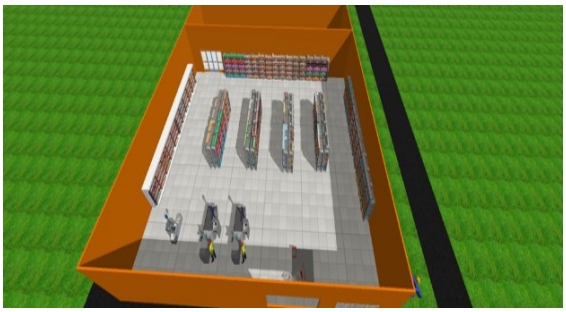
a  b 

Figure 6. Merchandising simulation.

Source: Author's sources.

The role in the VR zone is the customer, whose task is to enter the virtual store to shop in VR mode (figure 7a and 7b). Depending on the scenario, the customer may need to buy specific categories of products. The store they shop in can be random or created by one of the "managers" to test the effectiveness of other players' actions in different roles. After each shopping session by the "customer," their recorded route and the places where they made product choices can be reviewed.

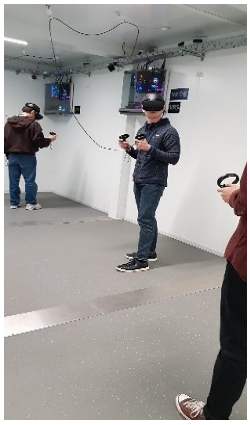
a  b 

Figure 7. Virtual Reality zones – Merchandising.

Source: Author's sources.

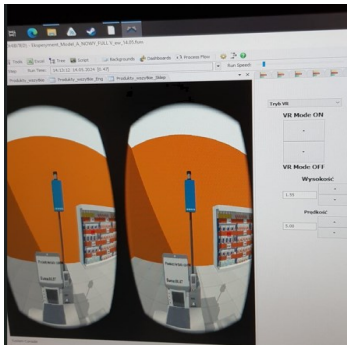
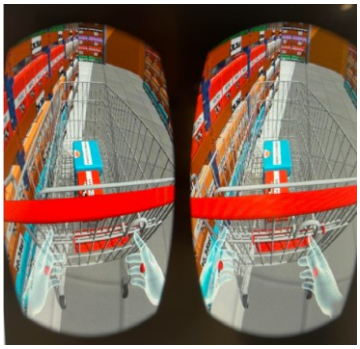
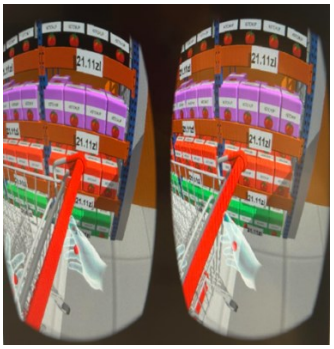
a  b  c 

Figure 8. Virtual Reality view - using the VR goggles.

Source: Author's sources.

Gathering the information from the observation, the list of VR advantages and disadvantages by Pecina, Andrisiunas (2023), and Javaid et al. (2024) was applied to identify the opportunities and limitations of using VR in management and business academic education. Table 2 presents the results broken down into specific types of VR advantages and disadvantages and additional attributes for using VR found by the Author.

Table 2.
Advantages of using virtual reality – summary of evaluation based on the Merchandising course using simulation and VR in the Business Process Simulation Center

Advantages of using virtual reality in education	**Evaluation based on the Merchandising course using simulation and VR in BPSC**
Safety	Director of BPSC: - *We copy real processes and managerial problems from business and implement them in software. Thus, students can play the role of managers and decision-makers, realistically affecting the process performance without leaving the WUEB campus* Teacher: *- There are no financial risks associated with damage to expensive equipment and tools in case of inappropriate handling during the teaching and learning process or the cost of study visits in real shops as well.* *- All negative consequences affect only the virtual model, not the actual enterprise.*

Cont. table 2.

Maximum visualization of teaching and learning	Director of BPSC: - *BPSC offers 20 high-performance PC stations powered by FlexSim, including 6 independent VR workstations, which allow the users to visualize and interact with the designed processes in a computer-generated environment with objects that appear to be real.* Software/environment Providers - *It provides the ability to design a process using 3D graphics objects, both in terms of active and passive process participants, i.e. the resources used in the process and so-called flow items. This is a very important feature, especially when we consider the expectations of students of the Z-generation regarding the graphical presentation of the contents of the class.* - *Visualizing the process models in 3D, as well as in VR, helps us, academic teachers, reach the audience better. The next thing is FlexSim's high flexibility, which allows us to design and visualize not only typical production or service processes but also to show, for example, the flow of documents, which is of great importance to academic teachers leading such management courses as management control, cost or management accounting.* Students: *- It was a very real experience - like being in a real store. Being able to move around the store, pick up items, and put them in my shopping basket really captures the real shopping experience.*
It shapes creativity and prepares for the profession	Software/environment Providers: *- The academic staff use these games during their classes. Most of the events and parameters are described by probability distributions, thanks to which each game is different – the disruptive situations, like, for example, the breakdown of machinery and equipment, the absence of an employee, or the introduction of a new tax by the country to which we import our goods is random.* *- The students learn the specifics of particular issues, gaining knowledge and experience that will pay off in the future when encountering similar problems in real life. As for the technical aspects, the game keeps track of the consequences of the user's decisions.* *- The user can dynamically react to such changes and witness the consequences of their decisions.* *- In these games, users take on various roles such as manager, director, or employee in any sector.* Teacher: *- Things and events can be shown literally from every possible point of view (manager, company owner, customer) and in different situations and settings.* Students: *- In a few minutes, I can learn the consequences of my merchandising decisions and all KPIs (after simulating one day of work) for the store I created. I can also learn the probable behavior of customers in this store using VR.*
Measurable progress in education	Director of BPSC *- The game also allows validation on multiple fronts. What is happening is visible, and the reactions to the decisions made are immediate. When a student makes a decision, he can see the results visually in the virtual space, as well as in the statistics and results that appear immediately. That makes a big difference and is an important aspect of the process.* Software/environment Providers: - *It is an innovative software with exceptional analytical capabilities that can quickly process as many experiments, optimizations, and simulations as you need to make the most favorable business decisions and get the best possible results.* Teacher: *- This experience allows users to better understand the importance of their decisions and observe the effects almost as if in real life. Their presence in the game can be further enhanced through interaction with existing objects, making them active participants in the process rather than mere observers. Users can verify whether the planned scenarios are physically feasible, which further increases the realism and educational value of the simulation.*

Cont. table 2.

Use of gamification elements	Director of BPSC: - *The users of BPSC have at their disposal dozens of virtual decision-making games centered around logistics, production, and service process models.* - *These games are used as teaching aids during classes, allowing users to get acquainted with the 3D model of the process and its flow.* Software/environment Providers: - *It is a very good environment for decision-making games.* - *Such simulations provide users with valuable knowledge and experience necessary for tackling similar challenges in real life. During the game, users can make mistakes and learn from them. These mistakes can lead to various problems.*
Economic efficiency	Director of BPSC: - *This object sets new standards regarding the complexity of intelligent solutions for building management systems (BMS) and access control, making it extremely user*-friendly but also cost-effective. - *Thanks to the implemented "audio-video cloud" integrated with BMS, or virtual reception, the users can access a unique, fully automated, highly efficient, and economical platform.*

Source: based on: Witkowska-Cempel, 2022, pp. 23-24; Kogut, 2023, pp. 20-23; Żuchowicz, 2024, pp. 41-43; Greenwood, 2024, pp. 26-30; The author's materials are the interviews with students and participants' observations.

Table. 3

Disadvantages of using virtual reality – summary of evaluation based on the Merchandising course using simulation and VR in the Business Process Simulation Center

Disadvantages of using virtual reality in education	**Evaluation based on the Merchandising course using simulation and VR in BPSC**
An illustrative preliminary stage of professional training	Director of BPSC: *- The information is needed - It allows students to understand that their decisions matter. When they are faced with a problem or a situation that requires a decision, information is critical. The more data, the better. The more accurately informed the student, the more accurate the decision they can make. This is what we teach them in games: that they need information. When they have it, they can develop a plan, set a direction, and thus make wise decisions. In this way, we teach students that every decision has consequences, which can be positive and beneficial or negative and costly.*
Participant Health and Safety Concerns and Restrictions	Director of BPSC*:* *- BPSC has its own rules of use, which apply to both students and teachers.* *- We have also limited the number of people who can use the VR chambers simultaneously for safety reasons.* Students: *- I have never used VR, and I am afraid to put on the VR goggles.* *- I have a severe visual impairment, and I cannot use VR without my own glasses. VR goggles can damage my glasses.* *- After putting on the VR glasses, I felt dizzy. I did not know I would react like this and had to stop the exercise.* Teacher: *- It is necessary to provide all participants with information regarding contraindications to the use of VR.* *- It is necessary to have a person in the class who supervises the student's work in VR and can react in a dangerous situation to the student's health.* *- If not all Students can use VR, the final grade cannot be made dependent on this part of the class.*

Cont. table 3.

VR does not solve everything. There are situations and circumstances that cannot be simulated and pretended	Software/environment Providers: - *All negative consequences of simulation affect only the virtual model, not the actual enterprise. Users can repeatedly attempt and refine their skills, allowing for continuous development and learning in a safe, simulated environment. However, it is still only a simulation.* Teacher: - *Such simulations provide users with valuable knowledge and experience necessary for tackling similar real-life challenges. However, this depends on the teacher's knowledge of possible action scenarios that appear in market practice and the decisions necessary to understand.*
No automatic evaluation of individual steps and actions of the learning subject nor any other form of active adaptation of the educational process	Students: - *My absence from classes at BPSC means that I am not able to learn all the simulation functionalities and VR capabilities quickly enough.* - *The assessment should not promote those students who have more experience than me in using VR technology.* Teacher*:* - *It is necessary to divide the project concerning the shop space management and the location of the assortment into smaller parts.* - *The greater or lesser manual dexterity of students in operating hand controllers differentiates them in terms of the effects achieved in VR.*
The relatively high cost of equipment and the necessity of training the teaching staff	Director of BPSC - *BPSC- this facility is the outcome of project PORTAL – Integrated Programme for WUEB Development, and this project is co-financed by the European Union.* Teacher: - *Learning the functionality of both the simulation system and VR is time-consuming and requires additional training, which increases cost.* - *Developing VR projects and improving them to make them more attractive means making changes to the system, thus increasing the costs of operating the center.*

Source: based on: Witkowska-Cempel, 2022, pp. 23-24; Kogut, 2023, pp. 20-23; Żuchowicz, 2024, pp. 41-43; Greenwood, 2024, pp. 26-30; The author's materials are the interviews with students and participants' observations.

The case study based on the Merchandising course and comparison of the advantages and disadvantages of using VR in the educational process provided valuable insights into higher education. The analysis of the collected information indicates the importance of specific opportunities and limitations. This allows the Author to identify that by using VR and making various decisions, the students can observe their impact on the simulated environment. Users can repeatedly attempt and refine their skills, allowing for continuous development and learning in a safe, simulated environment. This approach addresses one of the main challenges of modern education, especially higher education, and the gap between theory and practice. It is one of the reasons for the often difficult transition that graduates face when encountering the challenges of their early careers. After a semester of this research, student opinions were positive toward the future implementation of VR in their educational process. By allowing students to assume roles such as store managers or sales representatives in a simulated environment, VR fosters experiential learning that helps students understand real-world dynamics. This hands-on approach aligns with the increasing demand for soft and hard skills in the labor market.

The compatibility of software with virtual reality (VR) technology significantly enhances the realism of decision-making. With VR goggles, users can immerse themselves in a simulated shop in a previously designed virtual store, providing an even deeper immersion in the game world. However, the main problem is the cost and time for preparing the simulation and training for teachers.

4. Conclusions, limitations, and future research

The study highlights the transformative potential of Virtual Reality (VR) in the field of management and business education. VR bridges the gap between theoretical knowledge and practical application by providing immersive and interactive learning environments. Entrepreneurs and universities continue to emphasize the need for closer cooperation between the education system and the professional sector. The dynamically changing requirements of the labor market press educational institutions to adapt their curricula to the current needs of employers. Introducing specialized courses supported by new technologies such as VR can significantly increase the chances of young people finding a satisfying job after completing their education. Such cooperation is crucial to preparing future generations for the challenges of the changing labor market.

The findings of this study offer several practical implications for the integration of Virtual Reality into management and business education, e.g. a competitive advantage for Universities. Institutions that adopt VR in their programs can differentiate themselves in a competitive education market. Offering cutting-edge learning experiences can attract prospective students and meet the expectations of employers seeking skilled graduates. The next is the cost efficiency in the long time. While initial investments in VR technology can be high, the long-term savings in consumables (e.g., materials and physical spaces) and the ability to replicate scenarios repeatedly without additional costs make VR a cost-effective tool for educational institutions. The study's limitations include the VR participants' nature as computer game users. Students who are heavy users were potentially more familiar with the technology. This allowed for relatively smooth use of handheld VR controls, which might have aided the experience of merchandising games and virtual reality shopping. Future research steps can be taken to build on this study’s results. More studies are needed to compare these results in other academic disciplines or courses with the potential to refine student perceptions of virtual reality in higher education. Future research should also consider longitudinal studies to build on the insights gained from this study. Investigating the long-term effects of VR-based learning on student career success and skill retention would offer valuable insights into its efficacy. In the future, the new evaluation metrics can be created. Developing standardized tools and methodologies of evaluation is crucial to comprehensively assess the cognitive, behavioral, and emotional outcomes of VR-based higher education.

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