



Exploring the Lab Rotation Model in Hospitality Management Education

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Abstract. The rapid developments in technology have transformed the field of education through the integration of online teaching and learning (OTL) facilitated by Information and Communication Technology (ICT), enabling the acquisition of new technical and critical thinking skills. While many courses have seamlessly transitioned to OTL, the hospitality management course has encountered challenges due to its inherently practical nature such as conducting kitchen lesson online. Consequently, this paper explored the opportunities offered by lab rotation model in hospitality management education. In this article, we conducted a thorough literature review by extracting relevant sources from electronic databases, including Norwegian, WoS (ISI), Scopus, DOAJ, and others. We specifically focused on journals published between 2017 and 2023, utilizing a bibliometric approach to evaluate the literature. We also considered the concept of Complex Adaptive Blended Learning Systems as a theoretical framework guiding our study. Our review unveiled a notable growth in online teaching and learning, particularly through the blended-learning approach, across numerous educational institutions. Furthermore, our findings underscored the suitability of the lab rotation model for courses like hospitality management, where theoretical content can be effectively delivered online, while practical components can be assessed or practised in a computer laboratory. We recommend that institutions offering hospitality management courses seriously consider adopting the lab rotation model when implementing the blended-learning approach it as empowers learners to benefit from repetition and active involvement. Additionally, this knowledge can lead to enhanced educational outcomes and better prepare students for the evolving demands of the hospitality industry in an increasingly digital age.

Keywords: Hospitality Management, Blended-Learning, Lab Rotation Model, Information and Communication Technology, Online teaching and learning

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1 Introduction

The Fourth Industrial Revolution (FIR) has changed the society, culture, economy and politics of many countries, and in education, the FIR requires actions to be taken by educational institutions to produce students who are ready for the world of work and capable of competing in the future [1]. According to [2], it responds to the requirements of the FIR by building collaborative virtual learning environments. Darki et al. [3] agreed that the increasing technology integration has brought powerful shifts in the education systems as it influences how people think, learn and interact. UNESCO [4] agreed that the increasing technology integration has resulted in many changes in the teaching and learning system, such as the introduction of online teaching and learning. However, the evidence of the impact of technology-driven education is a matter of debate.

The United Nations [5] acknowledges advancements in technology but stresses the need for inclusivity due to the diversity of educational institutions, programmes, students, and educators. This means that implementing technology in learning is challenging due to course and curriculum objectives. While some courses have transitioned to Online Teaching and Learning (OTL), hospitality management courses face practical challenges [6]. Hence, [7] emphasize the need for rethinking teaching and learning activities in OTL courses, particularly in planning, communication, and selecting appropriate methods and tools. Despite challenges, it is crucial to provide students with high-quality education and digital skills for success in practical courses [8][6]. Therefore, efficient strategies for implementing OTL in practical subjects are crucial, with teachers, administrators, and policymakers advised to focus on appropriate models [9]. Blended learning models, which combine event-based activities like face-to-face classes, live e-learning, and self-paced learning, are particularly suitable for higher education [10-12].

Nevertheless, the correct utilization of blended learning is crucial to ensure it aligns with the expected outcomes of subjects or courses. [13] proposal for a versatile blended learning model, which includes sub-models like flexing, self-blend, rotation, and an upgraded virtual model, emphasizes the importance of educators understanding the model that best suits their specific subject or course outcomes. This paper presents the exploration of the lab rotation model in hospitality management education. The lab rotation model is being explored for its potential implementation in hospitality management education, aiming to equip students with technology skills for global competition.

2 Literature Review

2.1 Online teaching and learning

Hussin [14] described OTL as pedagogy utilizing digital technology like the internet, computers, videos, audio, visual graphics, and animations. [15] simply described OTL as education that takes place over the internet. Interestingly, [16] and [17] defined OTL as the teaching and learning that takes place entirely or partially through the internet, meaning it can purely be online learning or blended learning. In other publications such as [18] and [19] described OTL as a learning experience that allows growth, acquiring knowledge and constructing personal meaning by providing access to learning materials through the internet. It is clear that, authors agree on the versatility of OTL, which can be conducted in various settings using technological tools and the internet, either entirely online or blended. The success of OTL depends on the components of Information and Communication Technology (ICT), which refers to the technologies that provide and distribute information through telecommunications similar to Information Technology (IT) but focuses on communication technologies [20]. Ratheeswari [21] and [20] highlight ICT in education as a tool for OTL, utilizing internet, wireless networks, computers, and cell-phones. [19] argues that OTL is an alternative pedagogy in the 21st-century technology era, requiring students to adapt.

Hasifah [22] strongly supports OTL, emphasizing its ability to foster students' enthusiasm for learning and addressing any disparities compared to traditional face-to-face instruction. According to [23] highlight that OTL differs from face-to-face classes by enabling students to conduct research and reflect before responding to class-related issues. OTL allows students to explore digital libraries and websites independently, fostering their own understanding [22]. OTL offers numerous benefits for students and educators, enabling remote access to education, learning materials, and knowledge for those with physical disabilities, living in remote areas, or living in physical disabilities. As author [24] pointed out, OTL allows students to choose when to engage with specific concepts or content and to direct their own learning. In a study conducted by [25], it was found that OTL allows students to access resources independently, set learning objectives, and actively contribute to knowledge and skill development. Additionally, [26] noted that OTL allows students to revisit challenging topics by re-watching educational recordings and audio materials until they feel confident in their understanding.

2.2 The Blended Learning Model

Blended learning, as defined by [27] and [28], is a complex concept. Dakhi et al. [3] said that “a model is a plan, representation, or description that describes an object, system, or concept that is often simplified or idealized”. According to [29], a model is a representation of reality that is simplified and defined so that it can accomplish a task or reach an agreement on a specific topic. In simple terms, a model is a step-by-step guide to a concept, while a learning model is a structured framework guiding students

to achieve their learning objectives, considering the learning environment and interaction processes [3]. Regarding blended learning, it can be characterized as educational systems that integrate traditional face-to-face instruction with computer-mediated learning [30]. Hence, the blended learning model combines various teaching methods across different learning environments, such as traditional classroom sessions and online platforms, strategically organized by instructors. Cleveland-Innes and Wilton [31] elucidated that blended learning ensures consistent educational content across both face-to-face and online settings, with identical learning objectives, ensuring that traditional classroom content directly relates to online learning.

Staker, H. and Horn [13] refined the definition of blended learning as follows, “a formal education programme in which a student learns in part through online delivery of content and instruction with some element of student control over time, place, and/or pace and at least in part at a supervised brick-and-mortar location away from home.” This means that blended learning combines online delivery with traditional teaching methods, allowing students to work at their own pace at any time and place, ensuring a more flexible and accessible learning experience. [28] argued that blended learning uses a combination of theories, methods, and technologies to optimize learning in a specific context. Hence, the author proposed the following definition: “the appropriate use of a mix of theories, methods and technologies to optimise learning in a given context” [28]. For the purpose of this study, [28] definition is the most appropriate as it emphasizes the significance of context, considering course type, objectives, and institution, and the application of different methods and technologies for hospitality management courses, as courses may require different approaches and technologies.

In their research, [31] suggest that successful blended learning outcomes involve teachers being educated on the proper use of technologies and their seamless integration with course content. This implies that, teachers who receive training can effectively implement the right model of blended learning during the implementation phase. In addition, blended learning is a practical approach that combines synchronous and asynchronous learning modes [32][33]. Synchronous learning occurs in real-time, enabling students to interact with teachers, ask questions, receive immediate feedback, and make adjustments to their knowledge, skills, and performance [34]. On the other hand, in an asynchronous environment students can learn at their own pace, with teacher facilitation playing a less significant role [35]. It is evident that blended learning is a method that involves students rotating across various learning settings and methods, accommodating both traditional and innovative approaches.

Cleveland-Innes and Wilton [31] pointed out that, blended learning utilizes various technologies such as learning management systems, web conferencing, digital textbooks, blogs, wikis, social bookmarking, multimedia, simulations, games, virtual worlds, and e-portfolios. For example, in a hospitality management programme, teachers can invite celebrity chefs to demonstrate knife skills, allowing students to watch in a computer lab or video conferencing venue, guiding them towards their career paths as they have extensive experience in culinary. However, in their study, [36] highlighted

the importance of IT infrastructure in successful blended learning implementation, including lab, internet network, hardware, software, bandwidth, and accessibility. [37] contend that blended learning is a valuable strategy in higher education, but it faces infrastructure issues like lack of equipment, teaching materials, digitals, and skilled personnel. Institutions can manage these issues through policies, government support, financial assistance, income-generating projects, and alumni donations [38][39].

In their investigation, [40] suggest that combining online and face-to-face instruction is more effective than a single approach. However, [41] argue that blended learning's effectiveness is still under exploration. [2] highlight the advantages of blended learning, including flexibility and teacher engagement. [31] further elucidate that blended learning provides flexibility, accessibility, and integration of advanced multimedia and technologies, appealing to students and educators, enabling learning from any location, time, and pace. Table 1 provides descriptions of how these elements, such as place, time, pace, and path, contribute to the flexibility offered to students.

Table 1. Control elements in the Blended Learning Model

Control Elements	Description
Time	Learning happens anytime not only during school days
Place	Learning happens anywhere for example at home, library, lab, class etc.
Path	Learning is not limited to classroom learning by teachers to students. Interactive and adaptive software allows learners to learn in methods tailored to their needs.
Pace	Learning is tailored to learner's speed; they can use more time when needed for the learning process.

Source: [3]

Blended learning offers flexibility, allowing students to access materials from anywhere, reducing expenses for both students and educational institutions [2]. For instance, uploading educational materials onto an institution's learning management system significantly reduces costs for both students and the institution. [32] further note that blended learning bestows teachers with the flexibility to expand traditional teaching methods, incorporating in-depth and transformative learning approaches. Additionally, this approach benefits teachers by reducing the workload of creating course materials and enabling continuous assessment of students' performance and progress in their learning journeys.

Cleveland-Innes, M. and Wilton, [31] pointed out that blended learning offers educators the chance to reevaluate their approach to both face-to-face and OTL, allowing

students to become acclimated to digital environments. Kumar et al. [32] add that blended learning enhances the value of face-to-face instruction by incorporating advanced technologies, preparing students for global and future challenges. Furthermore, blended learning enhances active learning levels, improving the overall student experience and outcomes. [3]. In agreement, [42] highlights blended learning as a method that effectively engages students by incorporating personal experiences, self-assessment, self-reflection, and active peer communication. Moreover, [32] underscore that blended learning also elevates students' knowledge levels and subjective learning through dynamic methods.

In other words, authors concur that blended learning encourages active student participation in classroom activities, discussions, and course materials, fostering heightened interactions between peers and instructors. Consequently, [31] point out that this increased active participation can enhance students' learning skills, outcomes, and satisfaction, providing them with broader access to information and the opportunity to engage in peer teaching. In alignment with these views, [43] concluded that their research findings supported the effectiveness of blended learning in enhancing student learning and performance. Furthermore, [44] conducted a study to evaluate the impact of ICT-enhanced blended learning on the progress of elementary-level learners in the English language subject. The results demonstrated that blended teaching and learning significantly improve student performance, aligning with the overall goal of any subject or course, compared to exclusive face-to-face instruction.

Dewi et al. [36] emphasize the importance of considering factors like teacher-student collaboration, learning environment, school infrastructure, computer capabilities, teaching effectiveness, and attitudes towards computers. Furthermore, [31] highlight blended learning's benefits for students, highlighting its enhanced interactions across student-student, content-learning, and teacher-teacher dimensions, as exemplified by the scenario of a celebrity chef whose web conferences encourage collaborative learning. According to [32], access to computers, internet connectivity, and digital devices empowers students to pursue an education of their choice, irrespective of their geographical location.

Yoga et al. [45] and [9] highlight the advantages of blended learning over traditional methods, but also highlight its limitations, particularly in incorporating motivation into the teaching and learning process. They emphasize the need for teachers to be motivated through blended learning in their courses. To add, [42] stress the need for clear policies for blended learning to ensure effective implementation. They suggest that teachers without a step-by-step guide may face challenges. They also emphasize the importance of understanding the institution's definition of blended learning to ensure alignment with expectations and prevent misinterpretations of principles and practices. Moreover, institutions facing unstable internet connectivity, suboptimal online technology utilization, and inadequate infrastructure may hinder the efficient implementation of blended learning [9]. [45] concur that the absence of internet access and technology devices is a significant threat to blended learning success, making online learning unattainable.

Namyssova et al. [42] emphasize the significance of teacher training in the successful implementation of blended learning, stating that teachers must be proficient in incorporating blended learning and selecting suitable technologies for their specific courses. Moreover, as noted by [9], without proper teacher training, educators may struggle to select an appropriate model for their subjects, courses, and programmes. This implies that there is a need for educators to be familiar with available models and choose the one that aligns with their expertise.

Models of blended learning

Staker and Horn [13] introduced a set of six blended learning models, namely face-to-face operator, online labs, flexing, self-blend, rotation, and upgraded virtual. Nevertheless, the face-to-face and online lab models were subsequently excluded, as they were considered repetitive and lacked distinctive characteristics specific to the blended learning model. A visual representation of the evolution and structure of the blended learning model is provided in Figure 1.

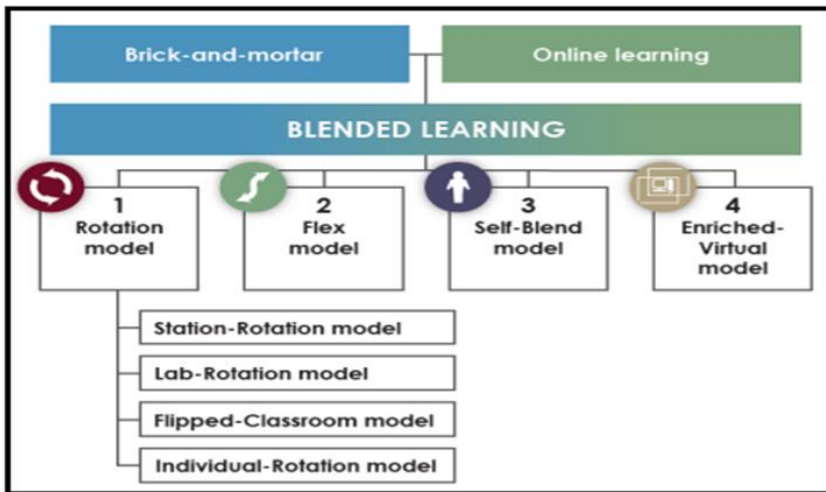


Fig. 1. Blended learning model

Source: [13]

Rotation model.

According to [46], the rotational model, widely used and recognized as a successful learning approach, involves students rotating through various learning modes, including online learning, with teacher guidance. This model allows students to receive instruction and assessment in the classroom, work independently, and engage with online materials [47]. For instance, in hospitality management, students transition from traditional classrooms to alternative learning environments like computer labs or kitchen labs. The rotational model enhances learning quality but requires teachers to balance

face-to-face and online learning by considering module objectives, curriculum requirements, and pros and cons [47][48].

For instance, in a hospitality management context, students transition from traditional face-to-face classrooms to alternative learning environments like computer labs or kitchen labs. [48] emphasized that the rotational model supports adaptable, straightforward, self-directed, and convenient classroom learning. Although the rotational model enhances the quality of learning, it is imperative for teachers to comprehend how to effectively blend face-to-face and online learning by considering module objectives, curriculum requirements, and the pros and cons of the rotational model [47]. The rotational model, a comprehensive training approach, can be implemented through four distinct methods.

- Lab rotation model

In this model, students have the opportunity to transition between various learning environments, such as moving from a traditional face-to-face classroom to an online setting or a laboratory [9]. To illustrate, in a culinary studies and nutrition class, students learn about meat cuts in person and then use a computer lab to create a PowerPoint presentation showcasing images of various cuts.

- Station rotation model

This model closely resembles the lab rotation model, involving students' rotation among various stations [49]. [3] stressed that students engage in rotations within the same classroom, blending face-to-face traditional learning with an element of online learning. To illustrate, in a culinary studies and nutrition classroom, students can engage in discussions about different vegetable cuts and explore them at various stations.

- Flipped classroom model

According to [9], students have the flexibility to work at home and the rest in the classroom, all while following the guidance of their teacher. However, [3] emphasized that this model operates under the premise that blended learning gives learners control over key elements: place, pace, time, and paths. This is because the model empowers students to determine where they prefer to engage in their learning. Furthermore, [50] asserted that a flipped classroom model enhances students' attention during the learning process.

- Individual rotation model

[51] defined the individual rotation model as a structured system in which students follow a fixed schedule set by the teacher for their rotations. For instance, in a culinary studies and nutrition class, students with special needs are divided into smaller, specialized groups, distinct from the larger student cohort.

Flex model

The flex model, often referred to as "flex," is aptly named for its inherent flexibility, allowing students the freedom to engage with computer-based learning at their convenience [52]. Blended learning uses ICT resources, primarily through computer-based instruction, and the flex model delivers educational content online, allowing students to follow unique schedules with rotations across different modalities, including online learning, study spaces, labs, small group sessions, and social areas [53][3]. [51] highlights that most content is online, allowing students to transition between delivery modes at their own pace. The flex model, as mentioned by [9], allows flexibility in classroom and out-of-class settings, allowing students to choose timing, location, and pathway. It also offers access to online learning resources and school library resources through computer integration. Lecturers guide students through computer lessons, providing assistance and monitoring as needed, rather than traditional lecture-style presentations or demonstrations [59][52].

Self-blend model.

The self-blend model, also known as the A La Carte model, is a form of self-directed blended learning that empowers students to take charge of their education using online learning resources [53]. In essence, the blended learning model, as described by [9], combines online learning with traditional face-to-face classes, encouraging students to take responsibility for their education even during evenings and weekends. This model combines online platforms with the teacher's presence, enhancing the overall learning experience [51]. Furthermore, [3] suggests that self-blend learning, which combines personalized teaching and online learning, is suitable for highly motivated students seeking additional courses or resources and allows students to access learning materials online and via social media [52].

Enriched virtual.

According to [53], the enriched model, also known as the virtual enriched blended learning model, has its roots in fully online schools but integrates a limited face-to-face classroom component. In this approach, the majority of teaching and learning still occurs within a physical classroom; however, online learning is a strategy that allows students to receive face-to-face instruction and study content independently using online resources, despite the majority of teaching and learning occurring in physical classrooms [51]. However, as noted by [9], the enriched virtual model emphasizes online learning over traditional face-to-face instruction, with the teacher acting as a facilitator. This model caters to students who need face-to-face interaction and allows them to complete course content remotely. Notably, it differs from the flipped classroom approach as it doesn't require daily physical attendance. Many virtual programmes incorporate blended components for enhanced in-class learning [3]. For example, the model suggests that 70% of learning may be conducted online, with the remaining 30% in a traditional classroom.

2.3 The nature of hospitality management education

Over 40 years ago, hospitality education gained recognition as a distinct field, with significant growth in the latter half of the 20th century [60]. Initially training industry employees, it has since expanded to include higher certificates, diplomas, degrees, and postgraduate programmes across secondary schools, colleges, and universities worldwide [61]. According to [62] the hospitality and tourism sector's rapid growth has necessitated a re-evaluation and continuous updating of Hospitality Management course curricula. Research by [63] highlights the evolution of the curriculum since the 1980s to align with the industry's dynamic and global landscape. [64] emphasize the importance of hospitality management education for real-world careers.

Over the past two decades, reports suggest a misalignment between the current curricula of hospitality management institutions and the skills and knowledge required by the industry [63]. Therefore, [65] recommend that institutions offering hospitality management programmes collaborate closely with the hospitality industry to develop effective teaching methods that remain relevant in an ever-changing world. In the United States of America, academics are continuously improving the hospitality management curriculum to prepare graduates for the professional work environment [63][66]. Hospitality Management programmes in South Africa typically encompass major modules such as Culinary and Nutrition Studies, Food and Beverage Studies, Accommodation Management, Financial Management, and Management Studies [67][68][69][70][71]. These programmes are designed to produce high-caliber graduates well-suited for the industry.

The teaching approach for hospitality management programmes is divided into two categories: traditional classroom learning and a substantial component of practical work experience [72]. [73] emphasized that hospitality management studies require physical facilities to develop technical skills like reception, culinary techniques, and customer service, which are integrated into coursework through live demonstrations and hands-on experiences. However, as noted by [74], similar to healthcare sciences courses, hospitality management courses combine theoretical and practical elements, emphasizing the importance of hands-on experience over simulations or demonstration videos. Therefore, it is crucial to focus on effective teaching and learning strategies. [72] highlighted that the teaching environment for hospitality management programmes should focus on understanding, analytical skills, self-learning, active participation, and assessment, while accommodating students with diverse learning styles to enhance the teaching-learning process. It is worth noting that, OTL can help educators cater to diverse learning styles, but hospitality management educators have faced challenges in incorporating emerging technologies into their classrooms over the past decade.

2.4 The application of blended learning in hospitality education as it includes practical components

According to [36], students in tertiary education in the 21st century are expected to develop collaborative and critical thinking skills. [75] suggests blended learning as the most suitable model for the digital era, which has gained popularity since the late 1990s and is now offered by many institutions [76]. Blended learning is a term used by various authors, includes flexible, hybrid, technology-mediated, mixed-mode, and web-enhanced instruction [77][41] [78,79]. Blended learning is an instructional approach that combines face-to-face teaching with ICT tools, including individualized computer-assisted learning, indirect instruction, direct instruction, and collaborative learning, as defined by [80][78]. [81] and [82] highlight the potential of blended learning and technology in education to personalize and enhance subject content, leading to improved performance and academic success by tailoring learning programmes to individual student needs. For the purposes of this study, [28] definition of blended learning is particularly relevant as it explores the application of this blended model in hospitality management education.

Erickson [79] mentioned that blended learning is a method that integrates established teaching and learning methods, allowing educators to adapt their practices to changing educational landscapes, including technological advancements, and respond to evolving situations. [76] and [80] highlight the advantages of blended learning, including improved student performance, self-reliance, satisfaction, lecturer self-development, flexibility, and enhanced communication. Furthermore, blended learning enhances the learning experience by allowing educators to employ diverse teaching methods to accommodate various learning styles [81]. As [82] elucidates, blended learning cultivates students' autonomy and active engagement in constructing knowledge, rather than passively absorbing information. This approach also offers lecturers opportunities for professional development through online courses [80]. Moreover, blended learning accommodates diverse learning styles, integrates online learning while maintaining human and social aspects, and equips students with digital literacy skills for the digital era. However, the successful implementation of blended learning relies on lecturer readiness and proficiency in its use [76]. Teachers must be well-prepared and comfortable with blended learning to ensure its effective implementation [83, 84][81]. This necessitates training for lecturers to ensure they have the required skills, which, in turn, requires time and resources.

2.5 Theoretical framework: Complex Adaptive Blended Learning Systems (CABLS)

According to [85], the integration of technology into education has presented a significant challenge, leading to the development of Complex Adaptive Blended Learning Systems (CABLS). CABLS aims to address the comprehensive design and implementation of blended learning. [86], in their exploration of blended learning becoming the new norm, emphasized that CABLS has gained global acceptance, with applicability

across various educational levels, from primary to higher education. This framework comprises six interconnected elements: the learner, the teacher, technology, content, learning support, and the institution [31]. CABLS provides guidance and support for individuals seeking to incorporate blended learning into their courses or programmes. [51] noted that CABLS aids less experienced teachers in designing blended learning courses by highlighting the essential interrelationships among these elements. In the context of this study, the framework aids in exploring effective methods for implementing blended learning, specifically the lab rotation model, in hospitality programmes. As highlighted by [87], implementing OTL in practical subjects can be challenging. CABLS offers guidance to hospitality management institutions and teachers on designing and implementing blended learning courses, subjects, or programmes, focusing on key interconnected components and enhancing educators' understanding of the six elements [31].

3 Methodology

This bibliometrics research study, applied in education, medicine, and business management, provides a comprehensive analysis of influential researchers, compares institutions and countries, and explores scientific communication facilitation in various disciplines [88][89]. As pointed out by [90], The bibliometric approach is a systematic literature review method that helps researchers identify essential themes, topics, and gaps in their fields by analysing bibliographic data from reputable databases like Scopus, DOAJ and others [91, 92]. This review explored the lab rotation model in hospitality management education using various electronic databases. This academic literature review utilized various electronic databases such as Google Scholar, Norwegian databases, etc. Relevant papers were selected based on keywords like online teaching and learning, blended learning model, and hospitality management education. The review focused on titles, abstracts, keywords, and year of publication, with papers published within the last 7 years:

Search strings: ((online teaching and learning) AND (blended learning) AND (Hospitality Management education) AND (lab rotation model) AND (complex adaptive blended learning systems))

Blended learning model substring: “blended learning model” OR “blended learning model” OR “models of blended learning”

Lab rotation model substring: “lab rotation model” OR “advantages and disadvantages of lab rotation model” OR “application of lab rotation model in practical subjects”

Three authors independently analysed retrieved papers, including systematic reviews, empirical, conceptual, and descriptive papers, by title and abstracts. They then performed an eligibility assessment by screening full texts of journal articles focusing on blended learning and lab rotation model. This study retrieved papers as full texts, written in English, and based on their relevance to the topic and contribution to the blended learning and lab rotation model. Disagreements were resolved through discussion or arbitration from a fourth author, ensuring high-quality paper. The study analysed

3,589 articles, removing duplicates and screening titles and abstracts. After removing 1 408 papers, 459 were assessed as full texts. 378 did not pass inclusion criteria, leaving 81 eligible studies for systematic review. In addition, 12 articles were selected as they focused on blended learning and the lab rotation model (Table 2). For quality assessment, the AMSTAR assessment tool was used. AMSTAR is a widely used tool for assessing the quality of systematic reviews conducted in any academic field [93].

Table 2. Relevant journal articles on blended learning lab rotation model

AUTHORS	TITLE	THEMES/VARIABLES	JOURNAL
Dewi, Cip-tayani, Surjono and Priyanto (2018)	Modelling Vocational Blended Learning Based on Digital Learning Now Framework	Blended learning, Physics, 21 st -century skills, University, Project-based laboratory rotation blended learning model, ADDIE model	<i>The Turkish Online Journal of Educational Technology</i>
Faustino and Kaur (2021)	Blended Learning Models: Perspectives in Higher Education.	Blended learning, blended learning models, higher education, Technology, 21 st Century, University	<i>Advances in Engineering Research</i>
Aksak Kömür, Kılınç and Okur (2023)	The rotation model in blended learning	Rotation model, blended learning models, K-12 education, mixing modalities	<i>Asian Journal of Distance Education</i>
Krismadinata, Nizwardi, Fahmi, Sukardi, Dochi, Arina, John, Ari Syaiful and Dony (2020)	Blended Learning as Instructional Model in Vocational Education: Literature Review	Blended learning, instructional model, vocational education, online learning, face-to-face learning, Khan's octagonal framework	<i>Universal Journal of Educational Research</i>
Tkachuk (2017)	Blended learning and features of the use of the rotation model in the educational process	Blended learning, models of blended learning, uses of rotation model, education process	<i>Information Technologies in Education</i>
Zulraudah, Syarif, and Refnaldi (2020)	The needs of junior high school students on blended learning models type lab rotation model for writing skill	Blended learning models, lab rotation model, writing skills, language learning, models of teaching, needs analysis	<i>Advances in Social Science, Education and Humanities Research</i>

	in English language learning		
Sandra, Razi, Jonuarti and Sari (2022)	Development of physics module integrated Moodle using lab rotation in senior high school	Development of physics module, moodle, lab rotation, senior high school, learning	<i>Pillar of Physics Education</i>
Adiwisastra, Mulyani, Alawiyah, Wibisono, Iskandar and Purnia (2020)	Implementation of the lab rotation model in blended learning based on student perspectives	Implementation of lab rotation model, blended learning, digital technology,	<i>Journal of Physics: Conference Series</i>
Dakhi, Jama, Irfan, Ambiyar and Ishak (2020)	Blended learning: A 21st-century learning model at college	Blended learning, 21 st century, instructional model, college/vocational, Polytechnic, ICT	<i>International Journal of Multi-Science</i>
Lovely and Cruz (2023)	Modified lab rotation model: A blended e-learning approach to improve students' conceptual understanding of English verb tense and aspect	Modified lab rotation model, blended E-learning, students conceptual understanding, English, Chalk-talk method	<i>The Asian Conference on Education</i>
Maspaeni, Muslim and Ibrahim (2022)	Improving course learning outcomes object-oriented programming through blended learning	Learning outcomes, blended learning, object-oriented programming, lab rotation,	<i>International Journal of Information and Education Technology</i>
Cai, Yang, Gong, MacLeod and Jin (2018)	A case study to promote computational thinking: The lab rotation approach	Computational thinking, lab rotation, college, teaching strategies, blended learning, fundamentals of computing	<i>Blended Learning. Enhancing Learning Success: 11th International Conference</i>

4 Results

The study analysed 12 journal articles published between 2017 and 2023 on blended learning lab rotation model using various platforms. A study of 12 journal articles published between 2017 and 2023 on the blended learning lab rotation model was conducted across 12 journals, including The Turkish Online Journal of Educational Technology, Advances in Engineering Research, and Asian Journal of Distance Education, using various platforms, as detailed in Table 2. This investigation identified common themes and variables in published journal articles, focusing on blended learning and lab rotation models. Five articles explored blended learning in higher education, while three focus on 21st-century skills. In summary, predominant themes discussed were blended learning, lab rotation model, higher education, 21st-century skills, and various learning models, among other aspects. The study further explored these themes and variables in a subsequent section. The research highlights the importance of these models in enhancing education.

4.1 21st Century skills (blended learning)

Faustino and Kaur [9] highlight the importance of blended learning in higher education to meet the demands of the 21st century, particularly in light of the 4th Industrial Revolution's transformative shifts in global mindsets, lifestyles, politics, economics, education, and culture [1]. The 21st century has marked a paradigm shift, with technology significantly reshaping education. As a result, traditional methods are no longer effective, necessitating individuals to adapt to these evolving technological landscapes [1]. Furthermore, [2] suggest that blended learning, employing advanced technologies, can foster the development of critical thinking, communication, and problem-solving skills. The student-centred approach fosters independent problem-solving and critical thinking by empowering students to find solutions. Additionally, the blended learning model integrates digital platforms for easier communication between students and teachers, even those who may be hesitant to engage in traditional settings.

4.2 Implementation of lab rotation in hospitality education

Blended learning is the ideal model for online teaching and learning due to its focus on context, course type, objectives, and educational institution. The selection of methods is crucial, as different courses have unique characteristics and requirements, necessitating different teaching methods and technologies for hospitality management programmes. In line with this perspective, [3] point out that blended learning's adaptability is evident in its ability to be effectively applied to various courses, despite variations in implementation based on discipline, course outcomes, and student profiles, provided essential considerations are taken. Consequently, blended learning is crucial for success in hospitality management, with the lab rotation model being particularly effective, combining offline and online theoretical and practical learning through computer-based laboratories [36]. As noted by [9], the lab rotation model enables students to develop critical thinking skills through virtual laboratory sessions, transitioning seamlessly

from traditional classrooms to e-learning environments, promoting analysis, interpretation, examination, and evaluation of evidence.

Aksak et al. [47] support the lab rotation model for specific courses, stating it is effective due to its predetermined schedule, allowing students to move between different locations, including the laboratory for online teaching and the traditional classroom for traditional instruction. This implies that in a hospitality classroom, students can transition between theory-based instruction in a conventional setting and practical lessons in specialized facilities like a kitchen laboratory. Moreover, it is noteworthy that the lecturer or laboratory teacher/assistants consistently provide guidance and support to students during laboratory sessions, ensuring an effective learning experience. [56] further highlight that the lab rotation model involves students following a structured schedule, participating in independent learning and primarily engaging in online activities within the laboratory.

Sahoo and Dipak [97] contend that, students transition to a laboratory equipped with electronic devices during face-to-face learning sessions. To provide further clarity, [53] assert that the lab rotation model differs from the station rotation model, as it requires students to move to different rooms for different aspects of the same lesson, facilitating both online and offline learning.

For a visual representation of how the lab rotation model functions, refer to Figure 2.

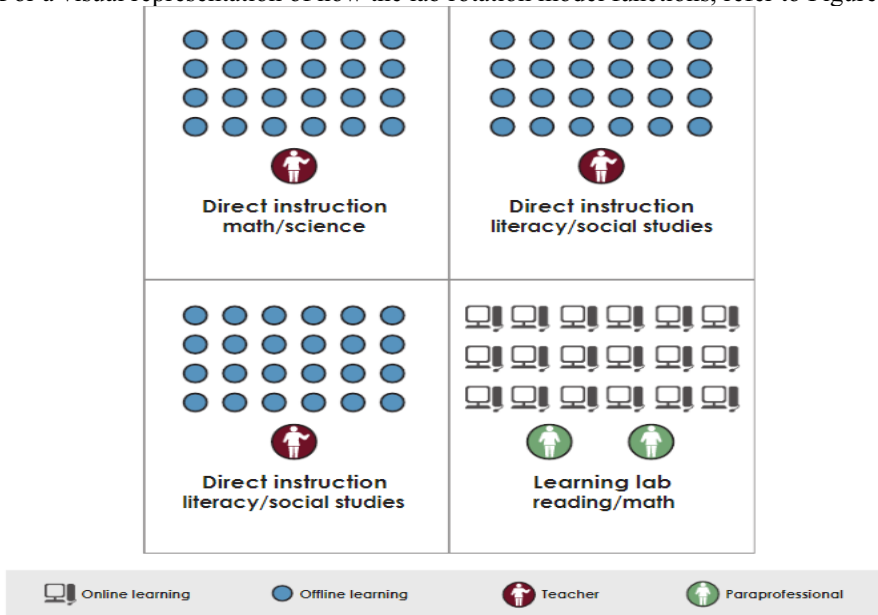


Fig. 2. Lab rotation model

Source: [54]

The lab rotation model, as described by [55] and [56], is a flexible instructional approach that caters to students' unique needs, including online learning and control over their learning, while considering the school's available resources. Hence, [57] praises the lab rotation model for its positive impact on learning, highlighting students' preference for video-based content and concise printouts from face-to-face classes.

On the other hand, [1] found that the lab rotation model is highly effective in practical learning scenarios for physics education, particularly in a Moodle-based physics course. In their comprehensive study, [1] concluded this model is also suitable for hospitality management education due to its combination of practical and theoretical components as physics education. This evidence strongly supports the potential applicability of the lab rotation model in a hospitality management programme. This shows that, the lab rotation model is a promising approach for hospitality management programmes, as it allows students to transition from theoretical culinary studies to hands-on training in kitchen laboratories. This approach fosters critical thinking skills, encourages interaction with chefs, and encourages collaborative discussions. This aligns with [2] practical example, which illustrates the lab rotation model's application in an ICT subject.

Table 3, which follows, provides a practical example of how the lab rotation model could be integrated into a hospitality management course, offering a visual representation of its potential benefits.

Table 3. Practical example of lab rotation in a hospitality management course

Learning content	Method of learning	Learning activities	Learning media
Guest cycle – Reservations stage	Contact (face-to-face) classroom lesson	<ul style="list-style-type: none"> • The teacher issues out learning material such as a study guide on hotel reservations. • The teacher explains what reservation is. • The teacher delivers a lesson on the types of reservations and the steps of creating a reservation. • Teacher and student engage in a discussion through the teacher asking questions and the students also asking questions. • The teacher gives a classroom assessment on the types of reservations and the steps of creating a reservation. 	Whiteboard PowerPoint- Presentation
	E-learning method	<ul style="list-style-type: none"> • Students move to the computer lab. • Students watch a video demonstration on how to create different types of reservations on the Property Management System. 	Video Internet
	Practice method	<ul style="list-style-type: none"> • Practice how to create different types of reservations. • The lecturer goes around and ensures that students understand how reservations are made. • Then students are required to print out their reservations for assessment. 	Computer Internet PMS software Printer

Advantages

According to [1] the lab rotation model integrates online teaching and learning, allowing students to learn in computer laboratories. Furthermore, teachers provide updated materials, allowing students to use modern cyber technologies. The model also fosters essential skills like customer service, problem-solving, time management, and teamwork, crucial in the dynamic hospitality industry, according to [58]. In addition, [1] highlight the ease of implementing the lab rotation model, as teachers can have direct control over the learning process, ensuring all activities, including classroom discussions and assessments, take place within the school environment. This provides an effective and seamless learning approach [57]. [1] further note that the lab rotation model allows students to learn independently, with teacher facilitation to minimize misconceptions. [32] experiment showed its effectiveness, boosting high-order skills and interest in the subject matter. [1] added that lab rotation promotes motivation and reduces concentration and boredom by allowing students to move around, promoting a more engaging learning environment.

Disadvantages

The successful implementation of lab rotation requires a flexible learning management system to accommodate different learning styles and stimulate creativity in students [1]. However, it faces challenges like requiring a significant shift in teaching methods and requiring additional supervision from a teaching assistant, which may compromise the personalized nature of the model, as suggested by [55]. Furthermore, lab rotation necessitates teachers to understand learning materials, module objectives, and individual student developmental stages, requiring extensive time investment and adequate teacher training to achieve this competency [1].

5 Conclusion

Blended learning, a flexible approach combining education with globalization and technology, has gained popularity in higher education due to its ability to cater to diverse learning styles. However, its effectiveness depends on institutional commitment and access to high-quality facilities. Moreover, the CABLS framework is crucial for successful blended learning implementation, as it considers students, teachers, content, technology, learning support, and institutions. This paper explores the suitability of the lab rotation model in hospitality management courses, emphasizing the importance of understanding and tailoring models accordingly. Blended learning, despite its popularity, can present challenges in different educational settings. Therefore, various models have been developed to address these needs, with the lab rotation model being particularly effective for practical subjects like hospitality management programmes. In this model, teachers can transition content from traditional classrooms to online laboratories, enhancing students' understanding and allowing them to demonstrate comprehension using computers. This approach is crucial for programmes like hospitality management, which require distinct structures and unique pedagogical approaches to effectively equip students with necessary skills. Hence, the CABLS framework emphasizes

the significance of context, teacher training, and learner preparation in implementing pedagogical strategies in hospitality management programmes, particularly in the lab rotation model, for successful implementation.

6 Research gaps and future research

Technology-driven teaching methods have led researchers to explore blended learning models across various educational disciplines. However, effective application in diverse academic fields remains critical. Contemporary scholarly interest has led to extensive literature on blended learning lab rotation models. This study analysed articles in reputable journals to examine the effectiveness of the lab rotation model in hospitality management education. It focused on themes and variables in research related to blended learning lab rotation. The limited existing literature provides an opportunity for researchers to explore this model's efficacy across various academic domains. This study primarily used journal articles, suggesting future research on the blended learning lab rotation model should consider incorporating books, online resources, dissertations, theses, and other scholarly materials. Further research in hospitality courses could significantly contribute to the field.

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