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RESEARCH ARTICLE

The Acquisition of Sports Massage Knowledge Using a Blended Learning Approach for Sports Science Students in Higher Education

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Abstract
This study aimed to assess the efficacy, benefits, and prospective impact of sports massage education delivered through a blended learning framework for college students. This study involved 52 male students enrolled in a sports massage course. Using qualitative methodology, this study employed systematic content analysis augmented with numerical data, visually representing user responses to sports massage education combined with blended learning. Analysis of the findings shows that 84.29% of participants showed a positive perception of the overall media aspects, contribution, benefits and potential related to learning sports massage through the blended learning model. In conclusion, this study argues that the integration of blended learning models increases the contribution, benefits, and potential of sports massage education, thereby enriching students' learning experiences.

Keywords
Massage Learning, Blended Learning, Sports Science

INTRODUCTION

The proliferation of information and communication technology development has led to a transformative impact on individuals' lives. Similarly, regarding acquiring knowledge, the forthcoming educational landscape will exhibit characteristics of flexibility, inclusivity, and availability, catering to the needs of individuals from diverse backgrounds. A multitude of factors undeniably impacts the attainment of educational objectives. The key components encompass professors, students, curriculum, and learning support facilities and infrastructure, which are of utmost importance.

The use of information technology and the goods it produces have contributed to the overdevelopment of science and technology in the twenty-first century. Students may be able to investigate information more thoroughly using technology than they would using simply face-to-face teaching techniques (Bouilheres et al., 2020; Ellis & Bliuc, 2019; Rafiola et al., 2020; Ryane & El Faddouli, 2020). Blended learning is a pedagogical approach that facilitates the achievement of learning and problem-solving goals (Azizi et al., 2020). Blended learning

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encompasses a combination of many instructional modalities, including face-to-face interactions, offline activities, online resources, and mobile learning platforms. The primary objective of blended learning is to provide students with opportunities for independent, engaging, productive, and efficient learning experiences (Albiladi & Alshareef, 2019; Attard & Holmes, 2022; Sumarmi et al., 2021). Blended learning encompasses both advantages and disadvantages. There are several advantages associated with utilizing blended learning: Six key factors should be considered to enhance the effectiveness of training and learning initiatives. Firstly, expanding the range of topics is important to ensure a comprehensive understanding. Secondly, the implementation process should be designed to be straightforward to execute. Thirdly, cost considerations should be taken into account to ensure affordability. Fourthly, the desired outcomes should be carefully defined and pursued to achieve optimal results. Fifthly, customization should be incorporated to address the unique needs of individual students. Lastly, efforts should be made to enhance the attractiveness of the learning experience (Finlay et al., 2022).

Learning is a deliberate endeavour to influence one's surroundings to shape oneself in a certain setting. Knowledge acquisition entails a dynamic exchange between educators and learners, encompassing direct engagement in person and indirect involvement facilitated via many media platforms (Kumar et al., 2021; Sukirman et al., 2022; Vallee et al., 2020). According to experts, learning is a series of activities deliberately created to facilitate learning (Albashtawi & Al Bataineh, 2020; B. A. Kumar & Goundar, 2019; Talib et al., 2019).

Blended learning is an educational approach integrating blended words, which refer to combinations or mixtures, with learning or studying. Another commonly employed phrase is a hybrid course, which refers to a blend or amalgamation of multiple courses. The term "blended learning" typically denotes a form of education that integrates traditional in-person instruction with computer-mediated learning, utilizing online and offline resources (Shakeel et al., 2023). Around 2000 saw the development of blended learning-based education, which is now widely employed in universities, the training industry, North America, England, and Australia. All learning tools that might encourage learning for those who learn are generated through blended learning. Face-to-face instruction and computer-based instruction can both be combined in blended learning. Specifically, using a combination of online and in-person learning resources, as well as those downloaded to computers, smartphones, iPhones, satellite television channels, video conferencing, and other electronic devices (Almaiah & Al Mulhem, 2019; Suartama et al., 2019; Yaroslavtseva et al., 2020).

Offline learning is often identified as using computer-based media without an internet network. Computer technology is an effective way to expand educational opportunities. One of the offline learning models is the use of multimedia (Dwiyogo & Radjah, 2019a, 2019b). Changes in the teaching and learning process are inevitable with the introduction of multimedia technology in Education (An, 2020; Bahar & Soegiarto, 2020; Laksono et al., 2019). Students are encouraged to be given many ways to gain knowledge, including maximizing the computer (Adi & Fathoni, 2020; Suartama et al., 2019).

Multimedia defines an expansive area that includes informatics, telecommunications, the audio-visual production sector, cinema, and digital media. Multimedia development to include multimedia elements and interactive features that create a better learning environment for both students and teachers in the learning process (Ansong-Gyimah, 2020; Ellis & Bliuc, 2019; Ibrahim & Hidayat-Ur-Rehman, 2021; Lubis et al., 2022). Interactive multimedia is designed by designers so that its appearance fulfills the function of informing massages and interacting with its users (Aisyah & Haryudin, 2020; Syahril et al., 2020; Wilar, 2022). Interactive multimedia is equipped with a controller that informs massages and can be operated by its users (Alzain et al., 2018; Grant, 2019; Lestari et al., 2019).

The deliberate application of networked information and communication technologies to teaching and learning is known as e-learning. According to this definition, using information and communication technologies within the teaching and learning process frequently denotes e-learning. Online education transmits information using electronic circuits connected to local and wide-area networks as well as the internet (Bawaneh, 2021; Carter et al., 2020; Chung et al., 2020). Massage is a term used to denote specific

manipulation of the body's soft tissues. Such manipulations are primarily performed effectively by hand control to affect the nervous, muscular, respiratory, circulatory, and lymphatic systems that are local and general. (de Souza et al., 2021; Deetz & Petrie, 2022; Ghanbari et al., 2022). Massage is one of the non-pharmacological pain management to make the body relax. Helpful in reducing pain or soreness, reassuring, relaxing, calming the nerves, and lowering blood pressure (Lai et al., 2022; Miake-Lye et al., 2019; Mrljak et al., 2022).

In supporting the massage learning process for Sports Science students, face-to-face, offline, and online learning is needed, which is combined with blended learning so that developments are created in the Sports Science student massage process, following the statement that all learning resources or learning media can facilitate learning so that development is created in the learning process (Cronje, 2020). Online and offline learning, often known as face-to-face and computer-based learning, are combined or mixed in blended learning (A. Kumar et al., 2021; Suartama et al., 2019). A blended program refers to an educational approach wherein program information is delivered through a combination of online and traditional methods, with the online component being between 30% and 79% of the overall program content. Blended learning is an educational approach that integrates diverse traditional and non-traditional techniques, resources, and approaches to effectively plan, develop, manage, and assess the learning process (Krismadinata et al., 2020).

The survey results and observations during the needs analysis show that the massage learning that has been held so far has only focused on the psychomotor domain, even though there are affective and cognitive domains that also need to be explored. Exploration of all domains is essential because it will stimulate students to think, and the developed blended learning can provide learning that accommodates children's thinking styles, namely auditory, visual, and kinesthetic, by carrying out massage learning based on blended learning, namely creating fun education for students and lecturers.

Prior scholarly investigations emphasize the imperative need to design nuanced blended learning materials characterized by meticulous detailing and visually clear interfaces, crucial for facilitating practical learning endeavors (Marinova, 2020). Additionally, empirical findings from other scholarly inquiries demonstrate that the availability of validated blended learning resources significantly contributes to students' optimal learning outcomes (Tisna MS et al., 2023).

It is vital to create a system of blended learning for students studying sports science in order to address these issues. Online, offline, and in-person learning techniques are all used in the blended learning concept. In order to avoid boring learning, it is intended that when learning occurs, it can cover all pupils using various learning approaches.

MATERIALS AND METHODS

Four stages of research were carried out. The development of blended learning-based massage learning is the first stage. The second stage is a trial run. The third phase is the dissemination of blended learning-oriented massage education to educational institutions at large. The implementation of massage learning based on mixed learning constitutes the fourth stage. The subsequent sections outline the sequential stages of the research to be conducted.

A requirements analysis has been conducted in the preceding phase. Subsequently, the implementation of Blended Learning-Based Massage Learning for students majoring in Sports Science is undertaken in the subsequent phase. The following sequence of activities characterizes the current stage of the research series.

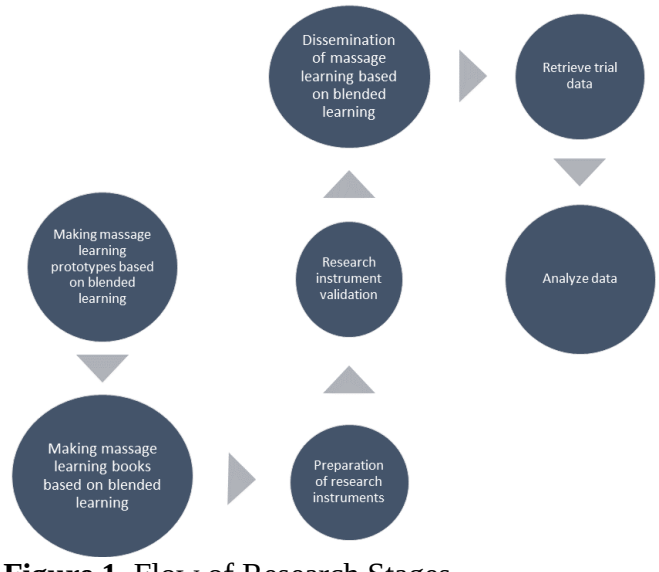

Figure 1. Flow of Research Stages

At this stage of the research, Research and Development were used to develop the development of blended learning-based massage learning for Sports Science students.

Participant

The cohort of research participants comprised 52 Sports Science students, exclusively of male gender, as the practice of massage learning in Indonesia conforms to the principle of gender-appropriate collective learning.

Table 1. Age of participants

Age	Amount
19 years old	43
20 years old	5
21 years old	4

Conducted in accordance with rigorous ethical standards, the present research obtained formal approval from the Ethics Commission of the Faculty of Medicine, Brawijaya University in Indonesia, under reference number 174/EC/KEPK - UM/09/2022. Informed consent was diligently obtained from all participants, who willingly agreed to participate after being presented with a comprehensive volunteer form elucidating the intricacies of the research, associated risks, potential benefits, confidentiality protocols, and the inherent rights afforded to participants. The study meticulously adhered to the ethical tenets outlined in the Declaration of Helsinki, prioritizing the rights and well-being of participants across the entire research spectrum, encompassing design, procedures, and confidentiality safeguards. Particularly, stringent measures were implemented to protect the identities of disadvantaged research participants, thereby upholding the overarching commitment to confidentiality and participant welfare.

Data Collection Instrument

Instruments for measuring research variables were adapted and self-compiled based on the variables translated into research indicators. The research utilized a product trial instrument as a validated questionnaire, which underwent validation by specialists in three domains: 1) learning, 2) massage, and 3) learning media technology. The validation component encompasses several factors, including the clarity of the questionnaire title, the clarity of the question items, the clarity of instructions for completing the questionnaire, the accuracy of the statements aligning with the expected answers, the statements about the research objectives, the statements aligning with the intended aspects to be achieved, the provision of accurate information, the inclusion of statements that convey complete ideas, the use of language that is easily comprehensible, and the use of appropriate language. The composition has improved spelling. Subsequently, the validators assessed each element and assigned scores using a Likert scale, encompassing a range of values from 1 to 4. Following this paragraph comes the grid containing the questionnaire instrument.

Table 2. Instrument Grid

Number	Indicator	Item number	Number of questions
1	Features of autoplay interactive multimedia, books and online media google classroom on blended learning-based massage learning for Sports Science students	1,2	2
2	Supporting features for interactive multimedia autoplay, books and online media google classroom on blended learning-based massage learning for Sports Science students	3,4,5,6	4
3	Help the learning process.	7	1
4	The benefits of autoplay interactive multimedia, books and Google Classroom online media in blended learning-based massage learning for Sports Science students	8	1
5	The potential of autoplay interactive multimedia, books and Google Classroom online media in blended learning-based massage learning for Sports Science students	9	1
6	The advantages of autoplay interactive multimedia, books and Google Classroom online media in blended learning-based massage learning for	10	1

Number	Indicator	Item number	Number of questions
	Sports Science students		
7	Weaknesses and weaknesses of autoplay interactive multimedia, books and Google Classroom online media in blended learning-based massage learning for Sports Science students	11	1
8	Further development steps	12	1

Data Analysis

The data obtained was carefully examined through qualitative descriptive analysis to explain its inherent characteristics and summarize the information. This approach involves analyzing numerical data to describe and understand various aspects of a data set without drawing conclusions beyond the sample studied. Qualitative descriptive analysis begins by using descriptive statistics to summarize the data set. Graphical tools such as tables can be used to represent data visually. This visual provides a clear picture of the distribution and patterns in the data set.

RESULTS

The research findings encompass implementing blended learning techniques in the context of massage learning for Sports Science students. These findings have been compiled into a book format, along with interactive multimedia autoplay features and integration with the Google Classroom platform. The product has been validated by three validators consisting of (1) a learning expert, (2) a massage expert and (3) a media expert in providing input on product improvement that has been prepared and produced for further trials on 52 respondents, namely Sports Science students.

The produced products encompass three distinct forms of learning media: 1) printed books utilized for face-to-face instruction; 2) Interactive Multimedia (namely, autoplay media studio) serving as offline learning material; and 3) Google Classroom, an internet platform designed for educational purposes.

The data collected from the outcomes of trials conducted on experts and respondents encompassed two distinct types: qualitative and quantitative data. The researcher gathered qualitative data and subsequently condensed it into multiple descriptive sentences. The quantitative data underwent analysis by inferential descriptive statistics and were afterwards presented as percentage figures.

The following is a summary of the qualitative data obtained from several validators and respondents to the products that have been compiled, which are described as follows: 1) the interactive multimedia background is given an attractive image for the rest is good enough, 2) the font size on the back cover is too large, and the author's photo is also too large, 3) many foreign languages are used that are not italicized.

Furthermore, quantitative data will be presented as percentage figures grouped into (1) expert validation data analysis and (2) trial data analysis. Data from the expert analysis was collected using a non-questionnaire questionnaire instrument with trial subjects using physical education experts, learning experts and learning technology experts. The findings of the expert analysis are displayed in the expert analysis table.

Table 3. Data from the Analysis of Learning Experts

Number	Component	Minimum Score	Max Score	Score Result	Percentage (%)	Information
1.	Presentation of material	4	16	16	100	Valid
2.	Compatibility of Material with competence	5	20	19	95	Valid
3.	Material Accuracy	3	12	11	91,67	Valid
Overall average		**12**	**48**	**46**	**95.83**	**Valid**

Table 4. The findings derived from the massage experts' analysis indicate a comprehensive data set

Number	Component	Minimum Score	Max Score	Score Result	Percentage (%)	Information
1.	Clarity of learning material	6	24	22	91.67	Valid
2.	Understanding of learning material	6	24	23	95.83	Valid
3.	The accessibility and comprehensibility of educational resources	6	24	22	91.67	Valid
4.	The suitability of educational resources	6	24	22	91.67	Valid
5.	The appeal of educational resources	6	24	20	83.33	Valid
Overall average		**40**	**120**	**109**	**90.83**	**Valid**

Table 5. The findings of the analysis were conducted on learning technology data

Component	Rated aspect	Minimum Score	Max Score	Score Result	Percentage (%)	Information
Printed book	Front and back covers	5	20	19	95	Valid
	Layouts, headers and footers	5	20	20	100	Valid
	Foreword	5	20	20	100	Valid
	List of contents	5	20	20	100	Valid
	The entire material substance	40	160	138	86.25	Valid
Interactive Multimedia	Opening view	7	28	27	96.43	Valid
	Main menu display	6	24	24	100	Valid
	Display of each material	6	24	24	100	Valid
	Video view	3	12	12	100	Valid
Google Classroom	Home menu	3	12	11	91.67	Valid
Overall average		**85**	**340**	**334**	**98.23**	**Valid**

According to the data presented in Table 3, the validation of learning experts yielded a score (F) of 46 out of a possible total score (N) of 48, resulting in a percentage of 95.83%. The validation of learning education professionals has yielded results that indicate the product is ready to advance to the trial stage. According to the data presented in Table 4, the learning validation yielded a score (F) of 109 out of a possible total score (N) of 120, resulting in a percentage score of 90.83%. The validation of learning experts has yielded results that support the progression of the product to the trial stage.

According to the data presented in Table 5, the validation of learning technology specialists yielded a score (F) of 334 out of a possible maximum score (N) of 340, resulting in a percentage of (98.23%). The validation of learning technology experts has yielded results that indicate the product is ready to advance to the trial stage. The data about the group trial findings were collected through a questionnaire instrument that was not in the form of traditional questionnaires but rather implemented using Google Forms. The study utilized a sample size of 52 participants, specifically individuals enrolled in a Sports Science program.

Table 6. Respondents' responses

No	Item	Respond	Percentage (%)
1	Respondents' responses regarding the convenience of the main features of blended learning-based massage learning media	Very quickly	19.2
		Easy	59.6
		Difficult	21.2
2	Respondents' responses regarding the clarity of the features of blended learning-based massage learning media	Very clearly	17.3
		Clearly	61.5
		Not clear	21.2
3	Respondents' responses regarding the ease of supporting features of blended learning-based massage learning media	Very quickly	15.4
		Easy	67.3
		Difficult	17.3
4	Respondents' responses regarding the attractiveness of the supporting features of blended learning-based massage learning media	Exciting	23.1
		Interesting	61.5
		Not interesting	15.4
5	Respondents' responses regarding the clarity of the supporting features of blended learning-based massage learning media	Very clearly	21.2
		Clearly	65.4
		Not clear	13.5
6	Respondents' responses regarding the complex level of supporting features of blended learning-based massage learning media	Very complex	13.5
		Complex	75
		Not complex	11.5
7	Respondents' responses regarding the contribution of blended learning-based massage learning media	Very helpful	26.9
		Helped	69.2
		Not helped	4.2
8	Respondents' responses regarding the benefits of blended learning-based massage learning media	Very useful	26.9
		Useful	67.3
		Not useful	5.8
9	Respondents' responses regarding the potential of blended learning-based massage learning media	Very potential	21.2
		Potentialy	69.2
		Not potential	9.6
10	Respondents' responses regarding the advantages of blended learning-based massage learning media	Very many advantages	19.3
		Advantages	63.5
		Few advantages	17.3
11	Respondents' responses regarding the shortage of blended learning-based massage learning media	Very many deficiencies	9.6
		Many deficiencies	32.7
		Slightly deficiencies	53.8
		Very few deficiencies	3.9
12	Respondents' responses regarding further development of blended learning-based massage learning media	Highly recommended	28.8
		Recommended	61.5
		Not recommended	9.6

Table 6 reveals insights on Sports Science students' perception of blended learning for massage education. Ease of acquiring skills showed 19.2% high ease, 59.6% moderate ease, and 21.2% difficulty. Clarity of massage learning had 17.3% high clarity, 61.5% moderate, and 21.2% low clarity. Perceived ease of features displayed 15.4% extremely quick grasp, 67.3% easy, and 17.3% challenging. Attractiveness had 23.1% thrilling, 61.5% fascinating, and 15.4% uninteresting responses. Supporting elements were clear for 21.2%, 65.4% found them clear, and 13.5% unclear. Complexity was perceived as very high by 13.5%, high by 75%, and low by 11.5%. Usefulness reflected 26.9% as extremely useful, 69.2% somewhat helpful, and 4.2% no help. Advantages were seen by 26.9% as highly beneficial, 67.3% as beneficial, and 5.8% as not useful. Potentiality was perceived as high by 21.2%, promising by 69.2%, and lacking by 9.6%. Benefits were noted by 19.3% as significant, 63.5% present, and 17.3% limited. Deficiencies were reported by 9.6% as high, 32.7% considerable, 53.8% relatively small, and 3.9% very few. Endorsement stood at 28.8%, general recommendation at 61.5%, and lack of recommendation at 9.6%.

DISCUSSION

Based on the 12 questions posed to the respondents, an overall percentage of 84.29% is obtained with the category of proper use. From the results of product trials on respondents, the

product developed in the form of blended learning-based massage learning can be used by Sports Science students.

Following the previously established stages in the research and development of massage learning based on blended learning, the outcome comprises three distinct materials: (1) face-to-face teaching materials in the form of print books, (2) offline teaching materials presented through interactive multimedia or autoplay, and (3) online teaching materials accessible via Google Classroom. Based on the findings derived from a research study using a sample size of 52 participants, specifically Sports Science students, the results indicate an average score of 84.29%. In order to get readily usable teaching materials for massage education, it is necessary to engage in product creation. Various advantages have been identified based on the research process outcomes. Firstly, based on blended learning, the massage learning textbook incorporates a QR Barcode feature that enables access to learning videos. Secondly, multimedia as a learning resource in massage learning has enhanced student learning outcomes (Lubis et al., 2022). Lastly, incorporating massage learning products can serve as supplementary references for students, facilitating their comprehension of massage learning materials.

Learning printed book product consists of several materials, including (1) chapter 1, learning design based on blended learning, (2) chapter 2, the meaning and History of Massage, (3) chapter 3, the benefits of Massage, (4) chapter 4 anatomy and physiology of the body, (5) chapter 5 massage management, (6) chapter 6 techniques and manipulation of massage movements, and (7) chapter 7 application of massage techniques to the limbs. The Massage instructional printed book has several benefits, one of which is the inclusion of a QR Barcode that enables users to access instructional videos corresponding to the content covered in the book. Assessment questions are presented as multiple-choice queries within the part dedicated to books. These questions serve the purpose of assessing the extent to which learning outcomes in the field of massage therapy have been attained. Utilizing educational literature as learning resources has proven to be highly efficacious in enhancing learning results (Bruggeman et al., 2021). Based on the findings of Wulansari's research, the outcomes reveal a wide range of benefits associated with textbooks as a learning resource. Specifically, 53.33% of the respondents strongly agreed on the enhanced understanding that can be achieved by using books. Additionally, 16.67% of the participants agreed with this notion, while 47.78% evaluated that incorporating textbooks could improve learning outcomes. Moreover, 51.11% of the respondents perceived textbooks as practical learning material. However, a minor proportion of 1.11% expressed disagreement with these perspectives (Wulansari et al., 2017). According to Sudthongkhong's findings, the academic performance of pupils, as measured by their learning outcomes or grades before the use of textbooks, ranges from 64% to 70%. The utilization of textbooks is associated with a statistically significant improvement in student learning outcomes, as seen by an increase from 89% to 92% (Sudthongkhong et al., 2020).

Furthermore, the researchers also developed teaching material products for massage learning based on blended learning which was packaged using interactive multimedia. The product material for interactive multimedia teaching materials is the same as a book which consists of a menu of (1) introduction, (2) history, (3) massage techniques, (4) flipbook, (5) google classroom, and (6) quiz. One advantage of incorporating blended learning in massage education is the utilization of interactive multimedia to deliver teaching materials. This approach includes physical education learning books in the form of flipbooks. The interactive display of learning materials ranging from four to seven contains interesting learning videos so that students can properly analyze each lesson contained in the video. In interactive multimedia, there are evaluation questions whose results can be immediately known. The primary objective of employing interactive multimedia as instructional resources is to enhance students' intrinsic motivation towards learning. Interactive multimedia-assisted learning has emerged as a prevalent mode of educational instruction. Interactive multimedia materials have been employed in sports education to facilitate the instruction of practical components within courses, specifically about developing motor skills (Gunawan et al., 2019). Moreover, additional research has indicated that educators are recommended to engage specialists in the development of interactive multimedia in order to

create captivating multimedia materials that can enhance the overall quality of the learning experience (Indah Septiani et al., 2020). The results of other studies also show an increase in learning motivation from low to rather high by 91% by using interactive multimedia learning media (Herianto & Wilujeng, 2021). The research conducted by Diyah demonstrates that using interactive multimedia movies enhances learning motivation, comprehension of educational material, and depth of learning (Diyah et al., 2022). Learning methods with a multimedia approach were more suitable for paying attention to achieving learning objectives (Harianja, Soraya, & Fibriasari, 2021). The involvement of students' perceptions is much higher with the help of interactive multimedia (Harianja, Soraya, & Hesti Fibriasari, 2021).

Researchers also employ online media platforms, such as Google Classroom, as an educational tool for students. This resource offers the advantage of being accessible anytime and from any location, as long as an internet connection is available. The utilization of Google Classroom classes as an online learning resource mostly revolves around providing materials that will be discussed in forthcoming sessions. The Google Classroom feature offers several advantages. Firstly, it allows for independent profile customization. Secondly, it provides a platform for sharing assignment documents and files among educators and students. Thirdly, it ensures convenient access to the Google Classroom platform. Lastly, it facilitates a more structured and organized interaction between educators and students. Using Google Classroom as an educational tool enhances learning results by providing a flexible learning environment without time constraints. Based on the findings of Dewi's research, it can be concluded that using Google Classroom as a learning platform has a significant positive impact on enhancing students' cognitive abilities and critical thinking skills (Dewi et al., 2022). Google Classroom provides an opportunity to create virtual classrooms¸ educators create links between theoretical and practical learning in building communication and collaboration (Sharda & Bajpai, 2021). Moreover, Bervell (year) asserted that the utilization of Google Classroom by educators effectively facilitated student engagement in online conversations and tasks, resulting in heightened student interest and drive to enhance their skills (Bervell et al., 2022). According to Ramadhani, using Google Classroom provides a secure virtual setting for students and educators, facilitating a more efficient and enduring teaching and learning experience (Ramadhani et al., 2019).

Most massage learning in the Sports Science Study Program uses theory in class and conducts learning in the field only at the last meeting of the course. Still, the problem when carrying out student learning is that it is difficult to get printed and offline learning resources; even in the FIK UM library, there are few books on massage learning. So most students still depend on the internet and take resources from BlogSpot. In summary, implementing the mixed learning model is a viable approach to address the challenges associated with traditional massage learning methods. The research findings presented by Indah demonstrate that incorporating interactive multimedia in pedagogy effectively enhances learning processes. Diverse educational activities are disseminated through traditional printed books accompanied by in-person instruction, but instructional material is also made available online to facilitate remote study (Indah Septiani et al., 2020).

The findings of this study demonstrate the use of a blended learning approach, which incorporates a combination of traditional face-to-face instruction via printed learning materials, offline learning through interactive multimedia resources, and online learning facilitated through the Google Classroom social network. Research has demonstrated that implementing blended learning methodologies in massage education positively affects various aspects of the learning process. These include heightened motivation, increased interest, and improved student learning outcomes. Moreover, blended learning has been found to enhance the efficacy, efficiency, and overall appeal of the learning experience in massage education. This viewpoint is consistent with the findings of the research, which indicate that blended learning yields superior learning outcomes by using the advancements in web-based learning tools presently being integrated into educational settings (Ashraf et al., 2021). Based on previous research findings, it has been observed that utilising a blended learning methodology yields a notable and favourable impact on students' academic performance, as evidenced by their

scores (Hamzah et al., 2022). Based on existing research, implementing blended learning has yielded a notable enhancement in students' motivation to study and academic achievements (Wang et al., 2021).

Blended learning is an effective method that offers students flexibility in terms of time and location and expedited access to educational resources. It also promotes independence among students, who are consistently drawn to its appealing qualities (Berga et al., 2021). Moreover, other research indicates that blended learning surpasses traditional learning in enhancing verbal talents and motivation (Ballouk et al., 2022). Based on the research results and experts' opinions, learning using blended learning in massage learning will experience an increase in learning outcomes in terms of increasing value, use of time, and attractiveness.

Conclusion

The implementation of blended learning in massage education for Sports Science students garnered positive feedback from both students and teachers. This approach capitalizes on the digital landscape, fostering continuous interaction between instructors and learners beyond traditional settings. It offers comprehensive learning experiences, enhancing accessibility and yielding improved outcomes. Blended learning's diverse modalities and flexibility contribute to a richer educational journey within the Sports Science program, augmenting understanding of massage techniques vital to sports. The study recommends integrating expert assessments and group tests for enhanced guidance. Suggestions focus on closer educator-learner interaction, covering all learning dimensions, and considering context-specific product development. Knowledge transfer suggestions emphasize evaluating broader product dissemination. Future development suggestions stress contextual material analysis, focus on learning factors' impact, comparative outcome testing, and cognitive domain assessment in blended learning contexts. These recommendations aim to refine and maximize the effectiveness of blended learning in massage education.

Conflict of interest

The authors declare the absence of any conflicts of interest. Grateful acknowledgment is extended to the Universitas Negeri Malang for its financial support, which has facilitated the completion of this research.

Ethics Statement

Conducted in accordance with rigorous ethical standards, the present research obtained formal approval from the Ethics Commission of the Faculty of Medicine, Brawijaya University in Indonesia, under reference number 174/EC/KEPK - UM/09/2022.

Author Contributions

Study Design, S, AFF and WBS; Data Collection, AFF and WBS; Statistical Analysis, AFF and MCYH; Data Interpretation, S, AFF and MCYH; Manuscript Preparation, S, AFF, WBS and MCYH; Literature Search, AFF and WBS. Each of the authors has thoroughly reviewed and granted approval for the final published version of the manuscript.

REFERENCES

Adi, S., & Fathoni, A. F. (2020). Blended learning analysis for sports schools in Indonesia. *International Journal of Interactive Mobile Technologies*, *14*(12), 149–164. [CrossRef]

Aisyah, S., & Haryudin, A. (2020). Instructıonal medıa used ın teachıng englısh. *PROJECT (Professional Journal of English Education)*, *3*(6), 737–742. [CrossRef]

Albashtawi, A. H., & Al Bataineh, K. B. (2020). The effectiveness of google classroom among EFL students in Jordan: An innovative teaching and learning online platform. *International Journal of Emerging Technologies in Learning*, *15*(11), 78–88. [CrossRef]

Albiladi, W. S., & Alshareef, K. K. (2019). Blended learning in english teaching and learning: A review of the current literature. *Journal of Language Teaching and Research*, *10*(2), 232–238. [CrossRef]

Almaiah, M. A., & Al Mulhem, A. (2019). Analysis of the essential factors affecting of intention to use of mobile learning applications: A comparison between universities adopters and non-adopters. *Education and Information Technologies*, *24*(2), 1433–1468. [CrossRef]

Alzain, A. M., Clark, S., Jwaid, A., & Ireson, G. (2018). Adaptive education based on learning styles: Are learning style instruments precise enough? *International Journal of Emerging Technologies in Learning*, *13*(9), 41–52. [CrossRef]

An, Y. (2020). A History of Instructional Media, Instructional Design, and Theories. *International Journal of Technology in Education*, *4*(1), 1–22. [CrossRef]

Ansong-Gyimah, K. (2020). Students' perceptions and continuous intention to use elearning systems: The case of google classroom. *International Journal of Emerging Technologies in Learning*, *15*(11), 236–244. [CrossRef]

Ashraf, M. A., Tsegay, S. M., & Meijia, Y. (2021). Blended

Learning for Diverse Classrooms: Qualitative Experimental Study With In-Service Teachers. *SAGE Open*, *11*(3), 1–11. [CrossRef]

Attard, C., & Holmes, K. (2022). An exploration of teacher and student perceptions of blended learning in four secondary mathematics classrooms. *Mathematics Education Research Journal*, *34*(4), 719–740. [CrossRef]

Azizi, S. M., Roozbahani, N., & Khatony, A. (2020). Factors affecting the acceptance of blended learning in medical education: application of UTAUT2 model. *BMC Medical Education*, *20*(1), 1–9. [CrossRef]

Bahar, & Soegiarto. (2020). Development of instructional media based on mobile technology to enriching teaching material for primary school students in Indonesia post-learning in the classrooms. *International Journal of Scientific and Technology Research*, *9*(1), 94–98. [CrossRef]

Ballouk, R., Mansour, V., Dalziel, B., McDonald, J., & Hegazi, I. (2022). Medical students' self-regulation of learning in a blended learning environment: a systematic scoping review. In *Medical Education Online* (Vol. 27, Issue 1, pp. 1–8). [CrossRef]

Bawaneh, A. K. (2021). The Satisfaction Level Of Undergraduate Science Students Towards Using E-Learning And Virtual Classes In Exceptional Condition Covid-19 Crisis. *Turkish Online Journal of Distance Education*, *22*(1), 52–65. [CrossRef]

Berga, K. A., Vadnais, E., Nelson, J., Johnston, S., Buro, K., Hu, R., & Olaiya, B. (2021). Blended learning versus face-to-face learning in an undergraduate nursing health assessment course: A quasi-experimental study. *Nurse Education Today*, *2021*(96), 1–6. [CrossRef]

Bervell, B., Kumar, J. A., Arkorful, V., Agyapong, E. M., & Osman, S. (2022). Remodelling the role of facilitating conditions for Google Classroom acceptance: A revision of UTAUT2. *Australasian Journal of Educational Technology*, *38*(1), 115–135. [CrossRef]

Bouilheres, F., Le, L. T. V. H., McDonald, S., Nkhoma, C., & Jandug-Montera, L. (2020). Defining student learning experience through blended learning. *Education and Information Technologies*, *25*(4), 3049–3069. [CrossRef]

Bruggeman, B., Tondeur, J., Struyven, K., Pynoo, B., Garone, A., & Vanslambrouck, S. (2021). Experts speaking: Crucial teacher attributes for implementing blended learning in higher education. *Internet and Higher Education*, *2021*(48), 100772–100785. [CrossRef]

Carter, R. A., Rice, M., Yang, S., & Jackson, H. A. (2020). Self-regulated learning in online learning environments: strategies for remote learning. *Information and Learning Science*, *121*(5–6), 311–319. [CrossRef]

Chung, E., Subramaniam, G., & Dass, L. C. (2020). Online learning readiness among university students in Malaysia amidst Covid-19. *Asian Journal of University Education*, *16*(2), 45–58. [CrossRef]

Cronje, J. C. (2020). Towards a new definition of blended learning. *Electronic Journal of E-Learning*, *18*(2), 114–135. [CrossRef]

de Souza, T. P. B., Kurebayashi, L. F. S., de Souza-Talarico, J. N., & Turrini, R. N. T. (2021). The effectiveness of chair massage on stress and pain in oncology. *International Journal of Therapeutic Massage and Bodywork: Research, Education, and Practice*, *14*(3), 27–38. [CrossRef]

Deetz, D., & Petrie, B. K. (2022). Massage Therapy as a Complementary Treatment for Stiffness and Numbness Post Cervical Spinal Cord Injury: a Case Study. *International Journal of Therapeutic Massage and Bodywork: Research, Education, and Practice*, *15*(4), 3–8. [CrossRef]

Dewi, C. A., Muhali, M., Kurniasih, Y., Lukitasari, D., & Sakban, A. (2022). The impact of Google Classroom to increase students' information literacy. *International Journal of Evaluation and Research in Education*, *11*(2), 1005–1014. [CrossRef]

Diyah, A., Catur, P. □, Purwanti, E., & Kurniawati, Y. (2022). Developing Microsoft Sway-Based Interactive Media in Pigmented Facial Care to Increase Motivation and Outcomes. *Innovative Journal of Curriculum and Educational Technology*, *11*(1). [CrossRef]

Dwiyogo, W. D., & Radjah, C. L. (2019a). Effectiveness, efficiency, and instruction appeal of blended learning model. *International Journal of Recent Technology and Engineering*, *16*(4), 91–108. [CrossRef]

Dwiyogo, W. D., & Radjah, C. L. (2019b). Effectiveness, efficiency, and instruction appeal of blended learning model. *International Journal of Recent Technology and Engineering*, *8*(3), 2874–2881. [CrossRef]

Ellis, R. A., & Bliuc, A. M. (2019). Exploring new elements of the student approaches to learning framework: The role of online learning technologies in student learning. *Active Learning in Higher Education*, *20*(1), 11–24. [CrossRef]

Finlay, M. J., Tinnion, D. J., & Simpson, T. (2022). A virtual versus blended learning approach to higher education during the COVID-19 pandemic: The experiences of a sport and exercise science student cohort. *Journal of Hospitality, Leisure, Sport and Tourism Education*, *2022*(30), 1–10. [CrossRef]

Ghanbari, A., Shahrbabaki, P. M., Dehghan, M., Mardanparvar, H., Abadi, E. K. D., Emami, A., & Sarikhani-Khorrami, E. (2022). Comparison of the Effect of Reflexology and Swedish Massage on Restless Legs Syndrome and Sleep Quality in Patients Undergoing Hemodialysis: a Randomized Clinical Trial. *International Journal of Therapeutic Massage and Bodywork: Research, Education, and Practice*, *15*(2), 1–13. [CrossRef]

Grant, M. M. (2019). Difficulties in defining mobile learning: analysis, design characteristics, and implications. *Educational Technology Research and Development*, *67*(2), 361–388. [CrossRef]

Gunawan, G., Firmansyah, D., & Widiastuti, W. (2019). Effect of interactive multimedia learning to learn skills of students sports volleyball. *Journal of Education, Health and Sport*, *9*(9), 263–270. [CrossRef]

Hamzah, Tambak, S., Hamzah, M. L., Purwati, A. A., Irawan, Y., & Umam, M. I. H. (2022). Effectiveness

of Blended Learning Model Based on Problem-Based Learning in Islamic Studies Course. *International Journal of Instruction*, *15*(2), 775–792. [CrossRef]

Harianja, N., Soraya, T. R., & Fibriasari, H. (2021). Development of Interactive Multimedia on Learning Descriptive Text for French Learners in North Sumatra. *International Journal of Early Childhood Special Education*, *13*(2), 1322–1330. [CrossRef]

Harianja, N., Soraya, T. R., & Hesti Fibriasari. (2021). Development of Interactive Multimedia on Learning Descriptive Text for French Learners in North Sumatra. *Britain International of Linguistics Arts and Education (BIoLAE) Journal*, *3*(1), 88–100. [CrossRef]

Herianto, & Wilujeng, I. (2021). Increasing the attention, relevance, confidence and satisfaction (Arcs) of students through interactive science learning multimedia. *Research in Learning Technology*, *2021*(29), 1–13. [CrossRef]

Ibrahim, Y., & Hidayat-Ur-Rehman, I. (2021). COVID-19 crisis and the continuous use of virtual classes. *International Journal of Advanced and Applied Sciences*, *8*(4), 117–129. [CrossRef]

Indah Septiani, A. nisa N. S., Septiani, I., Rejekiningsih, T., Triyanto, & Rusnaini. (2020). Development of interactive multimedia learning courseware to strengthen students' character. *European Journal of Educational Research*, *9*(3), 1267–1280. [CrossRef]

Krismadinata, Verawardina, U., Jalinus, N., Rizal, F., Sukardi, Sudira, P., Ramadhani, D., Lubis, A. L., Friadi, J., Arifin, A. S. R., & Novaliendry, D. (2020). Blended learning as instructional model in vocational education: Literature review. *Universal Journal of Educational Research*, *8*(11B), 5801–5815. [CrossRef]

Kumar, A., Krishnamurthi, R., Bhatia, S., Kaushik, K., Ahuja, N. J., Nayyar, A., & Masud, M. (2021). Blended Learning Tools and Practices: A Comprehensive Analysis. *IEEE Access*, *2021*(9), 85151–85197. [CrossRef]

Kumar, B. A., & Goundar, M. S. (2019). Usability heuristics for mobile learning applications. *Education and Information Technologies*, *24*(2), 1819–1833. [CrossRef]

Lai, C. Y., Wong, M. K. W., Tong, W. H., Lau, K. Y., Chu, S. Y., Tam, A. M. L., Hui, L. L., Lao, T. T. H., & Leung, T. Y. (2022). The impact of antenatal massage practice on intrapartum massage application and their associations with the use of analgesics during labour: Sub-analysis of a randomised control trial. *BMC Pregnancy and Childbirth*, *22*(1), 1–8. [CrossRef]

Laksono, E. I., Damayanti, E., & Santoso, I. (2019). Students ' Perception Towards the Application of Social Media Instagram As an Instructional Media. *Project: Professional Journal of English Education*, *2*(4), 421–428. [CrossRef]

Lestari, I., Maksum, A., & Kustandi, C. (2019). Mobile learning design models for State University of Jakarta, Indonesia. *International Journal of Interactive Mobile Technologies*, *13*(9), 152–171. [CrossRef]

Lubis, J., Haqiyah, A., Kusumawati, M., Irawan, A. A., Hanief, Y. N., & Riyadi, D. N. (2022). Do problem-based learning and flipped classroom models integrated with Android applications based on biomechanical analysis enhance the learning outcomes of Pencak Silat? *Journal of Physical Education and Sport*, *22*(12), 3016–3022. [CrossRef]

Marinova, D. (2020). Trends ın e-learnıng ın massage therapy - technıcal and pedagogıcal solutıons. *Pedagogika-Pedagogy*, *92*(7), 28–38. [CrossRef]

Miake-Lye, I. M., Mak, S., Lee, J., Luger, T., Taylor, S. L., Shanman, R., Beroes-Severin, J. M., & Shekelle, P. G. (2019). Massage for Pain: An evidence map. In *Journal of Alternative and Complementary Medicine* (Vol. 25, Issue 5, pp. 475–502). [CrossRef]

Mrljak, R., Danielsson, A. A., Hedov, G., & Garmy, P. (2022). Effects of Infant Massage: A Systematic Review. In *International Journal of Environmental Research and Public Health* (Vol. 19, Issue 11, pp. 1–13). [CrossRef]

Rafiola, R. H., Setyosari, P., Radjah, C. L., & Ramli, M. (2020). The effect of learning motivation, self-efficacy, and blended learning on students' achievement in the industrial revolution 4.0. *International Journal of Emerging Technologies in Learning*, *15*(8), 71–82. [CrossRef]

Ramadhani, R., Umam, R., Abdurrahman, A., & Syazali, M. (2019). The effect of flipped-problem based learning model integrated with LMS-google classroom for senior high school students. *Journal for the Education of Gifted Young Scientists*, *7*(2), 137–158. [CrossRef]

Ryane, I., & El Faddouli, N. E. (2020). A case study of using edmodo to enhance computer science learning for engineering students. *International Journal of Emerging Technologies in Learning*, *15*(3), 62–73. [CrossRef]

Shakeel, S. I., Haolader, M. F. A., & Sultana, M. S. (2023). Exploring dimensions of blended learning readiness: Validation of scale and assessing blended learning readiness in the context of TVET Bangladesh. *Heliyon*, *9*(1), 1–17. [CrossRef]

Sharda, P., & Bajpai, M. K. (2021). Online learning and teaching using google classroom during the COVID-19 pandemic. *DESIDOC Journal of Library and Information Technology*, *41*(5), 352–357. [CrossRef]

Suartama, I. K., Setyosari, P., Sulthoni, & Ulfa, S. (2019). Development of an instructional design model for mobile blended learning in higher education. *International Journal of Emerging Technologies in Learning*, *14*(16), 4–22. [CrossRef]

Sudthongkhong, C., Thanasuan, K., & Bumrungsena, P. (2020). The Development of Traditional Thai Massage Chatbot Application for Hypertension Treatment. *Advances in Intelligent Systems and Computing*, *1205 AISC*, 246–252. [CrossRef]

Sukirman, S., Masduki, Y., Suyono, S., Hidayati, D., Kistoro, H. C. A., & Ru'iya, S. (2022). Effectiveness of blended learning in the new normal era. *International Journal of Evaluation and Research in Education*, *11*(2), 628–638. [CrossRef]

Sumarmi, Bachri, S., Irawan, L. Y., & Aliman, M. (2021). E-module in blended learning: Its impact on students' disaster preparedness and innovation in developing

learning media. *International Journal of Instruction*, *14*(4), 187–208. [CrossRef]

Syahril, Nabawi, R. A., & Prasetya, F. (2020). The instructional media development of mechanical drawing course based on project-based learning. *International Journal of Innovation, Creativity and Change*, *2020*(4), 309–325. [CrossRef]

Talib, C. A., Aliyu, H., Malik, A. M. A., Siang, K. H., Novopashenny, I., & Ali, M. (2019). Sakai: A mobile learning platform. *International Journal of Interactive Mobile Technologies*, *13*(11), 95–110. [CrossRef]

Tisna MS, G. D., Kusuma, K. C. A., Muliarta, I. W., & Darmawan, G. E. B. (2023). Content validity of D-MESS: Articulate storyline 3-based learning media in sport massage courses. *Journal Sport Area*, *8*(1), 105–116. [CrossRef]

Vallee, A., Blacher, J., Cariou, A., & Sorbets, E. (2020). Blended learning compared to traditional learning in medical education: Systematic review and meta-analysis. In *Journal of Medical Internet Research* (Vol. 22, Issue 8, pp. 16504–16519). [CrossRef]

Wang, N., Chen, J., Tai, M., & Zhang, J. (2021). Blended learning for Chinese university EFL learners: learning environment and learner perceptions. *Computer Assisted Language Learning*, *34*(3), 297–323.[CrossRef]

Wilar, B. (2022). The Instructional Media to Teach English for Young Learner. *Journal of English Language Teaching, Literature and Culture*, *1*(1), 1–13. [CrossRef]