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Original Research

Design, Production and Evaluation of Digital Educational Content Based on DDD-E Model: Depression Treatment in Traditional Persian Medicine

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Abstract

Multimedia conveys educational concepts and materials in an easier, wider, and more attractive way, along with text, sound, image, and video, to overcome the limitations caused by educational methods. The aim of the current research is to produce and evaluate digital multimedia based on the decide, design, develop, and-evaluate (DDD-E) model in the field of teaching depression treatment in traditional Persian medicine. The study was quantitative, and the professors and doctoral students of the two fields of medical education and traditional Persian medicine were the subjects of the present study. In this research, the DDD-E model was used to produce a training package for the treatment of depression in traditional Persian medicine. This study was conducted in four phases: decision-making, planning, development, and evaluation. The final evaluation was done in two stages. First, it was evaluated by preparing a checklist of educational multimedia production stages based on the original DDD-E model, and in the second stage, a QAMLM questionnaire was used to evaluate the final product. The results of the evaluation showed that, according to the evaluators, quality components were generally observed in multimedia production. There was a complete consensus among the experts regarding the quality of content matching the goal and attention to learning results (Kappa coefficient = 1). Regarding the quality of media selection components (Kappa coefficient = 0.383), Paying attention to cultural and social factors (Kappa coefficient = 0.395) There was the least consensus. The overall score of the multimedia produced was equal to 58.4, according to experts. The multimedia was produced in terms of content, education, and technology to provide training to general practitioners in order to improve practical knowledge and use the recommendations of traditional Persian medicine to adjust the treatment patterns of patients with depression.

Keywords: Medical education; Digital learning; Traditional Persian medicine; Depression; 3D-E Multimedia production model

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Introduction

Multimedia is a combination of more than one media type, such as text (alphabetic or numeric), symbols, images, pictures, audio, video, and animations usually with the aid of technology, for the purpose of enhancing understanding or memorization [1]. It supports verbal instruction with the use of static and dynamic images in the form of visualization technology for better expression and comprehension [2]. The hardware and software used for creating and running of multimedia applications is known as multimedia technology [3,4].

In order to improve comprehension or recollection, multimedia is the mixing of many media types, such as text (alphabetic or numeric), symbols, images, photos, audio, video, and animations, usually with the help of technology [5]. Using static and dynamic pictures as a kind of visualization technology, it enhances verbal instruction to improve expression and comprehension [6]. Multimedia technology refers to the gear and software needed to create and execute multimedia applications [7].

People can transmit ideas and information using digital and print elements thanks to the features of multimedia technology, such as engagement, diversity, and integration. In this context, the terms "digital" and "print" refer to multimedia-based tools or programs that are intended to provide information to individuals so they can better understand topics [8].

The sum total of knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, that are used to maintain health as well as to prevent, diagnose, improve, or treat physical and mental illnesses is the term used to describe traditional medicine (TM) [9]. A wide range of medical procedures that are not a part of a nation's traditional or conventional medical practices, nor are they completely included in the prevailing healthcare system of that nation, are collectively referred to as complementary or alternative medicine (CAM). In many countries, the phrases are interchangeably used with TM. Other phrases like "natural medicine," "non-conventional medicine," and "holistic medicine" are occasionally used to characterize these medical procedures [10].

Depression is a prevalent mental condition that impacts a considerable global population, estimated to afflict around 300 million individuals across various age groups [11].

According to the Global Burden of Disease (GBD), it plays a significant role in the development of disability and significantly increases the overall burden of disease on a global scale. Depression can have enduring or recurring consequences that significantly impair an individual's capacity to function and lead a fulfilling existence. The GBD study has utilized the metric of disability-adjusted life years (DALYs) to assess the magnitude of the health burden associated with depression. In the year 2019, the global burden of disease, as measured by DALYs, indicated that depression contributed to 1.85% of the total DALYs. Among these, major depressive disorder (MDD) accounted for 1.47% of DALYs, while dysthymia accounted for 0.38% [12]. Multiple factors, including biological, emotional, cognitive, and sociocultural aspects, have been proposed as potential contributors to the increased susceptibility of females to MDD [13].

According to data provided by the Substance Abuse and Mental Health Services Administration, the prevalence of major depressive disorder over a period of 12 months was estimated to be 7.1% among adults and 13.3% among adolescents [14].

In this regard, attention is paid to the role of the physician in maintaining health during health and restoring health during illness, and Persian medicine, which is one of the oldest schools of complementary and traditional medicine, attaches great importance to the prevention and treatment of diseases and can play a role as a suitable solution [15].

The use of multimedia production models is helpful in organizing and directing projects. Paying attention to the components or components of models designed for multimedia production can influence the selection of components needed to guide production and evaluate it.

DDD-E model

As a result of the significant technological advancements that have occurred since the turn of the twenty-first century, new models of instructional design have been created, including online learning platforms for e-learning and multimodal learning (also known as multimedia learning) [16].

The DDD-E model is a design model utilized in the e-learning process for e-learning initiatives. Decide, Design, Develop, and Evaluate are the four steps of the DDD-E paradigm, which is depicted in Figure 1 [17,18].

Merely a few studies (Ivers & Barron, 2002; Ivers & Barron, 2010; Atahan et al,; 2021; Wahidah et all., 2019) were found in a review of the literature pertaining to the DDD-E e-learning design [16–19]. This study attempts to address this gap in the literature by utilizing the DDD-E model.

According to the searches conducted by the researchers, no subject similar to the present subject was found that uses the DDD-E model in the treatment of depression. So, in this study, the design, production, and evaluation of digital multimedia with the educational content of depression treatment in traditional Persian medicine based on the DDD-E model have been done. We believe that it can be useful for general practi-

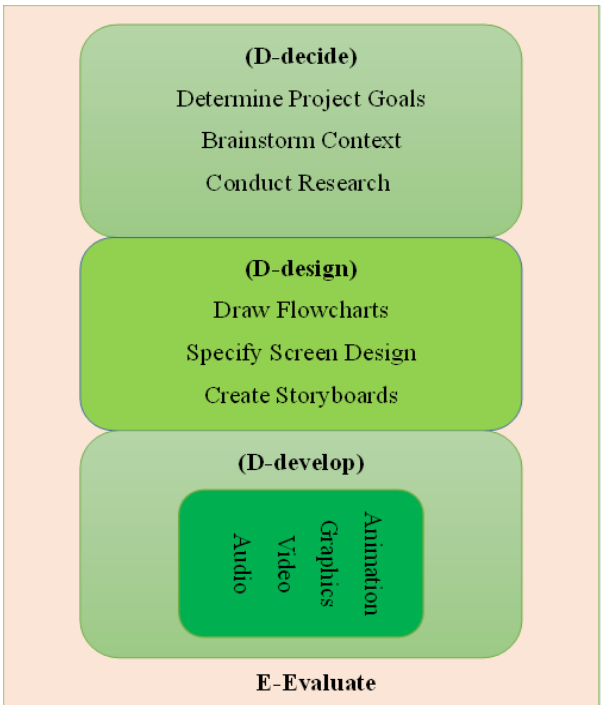

Figure 1. Structuring multimedia projects with DDD-E model [17]

tioners to use multimedia produced in order to promote practical knowledge and to use the recommendations of traditional Persian medicine to adjust the treatment pattern of patients with depression.

Methods

This study is a quantitative study, and in terms of its purpose, it is among applied research and educational product production. The population studied in this research included professors and doctoral students in the field of medical education and professors and doctoral students in traditional Persian medicine as educational and content experts. Targeted and accessible sampling was used to sample the statistical population. In this research, the DDD-E model has been used for the design, production, and evaluation of multimedia.

First step: decide

The decision-making stage determines the foundations of the other stages of the process. Therefore, the decision-making stage was important to the overall success of multimedia projects, and most of the researchers' time was spent on planning and organization in this stage.

Actions of researchers in the decision-making stage

• Project planning includes the formation of the research team, deciding on the title and stages of digital multimedia production, determining educational goals, and determining the resources used.
• Project organization includes: determining the time of brainstorming sessions, determining the time of content collection, retrieval and revision, and determining the time of multimedia recording.
• Starting and managing the project includes a wide review of texts, the mental preparation of researchers, and development of research activities.
• Forming the research team and assigning roles was the basis for the formation of the project, which guaranteed the future behavior of the research team and the performance of assigned tasks.
• Effective decisions were made to prepare reference books and worksheets and design educational objectives. When learning objectives are set for multimedia projects, it is important to ensure that learners learn more than they already know. After defining the educational goals, a project can be designed to meet the expected and desired outcomes. In this research, the level of knowledge, ability, and experience of the learner and the available resources were considered in determining educational goals. The educational objectives and evaluation criteria were introduced at the beginning of the project, and the learning outcomes were also considered by the researchers.
• In addition to educational goals, time is another criterion that must be met to be able to complete projects within a certain period of time. In this research, transitive variables regarding the allocation of time to different stages of the project, including access to professors, content collection, turn to use the studio, and the researcher's years of study were considered. The time needed to complete each stage is estimated according to the size and complexity of each stage, and enough time is considered for the start and end of the project, the time for brainstorming sessions, determining the time for content collection, content retrieval and revision, determining the time for multimedia recording, etc.

After determining the objectives and time of the project, reviewing the regulations and principles of research was very important to the mental preparation and progress of the project. This stage provided the basics of the next step of the process, namely planning

Second stage: design

As seen in the conceptual framework of the model, each stage depends on the previous stage. The planning phase was deeply important because it provided the project direction in the form of an overview. Workflow steps were compiled in the form of a flowchart, and the workflow was discussed in the group based on structure and communication.

Actions of the researchers of this study in the planning stage

• Exclusive design of pages:
In this research, PowerPoint software was used for

the specific design of the pages. For example, on each of the pages, the title was placed at the top, and 4-5 points were displayed in one slide. In addition, multimedia components were added by embedding audio, video, and various links.

• Choosing the context and display format:

In this section, attention was paid to points such as the display format, font color and font size, background color and patterns, and the arrangement of information on the pages. For example, the selected formats had a suitable contrast with the background color and text so that the words are easily readable.

• Adding media components:

In this section, audio and video components were added to the screen. An icon for each of these components was embedded on the screen and an instruction was placed to display them in the slides to be played one after the other and in a certain period of time.

• Production of storyboards:

Storyboards contain all the information that should be displayed in the slides. In fact, storyboards are more detailed than slides or content pages because they contain the descriptive information needed to produce text, graphics, animation, audio, video, etc. in the project. The learning content to be displayed on the lesson page was logically organized based on the desired learning objectives. Based on the objectives, several headings were used to express the topic.

Third stage: develop

At this stage, structural, graphic, technical and content problems of the product were fixed before the final approval.

Actions of the researchers of this study in the development stage

• Review and development of graphic components:

The term "graphics" refers to images or any information displayed on a computer as an image, drawing, or painting. In the graphic review, it was found that in order to further explain some cases, images should be used along with the text to increase the understanding of the content, so for some texts, photos were prepared and added in different formats to the content file.

• Review and development of visual and audio components:

At this stage, the final recorded product was reviewed to comply with the standard and set criteria. In some pages, the conflict between the text and the context and the reliability of the text, including the font and the size of the images, were observed, which was resolved in the re-recording. The professor's speaking skills and the ability to keep the audience's attention were checked and found to be favorable. Video file compression options were used to get the best quality with the smallest file size.

Fourth step: evaluate

In this research, the final evaluation was done in two stages, first by preparing a multimedia quality control checklist produced based on the original model (DDD-E) by an internal evaluator (an executive supervisor professor) and an external evaluator (a professor outside the executive team). and in the second stage, the QAMLM questionnaire was used to evaluate the final product. The results are given in the tables.

A: Multimedia Quality Control Checklist Based on the DDD-E Model

This checklist was designed by the researchers to determine the usefulness of multimedia based on the components of the main study model, which included the number of questions, and was completed by two internal and external evaluators.

B: QAMLM tool (quality framework for assessment of multimedia learning material)

The assessment guide Quality Assurance in Multimedia Learning Resources (QAMLM), created by the Commonwealth Educational Media Centre for Asia [20], is another tool for measuring the quality of multimedia learning materials. This tool consists of two parts: the first part evaluates the status of licenses and hardware and software prerequisites for multimedia production, and the second part evaluates the quality of multimedia on a 5-option scale. We only used the second part of this tool because this research took into account the necessary hardware and software. The validity and reliability of the tool have been tested by its developers in three periods. In the first pilot, 10 evaluators evaluated a multimedia. In the second pilot, an evaluator evaluated 25 multimedia, and the results of these two pilots were evaluated by a panel of experts, and the overall agreement coefficient of the evaluators was reported to be 90% and acceptable. This tool was used in 2010 in India and in 2011 in Malaysia by the Ministry of Science and Higher Education as an educational multimedia assessment standard.

✓ Preparation of questionnaires

First, the QAMLM questionnaires were translated into Persian (Farsi) under the supervision of medical education and English language experts, considering that the hardware and software prerequisites required for multimedia production in the studio of the Faculty of Medical Education (the place of multimedia production) are at the standard level. Therefore, we only used the second part of this questionnaire. To ensure the reliability of the second part of the questionnaire, Cronbach's alpha coefficient was calculated, and it was estimated to be 0.782. Also, four questions that were related to the interactive feature and sharing of tools on the Internet were removed with the agreement

of the experts.

✓ Distribution and collection of questionnaires
In order to evaluate the pilot, the researchers presented the necessary explanations to six medical education specialists and six traditional Persian medicine specialists, and the experts were requested to give their expert opinions after viewing the first version of the multimedia produced by completing the questionnaires. Also, the level of experts' agreement on the desirability of the variables was evaluated at this stage, which is given in the results section. After modifications to the initial version according to experts' opinions, the final product was distributed in the form of a CD along with a questionnaire among 100 experts across the country. The experts did not exchange information with each other during the multimedia viewing and completing of the questionnaires. After two weeks, the completed questionnaires were collected by the researcher. All the specialists who were given the questionnaires completed it and returned it to the researchers, then the data were extracted and the findings were analyzed and reported with the expert's opinion.

Results

In this study, 50 participants were in the age range of 41 to 50. Ages below 30 and above 51 years accounted for the lowest frequency (8 people). Other information is given in table 1.

Table 1. Demographic characteristics of study participants

Variable		Frequency
Age	More than 51 years	8
	Between 41 and 50 years	50
	Between 31 and 40 years	34
	Less than 30 years	8
Field of Study	Traditional medicine	50
	medical education	50
Experience in the field	Less than 2 years	15
	Between 2 and 7 years	51
	More than 7 years	34
Scientific rank	Associate Professor	13
	Assistant Professor	34
	PhD student	53

The results of the evaluation show that, in the opinion of the evaluators, in multimedia production, the quality components according to the checklist were generally observed. In the graphic review, it was determined that in order to better understand the content, in some cases, new images should be added, and in some slides, proper text layout was not done. The visual and auditory elements, the teacher's speaking skills, and the ability to keep the audience's attention were desirable. Audio-visual elements such as slide zoom, volume increase or decrease, slide forward and backward icons, and other items were well embedded and desirable. The lowest score was related to the exclusive design of the pages and the use of animation. Due to the fact that the animation film was not used in multimedia, both evaluators considered zero points in this component. Due to the high costs of animation production or translation and dubbing of existing animations, this section is considered a limitation of the project and was not implemented, and no points were awarded to this section.

According to the results obtained in this part, it can be seen that there was a complete consensus among the experts regarding the quality of content matching the goal and attention to learning results (with a Kappa coefficient = 1). Regarding the quality of media selection components (with a kappa coefficient= 0.383) and attention to cultural and social factors (with a kappa coefficient = 0.395), there was the least consensus.

According to the results obtained in this part, it can be seen that the adaptation of the content to the purpose, comprehensibility and content, and attention to social and cultural factors have the highest score, and the user interface component has the lowest score, according to the experts. The overall evaluation of the media has scored 58.4 points.

Discussion

The formation of new specialties in the education system of medical sciences such as traditional Persian medicine as a complementary medicine and its use in order to help improve the knowledge and skills of general practitioners to use the recommendations and clinical solutions of these sciences in the management of diseases seems necessary. Since general practitioners play a very important role in the management of various diseases and also considering the fact that, due to a lack of time, many doctors are not able to participate in face-to-face continuous medical education courses, the production and use of digital learning packages as one of the self-centered learning strategies can be useful in promoting new knowledge and skills in the medical sciences and the professional development of general practitioners [6]. Learning packages can be provided to users in the form of the

Table 2. Quality control checklist for multimedia production with DDD-E model

Question Number	Question	External evaluator (0-10)	Internal evaluator 0-10)
1	Is the storyboard set before production begins?	10	10
2	Has the special design of the screens been done?	6	7
3	Is the arrangement of information in each slide done properly?	7	8
4	Are the slides displayed one after the other?	10	10
5	Is it possible to advance the slides and view the next slide?	10	10
6	Is it possible to rewind the slides and view the previous slide?	10	10
7	Is the appropriate graphic format used in production?	7	8
8	Is the right background color used in the production?	7	9
9	Has a readable font been used to write the text?	9	10
10	Is the teacher's voice volume adjusted well?	10	10
11	Are the appropriate visual components embedded in the slides?	8	8
12	Are the appropriate audio components embedded in the slides?	10	10
13	Have animation films been used for content development?	0	0

Table 3. The results of experts' agreement about the quality of variables in the pilot study

Variable	Desirability	Count	Column N %	Kappa
Learning goals	Agree	8	66.7	0.445
	Against	4	33.3	
Speech (terminology)	Agree	11	91.7	0.668
	Against	1	8.3	
Prerequisites	Agree	11	91.7	0.668
	Against	1	8.3	
Content	Agree	9	75	0.513
	Against	3	25	
Adapting the content to the purpose	Agree	12	100	1
	Against	0	0	
Content structuring	Agree	9	75	0.513
	Against	3	25	
Content realm	Agree	10	83.7	0.549
	Against	2	16.7	
How to use the content	Agree	4	33.3	0.445
	Against	8	66.7	
The ability to understand the content	Agree	10	83.3	0.549
	Against	2	16.7	
Attention to learning styles	Agree	2	16.7	0.549
	Against	10	83.3	
Media selection	Agree	5	41.7	0.383
	Against	7	58.3	
User relationship	Agree	10	83.3	0.549
	Against	2	16.7	
Attention to social and cultural factors	Agree	5	45.5	0.395
	Against	6	54.5	
Text writing	Agree	10	90.9	0.595
	Against	1	9.1	
Attention to learning outcomes	Agree	12	100	1
	Against	0	0	
General evaluation of the media	Agree	3	25	0.513
	Against	9	75	

Table 4. Final evaluation results of multimedia quality produced by experts

Row	Variable	Very good	Good	Moderate	Poor	Very poor
1	Earning goals	25	41.7	33.3	-	-
2	Speech (terminology)	25	66.7	8.3	-	-
3	Prerequisites	25	25	25	25	-
4	Content	16.7	41.7	41.7	-	-
5	Adapting the content to the purpose	33.3	66.7		-	-
6	Content structuring	16.7	75	8.3	-	-
7	Content realm	25	25	25	25	
8	How to use the content	16.7	41.7	41.7	-	-
9	The ability to understand the content	33.3	41.7	25	-	-
10	Attention to learning styles	16.7	66.7	16.7	-	-
11	Media selection	25	58.3	8.3	-	-
12	User relationship	-	-	50	16.7	33.3
13	Attention to social and cultural factors	33.3	50	16.7	-	-
14	Text writing	33.3	-	66.7	-	-
15	Attention to learning outcomes	25	25	25	25	-
16	General evaluation of the media	16.7	41.7	41.7	-	-

compilation of educational pamphlets, the production of educational multimedia, or web-based programs. On the other hand, content quality and compliance with educational principles and learning theories in the produced packages are considered very important. Depression is one of the most important factors in causing disability and increasing the burden of disease in the world, which imposes a high economic burden on societies every year. Depression is the fourth disease burden factor in general and the biggest disease burden factor among non-fatal diseases. This disease is one of the leading causes of disability in the world and in the next 22 years, it will be the second cause of disability in the world. Considering the high prevalence and increasing depression in Iran, traditional Persian medicine, as a type of complementary medicine, provides treatment through psychiatry and provides a psychotherapy treatment model that can help the patient during the treatment period. Since general doctors have little information about these models from the point of view of traditional Persian medicine, we can consider training for them. In terms of content goals, this study is similar to the studies of Rabiei et al., Rezaei et al., Mazezi et al., and Di et al. [21-24].

In this research, the DDD-E multimedia production model was used as a road map, and based on the four dimensions of this model, digital content production was carried out under the title of educational content on depression treatment in traditional Persian medicine. The results of the study showed that multimedia production based on a conceptual model, co-thinking, organization, decision-making, planning, development, and evaluation can help researchers in optimal project management. In this regard, we can refer to the study of Mojtahedzadeh et al., who implemented the five stages of system educational design including system analysis, design, development, implementation, and evaluation, in the project of setting up an electronic learning system [25]. Also, Zandi et al., stated in their study that digital multimedia produc-

tion based on content production standards is necessary [26].

In this study, educational and content experts evaluated the produced multimedia based on specific criteria, and in their opinion, the design and quality of the produced multimedia were satisfactory. As Moradi et al. stated in their research results, the appropriate design pattern in the production of electronic content is one of the main challenges and, of course, the key to success [27]. In the current study, experts believed that speech (terminology), use of prerequisites, adaptation of content to goals, and attention to learning styles have an effect on increasing learning motivation, and the structuring and scope of appropriate scientific content is one of the strengths of multimedia production. According to Hassan et al. (2020) research, using e-learning models raises students' motivation levels. In this way, greater motivation will result in better academic performance, even for mathematical subjects that could be challenging to grasp [28].

Modern technology is developing so quickly that new approaches to remote learning and even the trend toward technology-based instructional designs like DDD-E learning are encouraged [19].

In a study conducted by Atahan et al. (2021), The analysis of the data revealed that there were positive improvements noticed in the students' perspectives towards the utilization of technology in the learning process, facilitated by the microlevel instructional design. Moreover, an upward trend was observed in the overall grade average on the scale. The implementation of student autonomy inside the DDD-E design paradigm facilitated the development of students' creative abilities and facilitated their acquisition of knowledge pertaining to a diverse range of multimedia technologies. Furthermore, through the implementation of the Problem-Based Learning (PBL) methodology, the students demonstrated their capacity to generate innovative and distinct resolutions for the encountered problem scenarios. Participants were having the opportunity to mathematically simulate potential real-life scenarios [29].

Conclusion

From the point of view of experts, the multimedia produced in terms of content, education, and technology is desirable for providing training to general practitioners in order to improve practical knowledge and using the recommendations of traditional Persian medicine to adjust the treatment pattern of patients with depression. Therefore, the use of appropriate patterns of decision-making, planning, development, and evaluation has an effect on the desired process of multimedia production.

Conflict of Interests

None

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