Designing and Validation of e-module on Agriculture for Nutrition and Health (A4NH)

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

There is less awareness about health and nutrition problems and at the same time lack of availability of relevant and credible modules for ready reference for the needy people in India. This has aggravated the health and nutrition problems among rural women. The very low ratio of extension workers to farmers is aggravating the problem of knowledge transfer through the traditional system, so e-learning which is supported by growing connectivity and increased penetration of electronics in rural India can be used as an alternative solution to give faster and easily accessible information to the rural women, hence e module was developed using Microsoft Office PowerPoint 2013, e-learning module was created. The module was published as a CD-ROM. The module was validated through the sample group of researchers using the validation tool conceived by Vijayragavan and Singh [1] adapted for research purposes. Validation is done using four parameters, out of 4 parameters content and design were ranked first with a mean score of

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3.88, followed by the satisfaction of felt information need with a mean score of 3.85. It was found that the utility of content and ease of understanding were scored low by the experts when compared to the content and satisfaction of the need for felt information. However, in absolute terms, all the parameters had a mean score of more than 3.5 indicating high acceptability of the complete module.

1. INTRODUCTION

Food and Nutrition Security is attained when there is a sufficient supply of food (in terms of quantity, quality, safety, and cultural suitability) that is readily available and accessible to everyone, and it is effectively utilized to support a healthy and content life. The nutritional aspect incorporates considerations such as caregiving practices, healthcare services, and healthy environments into this definition and concept. This broader concept is specifically termed "Nutrition Security," which can be defined as the maintenance of adequate nutritional status, encompassing protein, energy, vitamins, and minerals, for all members of a household consistently. In essence, it goes beyond the concept of mere food security.

Agriculture plays a pivotal role in influencing the health and nutrition of rural women in numerous ways. According to Ruel and Alderman [2], A lack of awareness about health and nutrition issues, coupled with a shortage of accessible and reliable information sources, has exacerbated health and nutrition challenges among rural women and local grassroots institutions such as Non-Government Organizations (NGOs), Accredited Social Health Activists (ASHAs), and Anganwadi workers (AWWs) which can be solved using e-learning module. E-learning is conceptually defined as the methodology using electronic media and information and communication technologies (ICT) in education. Operationally, an e-learning module has been defined as an educational module designed by using e-learning methodology to educate and communicate with the stakeholders regarding Agriculture for Nutrition and Health (A4NH). It is imperative to educate these stakeholders about the connections between agriculture, health, and nutrition problems, as well as the preventive measures that can be taken to address these issues. One of the most effective ways to address this issue is by leveraging Information and Communication Technology (ICT). ICT serves as a powerful tool for raising awareness among rural women regarding their health and nutrition concerns. Many organizations and institutions are adopting e-learning methods to disseminate knowledge because they can be just as effective as traditional knowledge transfer methods but at a lower cost [3-6].

While developing e-learning courses or modules can be initially expensive, especially when incorporating multimedia or highly interactive elements, the ongoing delivery costs for e-learning, including web servers and technical support, are significantly lower than those associated with traditional knowledge dissemination methods. Additionally, the limited number of extension workers available to reach farmers in rural areas exacerbates the challenge of traditional knowledge transfer. Therefore, e-learning, supported by the expanding connectivity and increased use of electronic devices in rural India, can serve as an alternative solution to provide faster and easily accessible information to rural women. These e-learning modules can be effectively utilized by organizations such as Krishi Vigyan Kendras (KVKs), NGOs, Self Help Groups (SHGs), Primary Health Care Centres (PHCs), and Anganwadis to create awareness among rural and farming women.

Looking at the importance of the above-mentioned issues, this topic was selected to study with the following objective.

1. To develop and validate an e-module on Agriculture For Nutrition And Health (A4NH)

2. METHODOLOGY

The research was carried out in the state of Andhra Pradesh, employing a diagnostic research design. The choice of the research location, Andhra Pradesh, was deliberate, as the nutrition and health challenges faced by rural women in this state are more severe compared to other states in India. Specifically, the Kurnool district was chosen based on criteria related to

health and nutritional vulnerability. Within the Kurnool district, two blocks were randomly selected. To sample a total of 180 women farmers, a stratified random selection technique was employed. Based on the data collected e module is developed and validated. The designing and validation of the module were carried out in the following four phases:

Phase I: Primary information from the research and Secondary information (Books, internet, journals, newspaper etc.) were collected regarding agriculture for nutrition and health (A4NH). The module was developed by integrating the information collected through secondary sources.

Phase II: Basic guidelines have also been created for the development of e-learning modules and storyboards.

Phase III: Using Microsoft Office PowerPoint 2013, an e-learning module was created. The module was published as a CD-ROM

Phase IV: The module's validation process involved a sample group of 30 researchers using a validation tool originally developed by Vijayragavan and Singh in [1], which was adapted for specific research purposes. This tool consisted of a set of statements, both positive and negative, about predefined parameters. Participants were asked to express their responses on a five-point scale, which included options such as "strongly agree," "agree," "undecided," "disagree," and "strongly disagree," each assigned scores of 5, 4, 3, 2, and 1, respectively, for positive statements, and in reverse order for negative statements. Based on the validation results and feedback from the sample group, appropriate changes were made to the module to enhance its validity and effectiveness.

3. RESULTS

In Table 1, a parameter-wise analysis is presented. Among the four parameters assessed, "content and design" received the highest ranking, with a mean score of 3.88, followed closely by "satisfaction of felt information need," which had a mean score of 3.85. Notably, the experts rated "utility of content" and "ease of understanding" relatively lower when compared to "content" and "satisfaction of the need for felt information." However, it is important to note that all the parameters received mean scores exceeding 3.5, indicating a high level of acceptability for the entire module in absolute terms.

Table 1. Average score of the different parameters of validation N=30

SI.No	Parameter	Mean score	Rank
1	Content & design	3.88	I
2	Satisfaction of felt information need	3.85	II
3	Utility of content	3.81	III
4	Ease of understanding	3.72	IV

Table 2. Statement-wise analysis of the e-learning module about content and design N=30

SI. No	Statements	Mean score	Rank
1	The content in each slide is understandable	4.60	I
2	Easily readable text	4.53	II
3	Presentation is easy to comprehend	4.37	III
4	Background and font colours are comfortable to Eye	4.20	IV
5	Font Size and colour are appropriate	4.13	V
6	Images are clearly visible	4.10	VI
7	Learners can easily access external links provided in module	3.87	VII
8	The learner can choose his/her own learning pace	3.83	VIII
9	Well-designed content on each slide	3.77	IX
10	Content is systematically presented	3.67	X
11	The layout of the module is appealing	3.47	XI
12	The link between text and images is clear	3.43	XII
13	The learning experience is enjoyable	3.27	XIII
14	Appropriate design of the module enhances learning experience	3.10	XIV

Table 2 provides a statement-wise analysis regarding the content and design of the e-learning module. Among the 14 items evaluated, 10 items received mean scores above 3.5, indicating favourable feedback. The statements related to "comprehensibility," "readability," and "understanding" ranked highest, second, and third, respectively. Statements concerning "image quality," "font size and colour suitability," and "content presentation" received moderate mean ratings. The statements that received the least favourable feedback were "e-learning experience" and "link between text and image."

Table 3 provides an analysis of statements regarding the ease of understanding the e-learning module. The statement with the highest mean score was "Content is specific and focused

on A4NH," followed by "appropriateness of the introduction" and "clarity of the content." On the other hand, the statements that received the least favourable ratings were "Terminology and Vocabulary used are difficult" and "Module is lengthy."

Table 4 illustrates the assessment of the e-learning module's effectiveness. Most statements received an average score exceeding 3.5, with only two exceptions. The statement "The module can be considered suitable for A4NH as ready material" and "The module generates interest in A4NH" received the highest mean scores. Experts recommended including new information since they gave the lowest score to the statement "The module did not include new concepts."

Table 3. Statement-wise analysis of the e-learning module about ease of understanding N=30

Sl. No	Statements	Mean score	Rank
1	Content is specific and focused	4.30	I
2	Introduction is appropriate	4.17	II
3	The content is clearly understood	4.03	III
4	Simple language is used	3.90	IV
5	Content is logical	3.60	V
6	Content has relevance to Agriculture for Nutrition and Health (A4NH)	3.50	VI
7	The terminology and Vocabulary used are difficult	3.23	VII
8	Module content is lengthy	3.07	VIII

Table 4. Statement-wise analysis of e-learning module about the utility of content n=30

Sl. No	Statements	Mean score	Rank
1	The module can be proposed as ready material for A4NH	4.40	I
2	The module creates interest in A4NH	4.07	II
3	The module can explain agricultural concerns regarding health and nutrition	4.03	III
4	Learning has been taken place after finishing the Module	3.90	IV
5	A clear understanding of A4NH has been created	3.77	V
6	Motivation A4NH has been increased	3.27	VI
7	The new concept was not included in the module	3.23	VII

Table 5. Statement-wise analysis of e-learning module about Satisfaction of felt information need N=30

Sl. No	Statements	Mean score	Rank
1	The information provided is useful	4.27	I
2	The information provided is credible	4.10	II
3	The information provided is up to date	4.07	III
4	Content covers information needed regarding A4NH	3.60	IV
5	New information was not gathered in the Module	3.57	V
6	The information provided is incomplete	3.53	VI

Table 5 presents a detailed analysis of individual statements regarding the e-learning module's capacity to meet perceived needs. All statements concerning the fulfilment of these needs received mean scores exceeding 3.50. Specifically, the statements "The provided information is valuable" and "The provided information is trustworthy" held the top two rankings. In contrast, the statement "The provided information is incomplete" was ranked the lowest.

4. DISCUSSION AND CONCLUSION

An e-module was created centred around A4NH, with a specific focus on health and nutritional issues, the intersection of agriculture with nutrition, the essential connections between health and agriculture, gender's role in agriculture and nutrition, pathways for agricultural interventions in health and nutrition, value chain interventions, and biofortification. This module underwent validation in four key parameters. Experts expressed the view that the module held high relevance for stakeholders. They also noted that it was engaging, user-friendly, and well-designed. Similar findings were reported by Bhurao in [7], stating that e-learning modules increase learner interest, offer easy access to e-learning content, and aid in understanding new concepts. The lower ratings for sentences related to an enjoyable learning experience could be attributed to the absence of modern features typically found in software-based modules [8,9].

The experts identified the module as highly beneficial, as evident from the utility parameters assessed during validation. It stands out as a ready-made resource that can be particularly advantageous for assisting individuals who face challenges in grasping scientific knowledge. The outcomes also indicate that this material has the potential to bolster stakeholder interest in A4NH and potentially make learning less challenging. Furthermore, it can function as an instructional aid for training purposes and serve as a valuable teaching tool for educators. Ganiron's [10] study on e-learning effectiveness similarly concluded that this module could effectively support knowledge dissemination. The module comprehensively covers the current topics and programs, with the only notable drawback being a lower rating for the statement "New concepts were not included in the module." With its diverse content, the module holds promise as a valuable resource for a wide range of learners [11-13].

The module, being in CD-ROM format, offers the advantage of easy duplication and can be utilized effectively in classroom settings through CD-ROMs. This format enhances portability and supports self-paced learning. However, it does come with the drawback of requiring access to a CD and a CD drive. These pros and cons of CD-ROM usage were also discussed by Singh in 2011, who noted that while CD-ROM-based modules have their limitations, such as the need for the physical CD, they enable independent learning and serve as valuable resource materials, representing an improvement over traditional learning material [14].

The high mean scores, all surpassing 4, across all parameters of the module indicate its potential for future applications. This suggests that there is a satisfactory level of acceptance among stakeholders, highlighting the necessity for modern extension education approaches. The study also implies that various stakeholders are receptive to adopting new instructional technologies. Therefore, further experimentation in this realm of extension education is warranted, as investing in the development of human resources represents a valuable investment.

Sung [15] opined that the use of appropriate and well-designed e-learning modules is worthy even in agricultural education.

Maioresu [16] reported that e-learning is a very effective and efficient option for lifelong learning, be it formal, non-formal or informal education

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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