Evaluation of a Developmentally Tested and Revised Experiential Multiple Media Instructional Package on Women Distance Learners

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Abstract: *A non-digitized prototype experiential, self-instructional, multiple media package was designed on the basis of a concept map. The prototype was developmentally tested on a group of 16 women learners enrolled for a diploma programme in nutrition and health education at undergraduate level using a criterion referenced achievement test and Likert scale. Their responses and reactions were noted in detail and on the basis of this feedback a revised prototype was designed including print, audio and video materials.*

The revised prototype was then evaluated in an instructional cycle of approximately two months. In the first instructional cycle, 100 women surrogate/prospective distance learners in the age range of 20-30 years (50 matched pairs on pre-test scores on the criterion referenced test and Likert Scale) participated and were randomly assigned to the experimental group and the control group. The experimental group was exposed to the instructional package consisting of the project module (print, audio and video in non-digitized form) and face-to-face counselling during 7-9 sessions of 2 1/2 hours duration each. The post-test scores of the learners exposed to the instructional package were found to be significantly higher (p<0.001) than the post test scores of the control group on both the criterion referenced test and Likert scale.

Developmental testing and evaluation of packages was limited to women distance learners/surrogate or prospective distance learners in the age range of 20-30 years who had completed 10+2 (schooling at secondary level/graduation, were resident in Delhi and familiar with the English medium).

Introduction

Distance education methodologies have been employed to train thousands of potential employees for the non-governmental sector through a diploma programme in nutrition and health education. Students enrolled for the diploma programme and surrogate/ prospective students constitute an important group for developmental testing and evaluation of an experiential, self-instructional, multi-media package on process models in community nutrition and health interventions. The present study proposed to design

and develop an experiential, self-instructional, multiple media package on process models to enable distance learners to attain specified cognitive and effective instructional objectives. Redesign and enrichment of existing distance learning curricula in nutrition to incorporate experiential learning was considered significant in this context (Thomas, 2000).

The use of technology as a tool to facilitate the attainment of instructional objectives is critical. Matching media attributes to learning objectives promotes the best use of the distinctive presentational attributes of each medium (Koumi, 2000). Multi-media packages are necessary to attain instructional objectives since a single medium cannot generally be employed to teach all types of subject matter (Brahmawong, 1993). The need to establish the conditions for selecting one medium over another and for combining them has been emphasized. It has been reiterated by a number of authors based on several research studies that no one medium is superior and further, that often, a combination of media can be more effective.

Since any medium has specific characteristics that influence its potential to transform teaching and learning, it is possible for technology to shape an entirely new type of pedagogy (Peters, 2000; Ansorge and Cooley, 2001). Media combinations could encourage learners to select the media most appropriate for their own learning style and circumstances (Mason, 1994). The use of multimedia adds value to the educational experience. It has been emphasized that the more senses involved in learning, the better the retention (IDC, 2000).

At present the distance learner in open universities in India has access to multi-media or multiple media courses in nutrition i.e. non-digitized combinations such as print, audio cassettes and video cassettes. The term multi-media or multiple media refers to such a collation of media emanating from disparate presentation devices. Multi-media packages are products that use more than one medium for communication purposes.

Objectives

The objectives of the present study included:

- Design and development of a prototype self-instructional experiential, multi-media (multiple media) package for distance learners on process models in community nutrition and health interventions;

- Evaluation of the prototype multi-media package in meeting cognitive and affective learning objectives.

Methodology

The existing curriculum of the Diploma Programme in Nutrition and Health Education of IGNOU includes one unit/lesson on process modes in community nutrition and health interventions (Thomas, 1993). Feedback on the Unit was obtained through detailed qualitative analysis of 187 responses to a specially designed assignment. The assignment responses were submitted by learners from centres across India. On the basis of the

analysis of the assignments and the content to be covered, a concept map was created. On the basis of this concept map, the prototype experiential, self-instructional, multi-media package was designed and developed for distance learners. Based on Anderson (1983), in sections of the package intended to promote achievement of cognitive objectives:

- Print was considered if display of neither motion nor sound was required.

- Audio-print was considered if display of sound was required but not motion.

- Video with print was considered if display of both motion and sound was required.

In sections intended to promote achievement of affective objectives:

- Audio-print was considered if display of motion was not required.

- Video with print was considered if display of motion was required.

In the context of design and development of a multi-media package for distance learners, print was selected as the core medium supported by audio-print and video-print. In the case of audio-print and video-print, the print took the form of media notes to accompany the audio and video programmes. During developmental testing, the cheapest, and the most flexible medium available that approximated the final medium for instruction was selected. Typed copies of audio scripts, typed materials of print and rehearsal video tapes were considered. In the case of the video, an existing video cassette was used since it was found to be a good source of open-ended case study material on the work of a Delhi-based NGO suitable for meeting the cognitive and affective objectives of the instructional package. The video was awarded the SONY Area Prize, 1997. The audio programmes were developed from draft script stage and recorded after developmental testing. The print material includes one section based on a lesson (unit) mentioned earlier. Considerable additional material was written to expand the single unit into a full-fledged structured project course.

The tools employed to developmentally test and evaluate the multiple media package included the criterion referenced test and the Likert scale on attitude towards community participation. The prototype multi-media package was tested only on distance learners familiar with the English language and based in the Delhi area.

The multi-media package developed was limited to a final prototype of non-digitized media combinations.

Construction of Tools

The criterion referenced achievement test in six parts (based on each of the parts of the project module) was developed on the basis of a table of specifications. A total of 52 items was selected for the Likert Scale based on the responses of 102 surrogate/prospective learners. Scores on test and retest were obtained on the criterion referenced test. The Test-Retest reliability was found to be 0.9 when tested on a sample of 102 learners. The scores on odd numbered and even numbered items on the Likert scale were obtained on the same sample of 102 learners. The split half reliability was found to be 0.68.

Developmental Testing and Evaluation of Experiential, Self-Instructional, Multimedia Package on Process Models

Students enrolled for the Diploma Programme constitute an important group for developmental testing of an experiential, self-instructional, multi-media package on process models. A prototype package consisting of draft materials in print, audio and a recorded video cassette earlier prepared was developmentally tested on sixteen learners enrolled for the diploma programme. Surrogate/prospective distance learners participated in evaluation of an experiential, self-instructional, multi-media package on process models. The prototype was revised based on the results of developmental testing and the revised version was evaluated in a two month instructional cycle. Randomized experimental and control groups were employed. The results are elaborated and discussed in the following subsections.

Developmental Testing of the Prototype Multi-media Package

A group of 16 women learners enrolled for the Diploma Programme participated in the developmental testing. The learners had been invited to attend an orientation session on the project work. Those who volunteered to undertake the structured project module were enlisted for the study. This was, therefore, not a random sample of learners. Also, since the majority of learners enrolled were women and since almost all the learners who volunteered were women, it was decided to limit the study to women learners. The learners were administered the prototype package in the form of print, audio scripts, and an existing video programme providing case study material. Materials were tried out in as near the final form as possible. It has been stated that open-ended data is often more useful in drawing conclusions about necessary revisions. The way in which distance learners used the learning resources was ascertained by direct observation of individuals or group in the process of studying during counselling sessions specially organised for the project work component.

Anderson (1983) outlined some hints for developmental testing of media. These included: using "lean" lesson materials

- introduction, contextualization and explanation of purpose and procedures;
- development of concepts and skills;
- clarification of doubts and further exploration of content; and
- discussion on supplementary materials.

The approaches emphasized in counselling/tutoring included: making objectives explicit; involving learners in a process they perceive as relevant to their learning needs; involving learners in interactive sessions to clarify doubts and provide opportunities for discussion.

On the basis of the feedback obtained during developmental testing, the print components were revised, audio scripts modified and audio programmes were recorded. The video programme was retained in the existing form.

Evaluation of the Revised Prototype Multi-media Package

A sample of 100 women surrogate/prospective distance learners in the age range 20-30

years in 50 matched pairs was selected and assigned to experimental and control groups. A more optimal situation can be achieved if the experimental and control groups are carefully matched with each other for the factor being studied. This procedure was, therefore, adopted for the present study. The pre-test accounted for previous knowledge of the content as well as occupational exposure, if any, to the content area. A degree of control over the influence of age and education level was achieved by restriction of age range and educational qualifications of learners included in the study. Time taken for self-study and peer-interaction during counselling sessions was assessed in terms of exposure to self-study/group-study by direct observation.

The experimental group was exposed to the following instructional components:

- project module (print, audio and video in non-digitized form),
- face-to-face counselling during 7-9 sessions of 2 1/2 hours duration each.

The following conditions were observed during counselling sessions and administration of tests.

- opportunities were freely provided for interaction both at individual and group levels as usual in counselling sessions (except during test administration);
- remedial face-to-face counselling was provided for items wrongly or incompletely answered on an individual basis;
- opportunities were provided to redo the test items after remedial counselling.

Results and Discussion

The results of the evaluation for achievement of cognitive instructional objectives on the criterion referenced achievement test during the first instructional cycle are summarized in *Table 1*.

Table 1: Evaluation of surrogate/prospective distance learners on criterion referenced achievement test

Scores/ P value	Experimental group	Control group
Pre-test	11.22 p 4.23	11.18 p 4.11
Post -test	59.02 p 6.23	12.02 p 3.33
P value for post-test on "t" test	P<0.001	P<0.001

Table 2 summarizes the results of the evaluation for achievement of affective objectives on the Likert scale during the instructional cycle. The face-to-face counselling sessions were primarily used by learners for interaction with the tutor/counsellor and peers rather than self-study. Studies conducted in India have revealed multi-media packages to be effective in terms of cost (Sahoo, 1995). The media mix decided on this basis was found to be highly effective.

Table 2: Evaluation of surrogate/prospective distance learners on the Likert Scale

Scores / P value	Experimental group	Control group
Pre-test	136.56p37.52	134.09p37.38
Post-test	166.60p 30.93	134.33 p 37.75
P value for post test on 't' test	P<0.001	P<0.001

Print remains the most important medium in distance education (Averkamp, 1998; Mishra, Ahmad and Rai, 2001). Distance learners who participated in the present study found print materials easy to use. They found it more difficult initially to study from audio materials. Studying from video material was found to be the most interesting but operationally the most difficult. Guthrie (1989) emphasized pragmatic considerations in the choice of the print medium for nutrition education. The advantages included: relatively low cost compared with alternate media; ability to present information in a condensed form; ease of distribution; reinforcement values since it can be referred to over and over, and the use of technology that is relatively simple and familiar. It has also been suggested that printed materials should be pretested, evaluated, revised and re-evaluated as much as necessary with the target audience to ensure comprehension. The multi-stage development testing and evaluation procedure of the present study built on this observation.

The audio programmes developed demonstrate the relevance of the findings of Sakamoto (1987) on the appropriate use of audio cassettes for instruction. The dramatic format adopted enabled the learners to be convinced about the relevance of participation especially women's participation. They enjoyed the dialogue between the main characters in each of the audio programmes.

A friendly, personal approach in audio cassette teaching was found to encourage active, participatory learning (Durbridge, 1984). The audio programmes developed as part of the project module were characterized by the use of a narrator to comment on dialogues and sequences highlighting the main teaching points, summarizing the major arguments. The audio cassettes developed as part of the present study demonstrate a constant dialogue with the learner interspersed with dramatic sequence to highlight the key points of the process models.

The video cassette on a nutrition and health intervention scheme of a local non-governmental organization presented primary learning resources in the form of case study material. It was found useful to change students' attitudes. This supports the functions attributed to video cassettes (Sakamoto, 1987).

It has been noted that many students appear to find video a more formal medium to work with than audio, and apparently feel less comfortable working with its because of its more "intrusive nature" (Durbridge, 1984). Video work involves concentrated watching as well as listening. It has been observed that students tended to concentrate on the factual content rather than attempt analysis or further explanation of the content (Brown, 1984). This was supported by the present study. Therefore particular attention was given to developing media notes for learners containing guidance and feedback particularly on the kinds of responses expected or discussion questions.

Open-ended stimulus material was found to be more suitable for group use. Effective audio and video instruction in distance learning settings were found to be characterized by the high degree of integration with other course materials and the high level of student/audio or video and student/tutor and student/student interaction they encourage. This finding has been supported by other authors (Brown, 1984; Durbridge, 1984).

Open-ended documentary style programmes (as in the video programme), bringing in case-study material for analysis by the student, can help develop students' skills at applying and interpreting what they have learned, provided learners have been given adequate guidance (Bates and Gallahger, 1987). Kemp and Dayton (1985) emphasized that pictures, words and sounds when skillfully combined have the power to evoke emotions, change attitudes and motivate actions. They suggested that media combinations provide a unique opportunity to help the learner to "understand ideas and acquire information too complex for verbal explanation alone."

While generating useful feedback for learners, the focus should remain on enabling learners to judge the quality of their performance (Wagner, 1994). The project module developed has extensive "check your progress" and practice exercises for which answers are provided. The module also has several open-ended stimulus materials presented in an easy-to-use structured format. One of the dangers with media-based learning is that too much "nice to know" material may be involved and not enough emphasis placed on "need to know" material, and that open learners may not easily be able to distinguish between the two categories (Race, 1998). Careful attention to this workload-related aspect made the project course feasible for the learners to attempt.

Distance learners are frequently expected to be independent and self directed. A recent study has suggested that this may not be the case (Hutton, 1998) for a significant number of learners. The pilot study found that a high need for structure correlated with failure and drop-out. Design strategies that meet a need for structure are easily incorporated into course materials, for example providing study timetables, explicit instructions regarding learning and assessment, overviews and summaries, and meaningful course maps showing the linkage between components of the course (Hutton 1996). Further attention to these aspects will help to improve some parts of the module in printed form.

Conclusions

A multiple media package with print as the core medium appears to be a good alternative at present for the distance learner in nutrition at the undergraduate level. Intensive research into how learners navigate their way through non-digitized multi-media (print, audio and video) in an integrated rather than supplementary package provides useful insights into the design and development of distance learning materials in nutrition. It was found that learning materials on community participation and process models in community nutrition and health interventions lend themselves to challenging multiple media presentations. They require "associative paths of traversal" by a learner having scope for integration with experiential learning.

[**Note:** This paper is based on research leading to doctoral degree of the first author.]

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