
Communications

Learning Modules as a Supplement to Existing Audiovisual Aids

Thomas C. Brown, PhD and Warren A. Heffron, MD
Davis, California

Audiovisual aids to teaching are presently being used by many family practice programs.¹⁻³ These aids have been developed by a variety of sources and attempt to appeal to a broad audience which may decrease their relevance to training programs in family practice. This paper describes a program which was developed to allow the use of existing audiovisual programs but which would focus the learners' attention on items most relevant to family practice. In conjunction with two video tapes dealing with marital counseling,^{4,5} written materials were prepared which resembled a semiprogrammed workbook. Following this method, the learner stops at nodal points during the video-tape program and, by using the workbook, becomes a more active participant in the program. Learning retention of the preselected items most relevant to family practice is enhanced by several methods of repetitive reinforcement.

Rationale

Gagne has stated that higher-order learning sequences are "nothing more than a conveniently arranged succession of prior learning events. . . ."⁶ Experimentation in programmed

instruction in medical education has taken two forms: the familiar "programmed textbook" approach and computer-assisted instruction.⁷ Major efforts to supplement audiovisual aids have made use of monographs and the like,¹⁻⁷ although some report use of media as a form of programmed instruction, which is then integrated into a learning package of various multi-media programs. The authors have experimented with a third approach. To augment existing audiovisual aids that do not require active learner participation, written materials are added which emphasize repetitive learning based on Gagne's postulate that each learning event is a factor which enhances further learning.⁶

Our approach also emphasizes several realistic conditions. One is that by supplementing *existing* audiovisual aids, time and resources are saved, and expensive cameras and techniques are not required. It should be noted that the two supplementary learning modules discussed in this paper were developed in less than two days. Although critiquing by a few residents and faculty on a one-to-one basis was completed later to improve the first draft of the materials, physician time was reduced because follow-up revisions were technical in nature. The pilot testing provided some evidence that the entire set of materials could be used as a self-learning package.

Components of Supplementary Learning Modules

The written programmed instruction or supplementary learning module designed to accompany an existing audiovisual aid consists of an intro-

From the Department of Family Practice, University of California, Davis, California, and the Department of Family, Community, and Emergency Medicine, University of New Mexico, Albuquerque, New Mexico. Requests for reprints should be addressed to Dr. Thomas C. Brown, Department of Family Practice, University of California, Davis, CA 95616.

duction, the objectives, a pretest, the problem-solving exercises, and a post-test.

The pretest serves multiple functions. It may contain questions that learners can answer and self-correct to inform themselves of the level of their individual readiness for and interest in the audiovisual material, as well as to sensitize their recall and so improve their receptiveness to the content of the audiovisual program.

The problem-solving component of the module commences by instructing the learner to begin viewing the tape, and indicates nodal points at which to stop viewing and actively respond to questions and problem-solving exercises based on material covered to that point. This component may, for example, review the problems to date and ask the learner to suggest either further questions or a work-up, or steps to be taken in patient management. In addition to illustrating areas of importance to family practice, these "stop action" nodal points challenge the learner to actively develop management plans while viewing the tape. For both of the video tapes discussed in this paper, several of these "stop action," problem-solving exercises were inserted.

Examples of how nodal points are used could include such questions as: "The physician is about to review his perception of the patient's problems identified to this point. What are your assessments of the patient's problems?"; "The physician is ready to instruct the patient in his management plan. What would you include in a plan for management at this time?"; "What patient education or health maintenance would you perform on this visit?" After the learner has responded, immediate feedback is provided in the module. The learner resumes viewing the material and compares personal management plans with those of the video-tape therapist. In this way, the learner becomes an active participant at a high intellectual level, and passive, often nonproductive "viewing without learning" is avoided.

The post-test is used to ascertain mastery of content. Generally, questions are similar to those found in the problem-solving exercises, since they are the points considered most applicable to family practice. Answers are supplied and minimum pass criteria are set so the learner can analyze his/her performance and, if needed, return to portions of the audiovisual program to clear up misunderstandings.

Development of Learning Modules

The development of the supplementary learning modules proved to be a reasonably simple procedure and one which could be duplicated for many audiovisual materials in any residency program. One physician can view the program, identify important content areas, and devise a pretest. On re-viewing the program the stop-action nodal points can be identified and learning exercises individually developed. A final complete screening of the program then readily leads to development of the post-test. This can be written with minimum library research if the person developing the supplementary learning module has a practicing physician's background in the area covered. One day was spent developing the first prototype module and about one half day was spent developing the second. With experience and minimal interruptions, this time could probably be shortened. If residents in a program wanted to develop modules to be used within their residency program, the learning exercise would be very valuable.

Results of Group Use

In order to determine the effectiveness of our efforts, ten first year family practice residents at the University of New Mexico participated in a group-paced pilot test of the two video-tape programs. The session took four hours to complete, largely due to time for discussions and the completion of open-ended reaction forms to the video tapes and the supplementary learning materials.

*The Frigid Wife*⁴ was the first in the series. The pretest was not based on the video-tape content but was a ten-item, true-false test on general sexual counseling designed to provide residents with feedback on their overall knowledge in the area. Of the ten residents taking the pretest, seven scored 70 percent or better, which had been predetermined as a desirable entry level of knowl-

edge on that test. The average score for the group was 72 percent. Performance on problem-solving exercises at the stop-action points initially was poor but improved at subsequent stop-action points. It appeared that the combination of multiple-choice and essay questions required residents to begin viewing the video tape differently as their active involvement required higher order problem-solving abilities. Toward the end of the video tape, performance improved, especially in the area of essay questions. The post-test consisted of 20 questions in a different format but covering the same content presented in the problem-solving exercises. The residents averaged 85 percent on the post-test. All ten residents equalled or exceeded the 80 percent predetermined criterion level.

*The Frigid Wife's Husband*⁵ was the second learning module developed. In this case, the pretest, again a ten-item, true-false test, was not directed at the content but tested learners' recall of the first video tape. Of the ten residents, nine scored above the predetermined criterion level of 70 percent. The average score was 77 percent. One resident scored 100 percent. Although initial performance on the problem-solving exercises was below performance on later exercises in the program, overall performance was higher, again demonstrating that residents were able to adjust to the format and apparently were anticipating the points made in the supplementary learning modules. The post-test contained 16 questions of the same multiple-choice and essay mix, again covering the same content as the problem-solving exercises but presented in different formats. The residents averaged 84 percent on the post-test. One resident fell below the predetermined criterion score of 80 percent. However, that score was 78 percent and not considered deviant enough to cause concern.

Resident comments about these modules were mixed. In some cases, they were critical of the content within the video tapes. In others, they objected to essay questions. Overall, residents felt the use of the supplementary learning modules with the video tapes was beneficial to their learning of the content, and they did not object to the longer time required to view them even though more time was required due to the testing and stopping for problem-solving exercises than would otherwise have been required to simply view the tape.

Other Uses for Supplementary Learning Modules

These two prototypes were developed for use as a part of an audiovisual library for family practice residency programs. In this setting they are available for use by a much wider audience. Modules can be left in the Family Practice Center and used over interrupted time sequences by medical students who are rotating through the center. When the student is using this program to reinforce information on a patient condition he is about to see or has just seen, minimal faculty time is involved once the module is developed. In our experience, the use of these modules frequently leads students to further reading on the subject or to discussions with the faculty.

In like manner, learning modules can be kept available for use by family nurse practitioner students and other allied health-care personnel who might be gaining their clinical experience in the Family Practice Center. Practicing physicians who return to the center for continuing medical education are another potential beneficiary group. Modules can be used at night or even rotated out of the center to practicing physicians at remote sites. The modules can be used individually but lend themselves well to group use, encouraging group discussion at the stop-action nodal points rather than requiring written individual responses. Healthy controversy can even be generated when the group disagrees with the prepared materials. Modules of this type could also be developed by physicians or family practice programs for use in patient education programs.

Summary

The development and use of supplementary learning modules for audiovisual aids designed for

wider audiences was found to be a feasible approach for the education of family practice residents. This approach allows programs to direct learner attention to areas of greatest interest in family practice. It was not excessively time consuming to develop the two modules and extensive technical expertise with media was not required. It was found that the modules were adaptable to individual or group use.

This teaching method appears to be an excellent learning tool for residents. Supplementary learning modules may be useful for medical students and other health-care providers in family practice. Further economy of time and other innovations using this basic approach could result from recruiting family practice residents and other students to develop their own learning modules on topics of individual interest.

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The Team Leader: A Concept for Family Physician Faculty Development

Ann L. Moore, MD, James T. Moore, MD, W. J. Kane, MD, and David P. Hunter, MPH
Durham, North Carolina

Many family medicine residency programs have experienced difficulty in obtaining qualified family physician faculty.¹⁻³ The ideal teacher of family medicine is a family physician with practice experience, current medical knowledge, and an in-

terest in teaching. Such physicians, however, may not be able to accept full-time teaching positions. Commitments to community, financial obligations, and doubts about the "currentness" of their medical knowledge are frequent reasons experienced physicians give for reluctance to begin a full-time teaching career. One available source of teachers of family medicine is the recent graduate of a family medicine program. Hiring a faculty member who has just completed his or her residency avoids the problems of ending commitments

From the Department of Community and Family Medicine, the Department of Psychiatry, and the Hospital Administration, Duke-Watts Family Medicine Program, Duke University Medical Center, Durham, North Carolina. Requests for reprints should be addressed to Dr. Ann Moore, Duke-Watts Family Medicine Program, 1012 Broad Street, Durham, NC 27705.

to a community, previous financial obligations, and current medical knowledge. There is, however, reason to question the suitability of such potential faculty. Family medicine is a specialty founded on the practice of clinical medicine. How can an individual who has not had the experience of managing a practice teach others? In this paper, we shall outline a method that has proven effective at the Duke-Watts Family Medicine Program.

The Duke-Watts Family Medicine Program began in July 1972, with four residents and one full-time faculty member. By July 1974, there were 14 residents and four full-time family physician faculty. The 14 residents were divided into four patient care teams, each with a faculty leader. Teams had both service and educational functions. The service function of the patient care teams was primarily to provide a system of cross-coverage among residents. Because residents were at the Family Medicine Center for a limited time, the probability was high that on occasion patients would need to be seen when their regular physician was unavailable. An attempt was made to schedule one resident from each team in the Family Medicine Center every day. The goal was to have each team function as a group practice so that patients could expect to be seen by one of four physicians rather than one of 14. Educational functions of the team centered around chart audit by the faculty team leader and regular team meetings. The chart audit by the team leader provided continuity and allowed each faculty member to become well-acquainted with residents on his/her team. The team leader was responsible for identifying strengths and weaknesses of particular residents and of helping the residents correct deficiencies. Team meetings served an educational function in the discussion of common office problems.

By June 1975, the four family medicine faculty were increasingly involved in administrative duties which limited their input both into resident education and direct patient care. This was especially a problem in the Family Medicine Center, where residents were supervised primarily by visiting preceptors who were present from one day per week to one day per month. While being exposed to a variety of preceptors was helpful, there was a lack of family physician faculty to serve as role models. This was particularly a problem given the evidence that the presence of a role model is

critical in the education of both student and resident in primary care.^{4,5} A clear need was present to decrease the amount of administrative responsibility and increase the teaching and patient care time of the faculty. It was also clear that teams as they were constituted did not adequately provide continuity of care. In practice, patients had to be scheduled with whomever was available. This was often a resident not on the primary physician's team.

The residency expanded from 14 to 25 residents in July 1975. The Family Medicine Center, which contained 4,000 square feet and ten examining rooms could not accommodate the additional residents. The expansion of the residency also created a need for more than the four family physicians then on the faculty. This situation provided the opportunity for an educational experiment. The experiment would be to change the role of one team leader so that this faculty member would be primarily a practitioner with limited direct educational and administrative responsibilities. The new team leader would be a recent graduate of a family medicine residency who would see patients 80 percent of the time (four days per week), be responsible for the routine administrative functions of the new team, serve as an informal preceptor while seeing patients, and audit charts of residents on the experimental team.

The new team would be housed in a separate facility two blocks away from the original Family Medicine Center. This would alleviate the space problem created by the expansion of the residency.

Questions to be answered by this experiment included:

1. Would the new arrangement improve continuity of care?
2. Could such an arrangement provide an experience comparable to what a young physician would have in private practice?
3. Would the new faculty member be credible to the residents?
4. Would such an arrangement be financially sound for both physician and program?
5. Would the educational responsibilities of the new faculty position interfere with the clinical practice portion of the physician's responsibilities?
6. Does such a position offer suitable opportunities for faculty development?

Method

In July 1975, a fifth patient care team was created at the new site under the direction of the recent residency graduate. The four original teams remained as before. These original teams served as controls in this educational experiment. Resident members of the fifth team (Team E) were selected from those who volunteered to participate in this experiment. Because Team E was experimental and physically removed from the main teaching practice based at the original Family Medicine Center, only second and third year residents were allowed to join the new team. A physician who had just completed training in the Duke-Watts family medicine residency program was hired to accompany the team to the new practice site. Team E was to function as a two-physician practice with the team leader and one or two residents seeing patients at all times. While additional preceptors were available at the original Family Medicine Center, residents relied heavily on informal teaching by their team leader. This teaching was primarily at the request of the resident, at the time of the patient visit, and performed with short interchanges. The teaching "contracts" usually involved listening to a suggested plan by the resident and approving or making a few suggestions, checking physical findings, and helping with the assessment of a problem. This informal precepting arrangement was adequate for the more experienced residents on Team E. Medical records of the residents on Team E were audited by the team leader in the same manner as for the other teams.

Results

In the two years of this experiment we have found that having the same physician present every day has substantially improved continuity of care. Patients needing to be seen have been able to

be seen by one of the physicians on Team E. Only rarely have patients of Team E had to be seen at the original Family Medicine Center. The presence of a full-time practicing physician adds a sense of stability to Team E that had not been achieved without the daily presence of a practicing physician.

This arrangement provides a young faculty member with an experience comparable in many ways to private practice. Although billing, medical records, etc, remain centralized, many of the administrative functions have been decentralized so that Team E has more autonomy than the other teams in the routine office management. This has been valuable not only for the team leader but also for the residents. The team leader has been exposed to patient responsibility in the usual areas of private practice (ie, office, acute-care hospital, and long-term care facilities).

The concept has been well accepted by residents. None of the residents of Team E have requested transfer back to the original Family Medicine Center in the two years of this experiment, and residents have requested transfer to Team E. The new team leader was also well accepted by residents in the hospital—at least partly because she is seen more as a practitioner than are other faculty members.

The arrangement described has proven to be financially sound. Daily patient visits of Team E average 30 to 35 per day compared with 15 visits per day to each of the other teams. Patient revenues of Team E are twice the revenues of the other teams and are sufficient to support the salary and overhead of the team leader.

The team leader brought a patient population of approximately 300 patients from the practice population she served as a resident; this has grown in two years to about 1,800 patients with an average of 25 patient visits per day.

The cost of such a faculty member to the program is minimal. While the team leader could achieve a higher income in private practice, the opportunities for continuing medical education, advantages of resident coverage of night call, and satisfaction from involvement in a teaching program help make up the salary difference.

This position has appeared to be an excellent way to gradually expose a young faculty member to increased administrative and educational responsibilities while providing the young physician

with the practice experience necessary to be an effective educator in the field of family medicine. As with other faculty positions, there is some pressure to increase administrative and educational responsibilities at the expense of patient care responsibilities. It has been possible to control this tendency, and additional educational and administrative responsibilities have been added at a pace that has been appropriate for a faculty-development position.

Conclusion

The concept of family medicine faculty development described here has proven useful in the Duke-Watts program. This is the concept of a family medicine faculty position which emphasizes patient care. The faculty member spends 80 percent of her time in direct patient care in a realistic and busy setting. The faculty member serves as a team leader to the six residents on the team and educational responsibilities primarily involve the residents on her team.

While there was some concern that the position would be diluted by administrative duties it has been possible to control this tendency. After two years in this position, the team leader still spends 70 percent of her time seeing patients.

The success of this program has caused a reevaluation of our concept of family medicine faculty, and we now feel there is a place for a faculty-development position which emphasizes patient care.

The practicality of this program is best demonstrated by the decision of the Duke-Watts Family Medicine Program to expand this concept to the other teams. A second team leader has been hired and it is planned to have such a position for each of the patient care teams in this program.

Construction has begun on a new, 22,000 square foot Family Medicine Center which is designed around the concept of four team modules, each

with separate waiting area, nursing station, etc. Offices of the team leaders will be located with the team module, rather than in the space allocated to program faculty offices. This concept of a team leader with significant patient care responsibilities provides several options for faculty development. While it is an excellent method of gradually developing a young faculty member, it also provides a method of maintaining practice skills of more experienced faculty. It might become possible to rotate this position so that faculty with primary administrative duties could spend one year out of every three or four in the practice of family medicine, while the original team leader was spending the year developing skills in administrative, educational, or research areas.

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