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Author(s)	Myint Swe Khine
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**MOTIVATIONAL FACTOR IN
DESIGNING MULTIMEDIA
INSTRUCTION**

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MYINT SWE KHINE

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Myint Swe Khine, PhD
Educational Technology Centre
Universiti Brunei Darussalam

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Motivational factor in designing multimedia instruction

Myint Swe Khine, PhD
Educational Technology Centre
Universiti Brunei Darussalam

Abstract

Motivation is an important factor in instructional design if the instruction is to attain optimum effectiveness. It has been widely believed that many training and education failures occur due to lack of concern for motivational side of learning. As the multimedia technology developed and established a high-profile status in the field of education, training and business, instructional designers are looking to exploit the full potential of the medium. Feedback as motivator has long been recognized as a powerful and dominant factor in the learning process. Feedback can be provided in varying levels and it can dramatically improve the instruction. This paper explores the role of feedback as a motivational factor and reports a research study on the effectiveness of varying level of feedback in a multimedia instruction. Implications on the design of multimedia instruction is discussed in the light of the research findings.

Introduction

In recent years multimedia has established a high-profile status in the field of education, training and business. Multimedia can mean different things to different people. The term multimedia can be considered as generic in nature which covers a variety of technologies and activities. In educational setting teachers have always used audio and visual presentations to enhance the learning situation. In the past a multimedia presentation can be video cassette tapes that combines audio and video materials or a tape/slide programme. These multiple media integrate audio, video, still images and sound. The new use of the term multimedia include the controlling of technology that is computer based. The inherent characteristic of multimedia is ability to provide real time interaction through the instructional sequences to the learner.

Education has been the subject of much change over the last few years and new technologies have slowly replacing old practices. Some critic said that multimedia is a solution looking for problems. As educators, the aim is to exploit the technology for the benefit of enhancement in learning which can take place in variety of learning situations. We need to harness the educational potential of multimedia and offer the best learning environment to our students as much as possible.

Motivation factor in instructional design

In the past decades, the debate was on whether the medium is the message. But one will unconditionally agree that

one of the elements of successful instruction is its design. The key to effective media, whether it is multimedia or multiple media, resides in the design of the courseware, rather than in the delivery system hardware. As Clark (1983) stated "the best current evidence is that media are mere vehicle that deliver instruction but do not influence student achievement any more than the truck delivers our groceries cause changes in our nutrition".

Spitzer (1996) argues that motivation is an important factor in instructional design if the materials to attain optimum effectiveness. He maintains that many education and training failures occur due to lack of concern for the motivational side of learning. There is a need to put emphasis on the motivational aspects of the instructional design.

The motives of human beings arise from basic psychological needs. Need theories argue that we behave the way we do because of the internal needs we attempt to fulfill. One of the most widely known motivation theories is the hierarchy of needs theory, developed by Abraham Maslow. The relation between theories of motivation and human learning has long been established and considered as one of the tenant of the instructional design.

Keller (1984) proposes in ARCS model that four sets of conditions must be met in order for motivation to be optimal for learning. The ARCS model seeks to improve the motivational content of the instructional materials and these four conditions spell out the acronym name for the model: attention, relevance, confidence and satisfaction.

Satisfaction is the feeling accompanying the process of reinforcement. This process occurs when the learner is given feedback information about the correctness of his performance, confirming an expectancy regarding the outcome of learning. To improve the quality of performance, the model called for provision of (corrective) feedback when it will be immediately useful and before the next opportunity of practice.

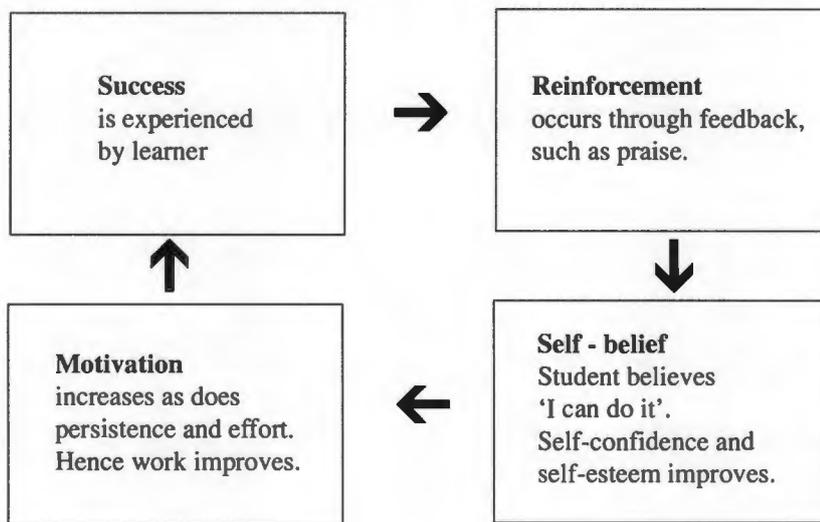
It was suggested that these conditions are related to events that take place within the learning situation. The establishment of learner satisfaction is the condition of ARCS model and such satisfaction can be attained by provision of feedback to bring about reinforcement. By following this procedure over different learning occasions, the satisfaction of each learning act can lead to learner confidence and maintain the attention. One of the most common practice in such situation is the use of feedback to learner performances to optimize the reinforcement (Keller, 1993).

According to Petty (1995) feedback as a motivator is the most powerful and dominant factor in the learning process. The students' experience of success and reinforcement can

feedback can be dramatically improved by providing it continuously, reinforcing the positive and focusing feedback on how performance can be improved in the future (Spitzer, 1996). Performance are then followed by information that indicates that they have been correct or incorrect. Format and immediacy in provision of feedback depends upon the type and capability of medium used. In the case of multimedia instruction, technology allows to permit the immediate use of feedback in an instruction.

Clarina, Ross and Morrision (1991) noted that while the benefits of feedback in general is taken for granted, uncertainty still exist as to how to select and optimize the uses of different forms of feedback depending on characteristics of students and learning situation. The effectiveness of feedback is a basic component of instructional theory that has been demonstrated by many researchers. Frequent and consistent use of feedback is also recommended in variety of teaching situations.

In a learning situation, feedback may be broadly defined as information obtained by students regarding the correctness of their performance in a learning task. Different types of feedback can be categorized according



The Learning Engine: Adapted from Petty (1995)

lead to increase in self confidence and self-esteem.

Feedback as a source of motivation

Persons involved in games and sports always receive immediate feedback which could be encouraging to proceed their activities. In an educational setting, when learner have completed a task, they are required to show the capability learned through performance. Learning

to their functions and characteristics (Dempsey and Sales, 1993). Knowledge of results (KOR) is the simplest level of feedback which provides responses such as "right" or "wrong", "true" or "false and "correct" and "incorrect" without giving the correct answer.

Elaborative feedback (EF) is a higher order post-response information which not only contains result on the appropriateness of a learner's response, but also provides

reasons for why it was wrong and gives the correct answer. No feedback (NF) allows the learners to proceed the instructional sequence without receiving any post-response on what they have tried.

The research literature so far has focused on numerous aspects of information feedback. Studies have examined immediacy of feedback, amount of information in feedback, the type of task involved, the importance of error analysis, and response certitude. Researchers agree that informative feedback does benefit learning under certain conditions, but whether it enhance performance for all types of learning tasks and all types of learners is still not clear.

Almost all of the existing literature suggested that manipulation of levels of feedback research used printed materials or computer assisted instruction. The development of technology assisted learning is rapidly moving from the simple use of computer as a text and graphic generating device to more integrated multimedia.

The role of feedback in multimedia instruction

Kulhavy and Wager (1993) noted that by and large feedback was viewed as a motivator or incentive for increasing the rate of accuracy of performance. The motivational approach to feedback was based in belief that letting people know how well they are performing a task acts as an incentive for greater effort in future.

A study was conducted to find out the efficiency of various levels of feedback as a source of motivator in a multimedia presentation. The subjects for this study were 105 upper secondary school students with the age ranged from fifteen to twenty. Eighty three percent of the group were between the ages of sixteen and seventeen. Of these students, 52 percent are male (N=55) and 48 percent are female (N=50). Subjects were randomly divided into three groups and exposed to a multimedia presentation. The multimedia programme was followed by a practice tests which provided one level of feedback (NF, KOR, EF) to three groups of students.

Table 1 indicates the means and standard deviations of posttest scores by each treatment group. As a whole group, subjects in the elaborative feedback (EF) group scored highest (Mean=14.22, S.D=2.37) as compared to those in the knowledge of results (KOR) group (Mean=13.50, S.D=2.85). Subjects in the knowledge of results (KOR) group scored higher than those in the no feedback (NF) group (Mean=9.85, S.D=3.1).

The one-way analysis of variance of mean scores of the treatment groups was performed in order to find out the efficiency of different level of feedback. As shown in Table 2, the results indicated that the value of $F = 24.7059$ is significant at $p = .0000$. However, it was not possible to conclude whether the significant difference among the group means reflects exclusively the positive effect of level of feedback, or if this significant difference also indicated superiority of other experimental conditions.

In order to clarify the true significant mean difference, a Scheffe's Multiple Range Test was used for the a posteriori multiple comparisons, with an Alpha set at the .05 level. The results showed that there is a significant difference in posttest scores between the NF group and KOR, NF and EF groups. However, a significant difference was not detected between the KOR and EF groups.

The results of this study are supportive of the positive value of higher level feedback to enhance the performance of the student on verbal information. These results are consistent with the findings from previous investigations on the provision of varying levels of feedback when compared to a no feedback situation. Several studies can be cited, whose conclusion on the value of feedback for enhancing the performance are similar to the results of this study (e.g. Kulhavy and Wager, 1993, Dempsey, Driscoll and Swindell, 1993 and Ross and Morrison, 1993).

It is important to note that most of the studies cited before used mainly text-based or computer assisted instruction modes. The subjects engaged in those studies used no more than two sensory channels. This study extended to multimedia instruction which incorporated sound, animation and video clips in the presentation.

TABLE 1
Means and Standard Deviations of Treatment Groups

Treatment Group	Mean	S.D.	Cases
No Feedback	9.85	3.1	35
Knowledge of Results	13.50	2.85	34
Elaborative Feedback	14.22	2.37	36

TABLE 2
Analysis of Variance of Feedback Efficiency for Three Treatment Groups

Source of variation	DF	SS	MS	F	Sig of F
Between Groups	2	385.1254	192.5627	24.7059*	.0000
Within Groups	102	795.0078	7.7942		
Total	104	1180.1333			

* Significant at the .05 level

Educational implications

It would be possible to include other dimensions in feedback apart from audio and visual responses. Visual dimensions include those that can be observed by the learner such as written text, pictures and icons as visual stimuli. Using slightly more sophisticated technology, a recorded or synthesized human voice might be used in the feedback. In fact, the range of emerging technology feedback applications that can be supported is potentially overwhelming. Designers must consider how, when, and why such technologies can be used to promote meaningful learning in a given task.

Wager and Mory (1993) pointed out that feedback served different purposes at different stages in learning. It was also concluded that it is unlikely to find any universal agreement on the "best" type of feedback. It will depend upon the type of question, the stage of information processing, and conditions within the learner to arrive at an answer.

It would also be useful if some qualitative data could be obtained during the experiment. Some information such as how students approach the learning task, whether they prefer to view the program in a group or individually, why and how they choose particular answers to the questions and whether they think the feedback in practice tests helps them to learn more about the content.

Other information which could be obtained by structured interviews might concern which particular aspect of the program content was difficult to understand. This would also provide some detail information into the process of student learning using a multimedia lesson.

Some tentative recommendations for instructional designers and classroom teachers concerning the use of varying levels of feedback as a source of motivator can be derived from the results of this study. It is recommended that in multimedia instruction, knowledge of results and

elaborative feedback be provided to students after every testing situation. The students should not only be informed of the correct or incorrect answers to each item, but also to elaborate on the those answers.

Multimedia technologies have advanced a great deal in the past few years, and impressive range of multimedia programs are now within the reach of every educator. Multimedia involves students in active learning process through physical interaction. Such active learning can serve to maintain attention, create new knowledge, and improve achievement.

Since multimedia is an emerging educational technology, teachers should explore the use of such innovations in an effective manner. One of the possible ways is to add on a teacher-made feedback practice program based on the original information, as was done in this study. This study confirmed feedback can be effectively used as a motivator in multimedia program.

Conclusion

From an educational technology perspective, there are many possibilities for conducting research into feedback when using multimedia instruction. There is a range of presentation dimensions available for feedback. Feedback can be provided through visual, verbal, sensory, or multiple modalities.

In designing multimedia instruction motivational impact of feedback should not be underestimated. There is a need to include elements that can stimulate and sustain motivation beyond the novelty effects of new technology. This study demonstrated that provision of motivational feedback immediately following task performance can enhance the efficiency in learning in a multimedia instruction. It is hoped that teachers and instructional designers would probably benefit from similar application of this strategy.

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