The Effect of ARCS Motivational Model on Achievement Motivation and Academic Achievement of the Tenth Grade Students

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Abstract

The presented study aimed at examining the effect of ARCS model on the Achievement Motivation (AM) and Academic Achievement (AA) of the tenth grade students. One hundred and thirteen tenth grade students (28 male, 85 female), divided into two groups (experimental = 50, control = 63), studied a unit about magnetism with the use of two different methods, an ARCS model and a traditional model for 2 weeks. Two instruments were used, a Motivation Achievement Test (MAT) and an Achievement Test (AT). The results showed that there were significant differences on the MAT and AT due to the implemented ARCS motivational model.

Keywords: *achievement, ARCS model, motivation*

Introduction

Motivation is defined as a student's willingness, need, desire and compulsion to participate in learning and to be successful in the learning process (Fairbrother, 2000). Steward, Bachman, and Johnson (2010) referred to motivation as a driving force that encourages a person to engage in a task.

Covington (1996) declared that motivation interprets the reason for the human behavior, as motivation is considered as the main factor that directs behavior (Connie, 1997; Feldman, 1995; and Woolfolk, 1995). Because of the importance of motivation in the learning process, Keller, Deimann, and Liu (2005) stated

that motivational strategies help students develop their interest in the course and a positive expectation of success.

Also, evidence documents motivation as an important determinant predicting students' achievement (Beal & Stevens, 2007; Broussard & Garrsion, 2004; Johnson, 1996; Sandra, 2002; Skaalvik & Skaalvik, 2006; Zhu & Leung, 2011).

Sometimes schools face problems with students' motivation. Mart (2011) claims that motivation needs to be taken into account by every educator. He also sees that through positive reinforcement, teachers can sustain students' interest. If school leaders expect students to become motivated to learn, they must first sustain their own motivation to create schools where students discover that learning is an exciting and rewarding activity. Many teachers complain that their students lack motivation, so they look for different ways to motivate them to learn.

Consequently, teachers must take students' learning motivation into consideration when they design teaching instructions (Fairbrother, 2000). Teachers depend on the assumption that motivation is an important factor that can lead to an increase or decrease in the status of students' level of concepts (Barlia & Beeth, 1999; Keller, 2000; Pintrich, Marx & Boyle, 1993). Teachers must leave the traditional methods in teaching at schools. Yet, until the latter half of the 19th century, science, more specifically physics, was taught exclusively with the help of lecture, demonstration, and the textbook (Turner, 2012). Although laboratory science became more common in the 20th century, lecture demonstrations have continued to be a mainstay in science classrooms, and teacher demonstrations have a negative association with student achievement, and no significant association with attitudes toward science. Moreover, the demonstrations provide insufficient opportunity for students to develop an understanding of the processes of science. Furthermore, observing teacher demonstrations may be valuable, but they are not a substitute for students' laboratory investigations (Odom & Bell, 2015).

From that point, this study attempted to testify for a method which can drive students' motivation to learning and sustain it. It assumed that Keller's ARCS motivational model can play a significant role in the learning process.

Keller (2000) claimed that the ARCS model resulted from reviews and integration of research literature and successful practices, and it is being used in many different countries and cultures in the world, but it does not offer simple, prescriptive solutions to motivational problems.

The letters in the ARCS acronym stand for *Attention, Relevance, Confidence and Satisfaction*, which form the main elements of the model. The attention element means arousing and sustaining curiosity and interest. Relevance means linking learners' needs, interests, and motives. Confidence means helping students develop

a positive expectation of achievement. Finally, satisfaction means providing extrinsic and intrinsic reinforcement for effort (Keller, 1983).

To examine the effectiveness of the ARCS motivational model, a few studies (but insufficient) were conducted. For instance, Arnone and Small (1995), in their research into the relationship between curiosity and all of the ARCS components, found that the model provided educators with a heuristic approach to generally increase the motivational appeal of instruction, and encourage intrinsic motivation for learning. Song and Keller (1999) found that the motivationally-adaptive CAI (Computer Assisted Instruction), which was developed in accordance with the ARCS model, showed higher effectiveness and overall motivation, achievement, perceived motivation, efficiency, and continuing motivation. Moreover, ARCS-strategies led to positive effects on different motivational indicators of self-regulated learning compared with a text without any motivational features (Astleitner and Lintner, 2004). Feng and Tuan (2005) pointed out that both students' motivation and achievement in the acids and bases unit increased significantly thanks to the ARCS motivational model. The performance of undergraduate students in terms of learner confidence was improved by the ARCS motivational model (Huett, 2006). Finally, Malik (2014) found out that the ARCS model might help organizations to overcome the dropout, passing percentage and low motivational problem of distance learners. In distance education programs, the elements of both teaching and motivation used together can improve the success of distance education students.

Previous researchers found that the ARCS motivational model plays effective roles in different educational situations, such as CAI, distance educational or online courses. The presented study attempted to explore the effectiveness of the ARCS motivational model in achievement motivation and academic achievement compared with the traditional method (lectures).

Purpose of the study

The presented study aimed at detecting the influence of the ARCS motivational model on achievement motivation and academic achievement. It tried to answer the following question:

Can we use the ARCS model to increase achievement motivation and academic achievement of tenth grade students?

Research Methodology

Participants

One hundred and thirteen 10th grade students participated in the study (*male* = 28, *female* = 85, *age*, *M* = 15 years). The participants were recruited with the use of a random stratified sample method. All the participants were randomly assigned into two study groups (experimental = 50, control = 63).

Instruments

Achievement Motivation Test AMT: An Achievement Motivation Test (36 items) was prepared with three dimensions (persistence, goals and time). All test items can be corrected by using a 5-point-Likert-type scale. The highest score was 180, and the lowest was 36. The highest scores refer to a high level of achievement motivation. Cronbach's Alfa values were calculated for the 3 dimensions and the total score 0.855, 0.847, 0.715 and 0.797, respectively.

Achievement test AT: A true- false test was used to examine the students' Academic Achievement (AA) before and after the experiment. It contained 15 items about a unit of magnetism in the student science textbook, the discrimination coefficients values ranged from 0.262 to 0.713, and their difficulty coefficients ranged from 0.53 to 0.80. Cronbach's Alfa of the total test was 0.858.

ARCS Lesson Plan: The first unit of magnetism in the physics course of the tenth grade was prepared based on the ARCS motivational model and implemented in the experimental group. The plan consisted of the four ARCS elements and contained eight modules of 45 minutes each, lasting two weeks. For the control group, the same lessons were taught with the use of the traditional method based on teacher demonstrations in the laboratory.

Procedures and Data Analysis

The subjects were chosen and randomly divided into two groups, the experimental group, instructed with the use of the ARCS model, and the control group, instructed with the use of the traditional method. Both groups were given the AMT and AT before the experiment. A trained physics teacher was recruited to teach all the lessons on magnetism unit according to the ARCS model. Another teacher taught the same unit using the traditional method (he used the ordinary

classroom and the laboratory). The experimental group studied eight 45- minute lessons about magnetism. All the lessons were conducted in the laboratory of the school. The session lasted two weeks. After ten days of the experiment, the students were given the AMT and AT again. Finally, means, standard deviations, and MANCOVA were used to analyze the data.

Results

To answer the study question of this study “*Can we use the ARCS model to increase the achievement motivation and academic achievement of tenth grade students?*,” means and standard deviations of the students’ scores on the posttest, and MANCOVA were calculated. Table 1 presents the values.

Table 1. Means and standard deviations of the students’ scores on the posttest of AMT

variable	group	N	M	SD
Persistence	control	63	31.38	2.574
	experimental	50	50.78	3.604
Goals	control	63	33.27	1.860
	experimental	50	46.54	3.085
Time	control	63	30.95	2.113
	experimental	50	43.60	3.642

Table 1 shows that there are differences between the control group and the experimental one in the three domains of the achievement motivation scale. To determine the significance of the difference, MANCOVA was conducted. The MANCOVA results show that there are significant differences in achievement motivation between the two study groups in favor of the experimental one (*Wilks’ Lambda* = .061, *f* (3,106)= 539.866, *p* <.000, *eta squared* = 0.939). To further examine the differences between the groups of the study, univariate follow-up procedures were conducted to determine differences in the dependent variables as shown in Table 2.

Table 2. MANCOVA analysis results to determine the significance of the difference between the experimental group and the control group in the AMT

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Method	persistence	9944.628	1	9944.628	1058.236	.000
	goal	4588.738	1	4588.738	749.839	.000
	time	4325.933	1	4325.933	547.298	.000
Pretest of persistence	persistence	27.828	1	27.828	2.961	.088
	goal	5.238	1	5.238	.856	.357
	time	33.710	1	33.710	4.265	.041
Pretest of goal	persistence	1.157	1	1.157	.123	.726
	goal	.353	1	.353	.058	.811
	time	16.346	1	16.346	2.068	.153
Pretest of time	persistence	.192	1	.192	.020	.887
	goal	9.018	1	9.018	1.474	.227
	time	20.250	1	20.250	2.562	.112
Error	persistence	1014.916	108	9.397		
	goal	660.920	108	6.120		
	time	853.649	108	7.904		
Corrected Total	persistence	11537.858	112			
	goal	5589.735	112			
	time	5385.982	112			

The results indicate that there were statistically significant differences in the three domains of the AMT (persistence, goals, time) due to the method.

To identify the differences between the experimental group and the control group in the AT due to the ARCS motivational model, the means and standard deviations of the scores of the two groups were calculated. Table 3 shows the results.

Table 3. Means and standard deviations of the scores of the two groups in the AT

method	N	M	SD
Control group	63	5.89	2.496
Experimental group	50	8.36	2.117
Total	113	6.98	2.632

The above table shows that there are differences between the two groups of the study in the *AT* scores. To determine the significance of these differences, ANCOVA analysis was used, whose results are presented in Table 4.

Table 4. ANCOVA for determining the significance of the differences between the experimental group and the control group in the achievement test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
achiev1	472.437	1	472.437	389.843	.000	.780
method	309.882	1	309.882	255.706	.000	.699
Error	133.305	110	1.212			
Corrected Total	775.965	112				

The above table shows that there are statistically significant differences in the achievement posttest between the two groups of the study due to the method in favor of the ARCS group.

Discussion

The purpose of the study was to detect the effect of the ARCS motivational model on AM and AA. The results indicate the influence of the ARCS model on AM (on the three domains of the AMT; persistence, goals, time), and AA. This result can be discussed in light of the ARCS model components. The ARCS model provides a new approach to solving academic problems for both teachers and students. According to Keller (2000), people like a certain amount of variety and they will lose interest if the teaching strategies, even the good ones, never change. Moreover, attracting a learner's attention by incorporating strategies that maintain curiosity and interest is essential to the effective learning process (Kupritz & Laszlo, 2003), and the ARCS model used in the presented study did so; the model drew the students' attention to lessons and sustained it; this could happen by the first ARCS model components (persistence). The students found that the ARCS strategy is related to their interest and cognitive style. Keller (2000) proposed that connecting the content of instruction to important goals of the learners, their past interests, and their learning styles could arouse curiosity. The model in this study provided a chance and expectation of success, which serves the students'

personal learning goals. The students were excited when they did the exercises of the lessons, they felt that the activities related directly to their daily life, and that confirmed the assumption of Keller (2000), who stated that the positive feelings about one's accomplishments and learning experiences led them to receive recognition and evidence of success that support their intrinsic sense of satisfaction, and they believe they have been treated fairly.

This result was similar to those of some previous studies (Arnone and Small,1995; Astleitner and Lintner,2004; Song and Keller,1999; Malik. 2014), which found that the ARCS model motivates students for advanced steps to learning.

The results also show that using the ARCS motivational model will help to increase AA. Different factors might help to achieve this result. For instance, it is considered as a novel method for students, and it drew their attention to the subject, the exercises were relevant to the students' environment (i.e., most of the participants said that they had played with magnets when they were children), and this might help them to interact with each other effectively, solve the problems easily, and enhance their self-confidence. These results can be supported by other results (Suzuki and Keller,1996), which revealed the efficacy of the ARCS model to help teachers to produce a more effective motivational design through their daily work. Keller (2000) claims that a sense of equity, or fairness, is important, students must feel that the amount of work required by the course was appropriate, that there was internal consistency between objectives, content, and tests, and that there was no favoritism in grading, and that will help in improving students' achievement.

It also seems reasonable to confirm that ARCS instruction increased student motivation more than a traditional lecture instruction type. In addition, student time engagement in learning under ARCS instruction was greater than that in the traditional model. This also confirms and supports our finding that ARCS instruction can promote student motivation (Johnson, 1996; Sandra, 2002; Brousard and Garrsion, 2004, Skaalvik and Skaalvik , 2006; Beal and Stevens, 2007; Zhu and Leung, 2011).

Implications, limitations and recommendations

The generalization of the results is restricted by some factors. One unit was taught with the use of the ARCS model because of the limited time, which was about two weeks, the period of the manipulation was restricted by the school administration.

In spite of the above limitations, there were some benefits. Teachers may use the model to improve their methods of teaching science. Also, instruction designers may design curricula depending on this model.

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