



EFFECTIVENESS OF KELLER ARCS MODEL ON VIII STUDENTS' ACHIEVEMENT IN SCIENCE

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Abstract

Today, no child is entitled to lose the privilege of studying in a school. If such a weightage is given to students, how much more weightage should be given to the learning process and the academic achievement. Thus the learning plays a vital role in the life of a child. Motivation is one of the core factors in the process of learning. The present study was a new motivational design developed by Keller in 1983 which contributes both the teacher and the student to promote learning themselves. This study was planned to measure the academic achievement of the students through ARCS model and involved twenty-five students' – 12 as control group and 13 as experimental group studying Standard VIII. Tests were administered among the respondents selected with regard to the learning objectives – Knowledge, Understanding and Application. It is found that the experimental group scored higher gain and retention scores in Knowledge and Application than the control group.

Key words: ARCS model, academic achievement, motivation, science, learning objectives.

INTRODUCTION

Motivation is one of the most important factors in learning process. A high degree of motivation helps in rousing students into action and ensures active participation in learning activities. Motivational design refers to the process of arranging resources and procedures to bring about changes in motivation.

Motivational design is systematic and aims for applicable principles and processes (<http://www.arcsmodel>). One such model is the Attention-Relevance-Confidence-Satisfaction (ARCS) Model of Motivational Design developed by John M. Keller of Florida University (Pandey, 2005).

ARCS Model

ARCS is a systematic model for designing motivating instruction and a problem solving approach to design the motivational aspects of learning environments to stimulate and sustain students' motivation to learn (Keller, 1983). There are two major parts to the model. The first is a set of categories representing the components of motivation. The second part of the model is a systematic design process that assists in creating motivational enhancements that are appropriate for a given set of learners.

Components of ARCS Model

Keller (1987) breaks each of the four ARCS components down into three strategy sub-components. The strategy sub-components are shown below.

Attention: The sub-components of attention are: perceptual arousal, inquiry arousal and variability. *Perceptual Arousal* provides novelty, surprise, incongruity or uncertainty; *Inquiry Arousal* stimulates curiosity by posing questions or problems to solve and *Variability* incorporates a range of methods and media to meet students' varying needs.

Relevance: The relevance includes: goal orientation, motive matching and familiarity. *Goal Orientation* presents the objectives and useful purpose of the instruction and specific methods for successful achievement; *Motive Matching* matches the objectives to student needs and motives and *Familiarity* presents content in ways that are understandable and that are related to the learners' experience and values.

Confidence: The components of confidence are learning requirement, success opportunity and personal responsibility. *Learning Requirement* informs students about learning and performance requirements and assessment criteria; *Success Opportunity* provides challenging and meaningful opportunities for successful learning and *Personal Responsibility* links learning success to students' personal effort and ability.

Satisfaction: It covers intrinsic reinforcement, extrinsic reward and equity. *Intrinsic Reinforcement* encourages and supports intrinsic enjoyment of the learning experience; *Extrinsic Reward* provides positive reinforcement and motivational feedback and *Equity* maintains consistent standards and consequences for success.

ARCS Design Process

The motivational design includes a systematic process that contains in knowing and identifying the elements of human motivation, analyzing audience characteristics to determine motivational requirements, identifying characteristics of instructional materials and processes that stimulate motivation, selecting appropriate motivational tactics, and applying and evaluating appropriate tactics and results in the preparation of learning environments that contain tactics, or activities, that have a predictable influence on the amount and direction of a person's behaviour.

Objectives of the study

To make the study a systematic and a fruitful one, the following objectives were framed.

- i) To find out the significant difference, if any, between the gain scores of the control and experimental groups; and
- ii) To find out the significant difference, if any, between the retention scores of the control and experimental groups.

Hypotheses

- i. There is significant difference between the gain scores of the control and experimental groups with regard to the learning objectives.
- ii. There is significant difference between the retention scores of the control and experimental groups with regard to the learning objectives.

Variables

The *independent variable* and the *dependent variable* involved in this study were Effectiveness of Keller ARCS model and Achievement in Science, respectively.

Design of the study

In this study, the Pre-test Post-test Equivalent Group Design (Best & Kahn, 1993) was followed.

Sample

The present study had a sample of 25 students of Standard VIII from Niveditha Matriculation School, Tirunelveli, Tamilnadu.

Tools used

i) Group Intelligence Test

The test is meant for assessing the general mental ability of pupils of age group 13 – 17 years developed by Pramila Ahuja. The factorial validity of the test was studied by Thurstone's Centroid Method and verified by Spearman's formula. The reliability coefficient of the test was calculated by test-retest method and split-half method and was found to be 0.84 and 0.974 respectively.

ii) Achievement Test in Science (ATS)

ATS consisted 24 multiple-choice questions from the selected topics "Measurement" and "Force and Pressure" in Standard VIII Science and were coined on the basis of the learning objectives namely knowledge, understanding and application. The reliability coefficient of ATS was established by split-half method and found to be 0.88.

Procedure of Conducting the Experiment

The sample was divided into two groups namely, control group and experimental group. Both the groups were given 45 minutes to respond to the pre-test. After conducting the pre-test, the control group was taught through traditional lecture method and the experimental group was taught through ARCS instructional method. The treatment for both the groups was given for 6 hours 45 minutes in nine days. After the treatment, both the control and experimental groups were given the post test. The achievement level of the students was computed through the gain scores (Post-test scores – Pre-test scores).

Finally, a delayed post-test was administered to the same sample with an interval of 14 days.

Data Analysis

The statistical techniques used were arithmetic mean, standard deviation and t-tests for dependent and independent means. The results were tabulated below:

Table 1

**Difference between Post-test scores of Control and Experimental groups
with regard to learning objectives**

<i>Learning objective</i>	<i>Group</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>t-value</i>	<i>P Value</i>
Knowledge	Control	12	43.75	32.20	0.398	0.044*
	Experimental	13	48.08	21.55		
Understanding	Control	12	62.42	21.47	0.586	0.435 ^{NS}
	Experimental	13	57.69	18.85		
Application	Control	12	44.08	31.72	0.358	0.045*
	Experimental	13	47.92	21.35		
Total	Control	12	43.08	25.67	0.867	0.049*
	Experimental	13	50.23	14.42		

*NS - Not Significant, *Significant at 5% level*

Table 2

**Difference between Gain scores of Control and Experimental groups
with regard to learning objectives**

<i>Learning Objective</i>	<i>Group</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>t -value</i>	<i>P value</i>
Knowledge	Control	12	22.15	7.96	2.41	0.034*
	Experimental	13	27.61	10.67		
Understanding	Control	12	23.23	14.30	3.89	0.002**
	Experimental	13	17.69	12.27		
Application	Control	12	17.30	8.04	2.25	0.045*
	Experimental	13	29.30	16.44		
Total	Control	12	25.53	9.18	2.32	0.040*
	Experimental	13	26.00	5.52		

***Significant 1% level, *Significant 5% level*

Table 3

**Difference between Retention scores of Control and Experimental groups
with regard to learning objectives**

<i>Learning objective</i>	<i>Group</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>t- value</i>	<i>P value</i>
Knowledge	Control	12	44.83	30.01	0.017	0.017*
	Experimental	13	45.00	18.93		

Understanding	Control	12	45.67	15.18	0.435	0.031*
	Experimental	13	42.00	25.28		
Application	Control	12	49.58	22.07	0.107	0.604
	Experimental	13	50.62	25.90		
Total	Control	12	45.00	25.59	0.636	0.008*
	Experimental	13	50.23	14.42		

*NS - Not Significant, * Significant at 5% level*

Findings

1. The post-test scores of the experimental group were higher than that of a control group with regard to Knowledge and Application and not to Understanding.
2. The gain scores of the experimental group were higher than that of the control group with regard to learning objectives – Knowledge, Understanding and Application.
3. The retention scores of the experimental group were higher than that of a control group with regard to Knowledge and Understanding and not to Application.

Interpretation and Discussion

Through the ARCS model of teaching, the achievement among the students was attained through motivation. In this study, the experimental group scored higher than the control group in the post-test. This may be due to the fact the learning through ARCS model is more effective than the traditional method of teaching science. The effectiveness was measured with regard to Knowledge, Understanding and Application. The finding is in harmony with the reviewed studies (Visser & Keller, 1990; Suzuki & Keller, 2004; Feng & Tuan, 2005; Cheng & Su, 2011). The gain scores of experimental group were higher than that of the control group with regard to the learning objectives- Knowledge, Understanding and Application. From the above facts, it was clear that the students were motivated effectively through the ARCS model of instruction that makes them to learn more efficiently than the lecture method.

The retention scores of the experimental group was higher than that of the control group with regard to Knowledge and Understanding. This reveals that the treatment helps for knowledge oriented learning and then the students understand the lesson to answer the questions.

Recommendations

The present study implies that the students of upper primary level may be oriented in Science knowledge so as to meet the need of equipping themselves in the present competitive world where Science plays a prominent role in earning one's livelihood. The students were attentive when they were motivated in the classroom. Hence it is the important role of the teacher to catch the attention of the students during teaching. Teachers have to be always ready to "learn to teach" and "teach to learn". Efforts may be taken to strengthen cordial relationship between teachers and students. This makes the students to reveal their own ideas in their learning process.

The intended outcome of this study was to evaluate motivation to learn Science and the effectiveness of the strategies employed in the process of acquiring knowledge and skills acquired by the students. Based on the results, teachers can provide learning environments that promote motivation towards learning and encourage students to select and use more advanced and effective learning strategies.

The ARCS model helped the teachers clarify motivational characteristics of the unit being designed from the viewpoints of the learning task, the learner, and the media. However, motivation was likely to receive more research and development in the future. The model has been used by teachers and trainers in elementary and secondary schools, colleges, and universities, and in adult learning settings in corporations, government agencies, nonprofit organizations, and military organization.

REFERENCES

- Bhatia, H.R. (1977). *A textbook of educational psychology*. New Delhi: Mcmillan Publishers.
- Clifford, M.T. (2006). *A brief introduction to psychology* (2nd ed.). New Delhi: Tata McGraw Hill Publishing Company.
- Keller, J. M. (1983). Motivational design of instruction. In C. M. Reigeluth (Ed.), *Instructional-design theories and models: An overview of their current status*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Keller, J. M. (1987a). The systematic process of motivational design. *Performance & Instruction*, 26 (9): 1-8.
- Keller, J. M. (1987b). Strategies for stimulating the motivation to learn. *Performance & Instruction*, 26 (8): 1-7.

Pandey, V.C. (2005). *Intelligence and motivation*. New Delhi: Isha Books.

Yadav, N. (2003). *A handbook of educational psychology*. New Delhi: Anmol Publications.

