International J. Soc. Sci. & Education
2013 Vol.3 Issue 4, ISSN: 2223-4934 E and 2227-393X Print

Do motivation tactics work in blended learning environments?: The ARCS model approach

By

[1]Mehmet Akif Ocak and [2]Murat Akçayır
[1]Gazi University, Gazi Faculty of Education, Department of Computer and Instructional Technologies Teaching, Ankara, Turkey, maocak@gazi.edu.tr
[2]Kırıkkale University, Faculty of Education, Department of Computer and Instructional Technologies Teaching, Kırıkkale, Turkey, muratakcayir@kku.edu.tr

Abstract

The purpose of this research was to determine whether the use of systematically designed motivation tactics based on Keller's ARCS model (attention, relevance, confidence, satisfaction) produced statistically significant increases in the motivation levels of treatment groups and to determine whether these tactics produced a statistically significant improvement in academic performance. The participants were 90 first-year college students who were trained to use the Microsoft Access database program for 3 weeks. The data analysis was conducted using a quantitative study approach and involved a motivational survey and an academic achievement test. The findings suggest the feasibility of improving overall learner motivation and academic achievement through external conditions such as motivational tactics. This study demonstrates the effectiveness of the ARCS model for enhancing learner motivation and academic achievement in a blended learning environment.

Keywords: *distributed learning environments, post-secondary education, pedagogical issues, classroom teaching, applications in subject areas*

1. Introduction

Motivation is a necessary element for learning (Dweck, 1986; Rodgers & Withrow-Thorton, 2005), accounting for between 16% and 38% of learning (Means, Jonassen, & Dwyer, 1997). Motivation is still an important factor in learning despite the developing educational technology and new instruction methods (Clayton, Blumberg, & Auld, 2010; Lim & Morris, 2009; López-Pérez, Pérez- López, & Rodríguez-Ariza, 2011; Méndez & González, 2011). Hence, understanding the principles of motivation and their application to instruction is an important consideration in teaching and learning. Deci and Ryan (2000) indicated that a central question concerns how to motivate students to value and self-regulate without external pressure and to perform educational activities independently, given that many of the educational activities prescribed in schools are not designed to be intrinsically interesting.

The literature contains many studies focused on students' motivation to improve learning (Kebritchi, Hirumi, & Bai, 2010; Overbaugh, & Nickel, 2011). ARCS research can be found concerning the traditional classroom (Means, Jonassen, & Dwyer, 1997; Visser & Keller, 1990) and computer assisted instruction (Lee & Boling, 1996; Song & Keller, 1999). However, although there is considerable literature supporting the need to enhance learner motivation, the study of motivation in distance education, web-based environments and other forms of distant computer-assisted learning (CAI) is sorely lacking (Gabrielle, 2003). In blended learning environment which becomes increasingly common and is preferred by distance educators and is accepted as a combination of the power of web technologies and face to face education, motivation is essential for both educators (Donnelly, 2010; Greener, 2008; Méndez & González, 2011; Shivetts, 2011; Stacey & Gerbic, 2008) and students and it is necessary to investigate how to motivate students in this learning environment (Greener, 2008). Therefore, the purpose of this study was to investigate the application of the ARCS model in a blended learning environment. To

this end, ARCS model and motivation tactics developed by Keller were used. ARCS model was preferred since it is recommended by researchers and has a potential to be a solution to the motivation problem of students (Keller, 1997). Means, Jonassen and Dwyer (1997) called Keller's ARCS model the "only coherent and comprehensive instructional design model accommodating motivation" (p. 5). Moreover, motivation tactics have positive effects on the attention, relevance, confidence and satisfaction of the students (Keller, 1999b). The lack of clarity about students' motivation in blended learning environments makes it necessary for teachers of blended college courses to understand how the use of the ARCS model affects college students' motivation and achievement. In this regard, the purpose of this research is to investigate the effects of the ARCS model in a blended learning environment in terms of motivation and academic success.

Purpose

The literature lacks studies on the use of the ARCS model in blended learning environments (So & Brush, 2008; Bliuc, Goodyear, & Ellis, 2007; López-Pérez, Pérez- López & Rodríguez-Ariza, 2011; Yen & Lee, 2011; Wu, Tennyson, & Hsia, 2010). There is a need for further investigation on the use of the principles of the ARCS model in blended learning environments. In blended learning environment, motivation is important as in distance education and face to face education (Donnelly, 2010; Greener, 2008). It is accepted that motivation affects academic achievement and attendance rate of the students in blended learning environment (López-Pérez, Pérez-López, & Rodríguez-Ariza, 2011; Méndez & González, 2011). Thus, in this study, we investigated the effects of the ARCS model in a blended learning environment in terms of motivation and academic success. For this purpose, we constructed two blended learning environments. The first included a mixture of traditional teaching methods, such as face-to-face teaching and on-line teaching. The second environment was based on the ARSC model.

2. Literature Review

ARCS model

To stimulate and manage students' motivation to learn, Keller (1987a, 1987b) created the ARCS (attention, relevance, confidence and satisfaction) model of motivation. The purpose of the ARCS model is to employ strategies to improve the motivational appeal of instruction. The ARCS model is an attempt to synthesize behavioral, cognitive and affective learning theories. It serves as a framework for the study of motivation and academic success in this study. Although the model was developed in 1987 when virtual learning environments did not exist, it is seen that it is quite effective in face to face education and CAI environment (Means, Jonassen, & Dwyer, 1997; Song & Keller, 1999). The ARCS model demonstrates that learner motivation can be influenced through external conditions (Huett, Kalinowski, Moller, & Huett, 2008a).

The ARCS model includes four categories and twelve subcategories (Table 1). According to Keller (1987a), each of the categories can be applied to a variety of instructional contexts, and "motivational interventions can be focused within a general category or specific subcategory of model" (p.6).

Table 1: Keller's ARCS Model Summary

Attention	Relevance	Confidence	Satisfaction
A1 Perceptual Arousal	R1 Goal Orientation	C1 Learning Requirements	S1 Natural Consequences
A2 Inquiry Arousal	R2 Motive Matching	C2 Success Opportunities	S2 Positive Consequences
A3 Variability	R3 Familiarity	C3 Personal Control	S3 Equity

Research on the ARCS model

A review of the literature indicates that the ARCS model has positive effects on learners' motivation. For instance, Bakar, Ayub, Luan, and Tarmizi (2010) investigated students' motivation using two types of mathematical software for learning transformation. These authors adopted the ARCS model due to its applicability and practicability for designing, developing, and evaluating instructional materials. Their findings indicated a significant difference in the students' attention, relevance and overall motivation.

Huett et al. (2008a) examined the use of ARCS-based, motivational mass e-mail messages designed to improve the motivation and retention of students enrolled in an online, entry-level, undergraduate computer applications course. Their results showed that cost-effective and easy-to-design mass e-mail messages show potential for addressing some of the motivational needs and retention concerns of online students. In another study, Song and Keller (2001) examined the effects of a prototype of motivationally adaptive CAI. The motivation strategies used in the CAI were based on the ARCS model. The results suggested that the CAI treatments had an effect on motivational factors, specifically attention and relevance. Pairwise comparison revealed that students in the motivationally adaptive CAI showed higher scores in both attention and relevance.

Researchers have applied ARCS guidelines to different learning and design environments. For example, motivation research can be found in distance education environments (Huett et al., 2008a; Huett, Young, Huett, Moller, & Bray, 2008b), CAI (Astleitner & Keller, 1995) and traditional classrooms (Bakar et al., 2010; Kebritchi, Hirumi, & Bai, 2010). Gabrielle (2003) used Keller's ARCS model as the basis for interventions and mass messages designed to improve learner motivation and performance in a study of undergraduate students in a public military school. That study found statistically significant differences between the groups regarding motivation, academic performance and self-directed learning and suggested that strategies based on Keller's ARCS model were worthy of consideration for instructional design.

Definition of blended learning

There is no consensus on the definition of blended learning. Blended learning is any combination of learning delivery methods, most often face-to-face instruction combined with asynchronous and/or synchronous computer technologies (So & Brush, 2008). Another definition of blended learning is a mix of traditional methods of teaching, such as face-to-face teaching and on-line teaching (Bliuc, Goodyear, & Ellis, 2007). Yen and Lee (2011) indicated that blended learning should be approached as a fundamental redesign of the instructional model with the following characteristics: "(1) A shift from lecture-centered to student-centered instruction in which students become active and interactive learners; (2) Increase in interaction between student–instructor, student–student, student–content, and student–outside resources; (3) Integrated formative and summative assessment mechanisms for students and instructors" (p. 139). In this study, blended learning is defined as a method that provides realistic, practical opportunities for learners and teachers to solve problems with the assistance of technology, classroom discussion and a web-based environment.

Motivation and blended learning

Independent learning approach

Blended learning, which includes student-centered and independent learning approaches, requires a strong sense of motivation. A review of the literature shows that there is a lack of clarity about the application of the ARCS model in blended learning environments. Rovai and Downey (2010) noted that motivation is an important factor in blended learning systems. The literature has not adequately explored how students can be motivated in blended learning.

Teaching in blended learning

The literature suggests that blended learning improves students' learning experience by developing their capacity for reflection (Cooner, 2010). The use of different teaching methods provides students with a higher level of independence in the learning process (Ginns, Prosser, & Barrie, 2007). Additional learning

materials reinforce the understanding acquired in class and motivate students, thereby improving and supporting their learning process (Lei, 2010). According to Wang, Shen, Novak, and Pan (2009), blended learning enables students to become more involved in the learning process. Some authors have reported that student satisfaction increases with the adoption of blended learning (Lim & Morris, 2009).

Faculty role in blended learning

Distance education environments provide unique challenges for instructors who wish to motivate their students. Howell, Saba, Lindsayc, and Williams (2004) found that motivation was one of the main factors in distance education. Keller (1999a) noted that self-directed learning environments, such as distance education classes, posed greater challenges to learner motivation than face-to-face environments. Similarly, in blended learning environments, the importance of students' self-motivation increases because there is less in-class time and more emphasis on self-regulated learning (Ley, 2006; Stacey & Gerbic, 2008; So & Brush, 2008; Gabrielle, 2003; Wang, Shen, Novak, & Pan, 2009). This means that students must overcome some challenges. Moreover, there is significant relationship between student motivation and achievement in blended learning environment (López-Pérez, Pérez-López, & Rodríguez-Ariza, 2011; Méndez & González, 2011).

Blended learning also requires students to change learning environments frequently, which may cause confusion regarding learning outcomes and make students unable to select and use appropriate cognitive activities. From a pedagogical perspective, it is important to be aware that teaching and learning in blended learning environments can be highly unstable, and consideration of the relevance of continuity between the face-to-face and online environments is crucial. Many students need external motivation to take and complete a course of study (Nel & Wilkinson, 2006; Chen & Jang, 2010). Moreover, students need to connect with the teacher and other students. Learner motivation and the need for social connection also affect the success of an online learning experience (Song, Singleton, Hill, & Koh, 2004).

3. Method

The study used an experimental design described by Campbell and Stanley (1963). Students were randomly assigned to treatment and control groups, and each group participated in lessons in a blended learning environment for three weeks. This study used quantitative instruments to collect data, which allowed the researchers to examine the effect of the ARCS motivation model on students. This study aimed to understand whether there are statistically significant increases in the motivation levels of treatment groups using systematically designed motivation tactics based on Keller's ARCS model. Furthermore, this study examined whether the tactics produce a statistically significant increase or change in academic performance.

Participants

A total of 90 first-year primary education students from a university in Turkey participated in the study. Two classes in the department of primary education, containing 45 students between the ages of 19 and 22 years, participated in the study. The classes were randomly assigned to treatment and control groups: the treatment group (45 students) was the 1B class, and the control group (45 students) was the 1A class. The gender composition of the 90 research participants, obtained from the pretests, is provided in Table 2.

Table 2: Demographic information on the students

Groups	Gender
Treatment	41 female
	4 male
Control	40 female
	5 male

To investigate the comparability of the two groups, an independent *t*-test was performed on the pretest scores. According to the *t*-test statistical analysis, there was no statistical difference between groups (t = 0.15; p = .496). The two groups had similar computer knowledge before the implementation.

Instruments

Data were collected through the quantitative instruments of the motivation survey and the academic achievement test. The instruments are described below.

Motivation survey

Pre- and post-tests were used to examine students' motivation. The survey was developed based on Keller's ARCS model (1987a) and was designed to assess how instructional material affects learner motivation (Rodgers & Withrow-Thorton, 2005) and how motivated learners engage in a particular type of lesson (Bolliger, Supanakorn, & Boggs, 2010). The survey contained 36 questions (see Appendix A) on a 5-point Likert scale that measured learners' motivational reactions to self-directed instructional material. Twelve items measured attention, 9 items measured relevance, 9 items measured confidence and 6 items measured satisfaction. The IMMS (The Instructional Material Motivational Survey) is considered a valid instrument and has a documented reliability coefficient of .96 (Keller, 2006).

Academic achievement test

An academic achievement test developed by the researchers was used to assess students' computer achievement. This test included Basic Computer II topics. The pilot test was performed on second-year students to determine the reliability of the achievement test. In this study, 2nd grade students were chosen as a pilot group since they previously took Basic Computer II lecture. The benchmark test reliabilities were moderate to good and were .81 for the pilot test (N=37).

Procedure

The students were trained to use the Microsoft Access database program for 3 weeks. One class was randomly assigned to the treatment group, and one class was assigned to the control group. Both the treatment and control groups attended Basic Computer II lessons twice a week.

At the beginning of the study, two sets of instruments were used for the groups: (a) the motivation survey, to identify participants' motivation toward the lesson, and (b) the academic achievement test, to identify the participants' Microsoft Access proficiency level. The lesson was taught to both groups by the same teacher in the 1st and 3rd week. All students attended the online training in the 2nd week. For the treatment group, we used motivational tactics (Table 3) recommended by Keller (2000) in all weeks. Keller (1999a) noted that an excessive number of motivational tactics might prove distracting to already motivated students.

Table 3: Motivational tactics suggested by Keller (2000; 2010) and their applications in the study.

Subscale	Recommended motivational tactics	1st week (face-to-face learning)	2nd week (online learning)	3rd week (online learning & face-to-face learning)
Attention	According to Keller, a lesson must gain the learner's attention. Tactics can range from simple unexpected events (e.g., a loud whistle, an upside-down word in a visual) to mentally stimulating problems that engage a deeper level of curiosity when presented at the beginning of a lesson.	The first part of the lesson was taught in the drama room, which was unfamiliar to the students. They learned the subject with small cubes (Fig. 1) on A4 paper. This helped them to visualize the subject and captured their interest. The second part of the lesson took place in the computer laboratory, where students applied what they had learned.	To motivate the students, they watched an interesting video about MS Access on the internet. The video helped the students to learn the subject in an enjoyable way. Students also used a wiki as their discussion platform.	Stories were told by the teacher. Questions were presented that motivated the students to learn more about the subject during the lessons.

Relevance	A traditional way to create relevance is to relate instructional content to learners' future jobs or academic requirements. Another, often more effective, approach is to use simulation and analogies.	The analogy method was used to provide relevance. Students used the cube as data and A4 paper as a table in MS Access.	The MS Access subjects were related to MS Excel because participants knew MS Excel very well. Many things in MS Access are similar to Excel. This helped the students connect the instruction to their experiences. Students were offered an opportunity to use prior knowledge to comprehend the new skill.	The teacher explained the importance of subject. Instructional goals were connected to the learner's future activities.
Confidence	By making the objectives clear and providing examples of acceptable achievements, it is easier to build confidence. Being successful in one situation can improve one's overall confidence.	All exercises were presented at once, and learners were able to approach the lessons in any order they chose.	Worksheet papers were distributed to all students. The teacher listed questions and tasks for students. Students recorded their work on the paper. Students who completed the paper knew they were successful.	Opportunities were provided for learners to practice the application of new knowledge and skills in a controlled environment. It was important that students experience success at each level of difficulty to build self-confidence.
Satisfaction	Tangible extrinsic rewards can produce satisfaction, and they can be either substantive or symbolic.	Feedback was provided that reinforced positive feelings.	Students who completed the worksheet correctly were rewarded.	Verbal and actual rewards were used.

Data analysis

The reliability of the motivation survey was estimated based on the Cronbach's alpha measure for the total scale. For the 36 items for pretest, $\alpha = .91$ ($N = 90$), and for the posttest, $\alpha = .87$ ($N = 90$). The survey reliability met the requirement of a cut-off point higher than .7, as suggested by Nunnaly (1978). To test the ARCS model's effects on motivation, descriptive statistics and an independent *t*-test were used. An independent *t*-test was conducted to measure differences in the mean scores between the treatment and control groups for all four factors.

To examine the effects of the ARCS model on learners' achievement, an analysis of covariance (ANCOVA) was used. Academic achievement and motivation were used as dependent variables, and the teaching environment (ARCS-based and normal blended learning environments) was used as an independent variable. The significance level for all tests was set at the $p < .05$ level.

To examine and compare the effects of these two groups, an ANCOVA was conducted on the post-test scores with the pretest scores as the covariate. Thus, the independent variable of the analysis was the groups, the dependent variable was the posttest scores and the covariate was the pretest scores.

Before performing the analysis, several underlying assumptions of the ANCOVA were examined. These assumptions included normality, homogeneity of variance, and homogeneity of the within-group regression (Wang, Chang, & Li, 2007). The Kolmogorov-Smirnov tests revealed that both the pretest and posttest scores for both groups conformed to normality. Levene's test of equality ensured homogeneity of variance between the two groups. The ANCOVA analysis was performed with SPSS 16.0.

4. Results

This study explored whether ARCS-based motivational tactics produced statistically significant differences between a control group and a treatment group in terms of overall learner motivation and academic performance.

Learners' perceptions of motivation were analyzed in terms of attention, relevance, confidence, and satisfaction. The response scale ranged from 1 to 5, and the minimum and maximum scores on the instrument were 36 and 180. The statistical comparison of the pre-test and post-test motivational levels of students was important to address the question of whether students were motivated by an ARCS-based blended learning environment. Data on perceived motivation were collected with Likert-scaled questionnaires and were analyzed with an independent *t*-test. The results indicated significant differences between the groups with respect to their motivation to learn the Basic Computer II skills as well as their overall IMMS score. The results also showed a statistically significant difference in performance between the treatment and control groups ($p < .001$). The results are reported in Table 6.

Overall IMMS Scores

Independent *t*-test results showed a significant difference in motivation between the treatment and control group on the posttest (t (88) = -2. 99, $p < .05$) (Table 4). However, there were no statistically significant differences between the groups in the overall IMMS scores on the pretest (t (88) = -1.40, $p > .05$). This result indicates that both groups had similar motivation levels prior to implementation.

Table 4: Results of statistical significance testing for overall IMMS scores

Test	Group	*N*	*M*	*SD*	*T*	*p*
Pretest	Control	45	114.31	16.87	-1.40	.163
	Treatment	45	119.20	16.07		
Posttest	Control	45	117.48	16.70	-2.99	.004
	Experimental	45	128.08	16.83		

Individual subscales

The ranked means for the ARCS individual components were found to be statistically significant between the groups ($p < .05$) (Table 5). On four of the subscales, the interaction between the control and the treatment groups tended toward significance (Figures 1, 2, 3, 4).

Table 5: Independent *t*-test of learners' posttest scores

Motivation	Group	*N*	*M*	Total Score	*SD*	*T*	*p*
Attention	Control	45	41.46	60	6.75	-2.30	.024
	Treatment	45	44.64		6.31		
Relevance	Control	45	28.40	45	5.13	-2.19	.031
	Treatment	45	30.80		5.26		
Confidence	Control	45	28.13	45	4.62	-2.04	.044
	Treatment	45	30.02		4.12		
Satisfaction	Control	45	19.48	30	4.26	-3.63	.000
	Treatment	45	22.623		3.90		

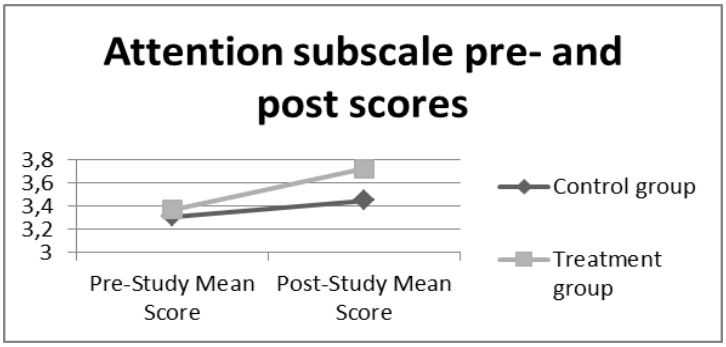

Figure 1. Attention subscale pre-test and post-test scores

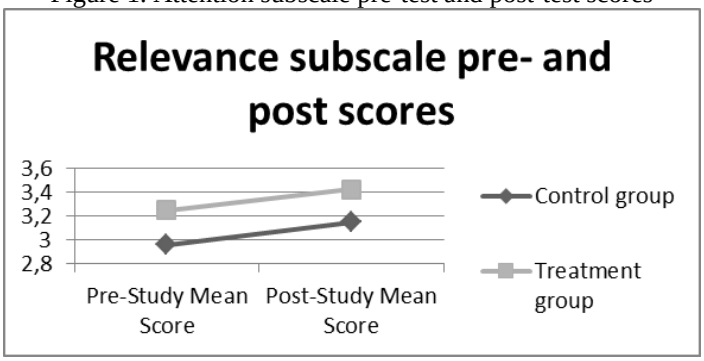

Figure 2. Relevance subscale pre-test and post-test scores

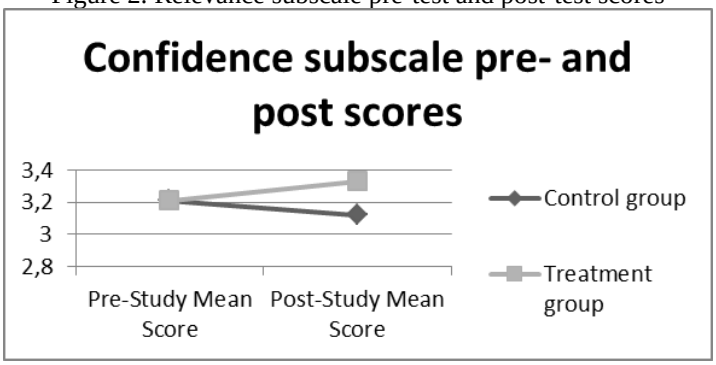

Figure 3. Confidence subscale pre-test and post-test scores

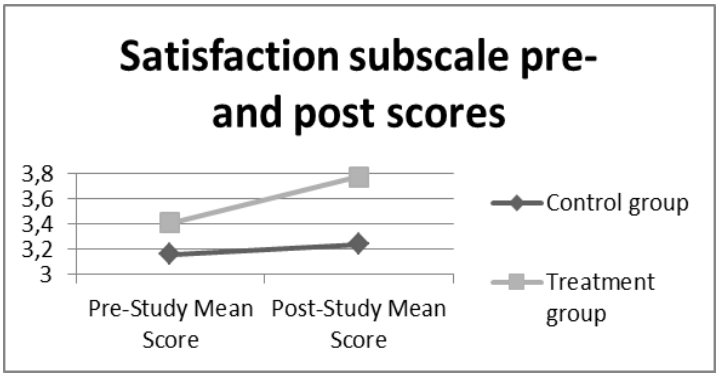

Figure 4. Satisfaction subscale pre-test and post-test scores

Academic achievement

Data on academic achievement were collected in the posttest and were analyzed with an ANCOVA (Table 6). The ANCOVA method allows us to eliminate the differences in the pretest scores between the groups and to derive the adjusted posttest scores, revealing the effects of the experimental treatment. ANCOVA analyses showed significant mean differences in the achievement posttest scores between the two groups ($F(1, 87) = 112.84$, $p = .000$).

Table 6: The results of ANCOVA with pretest scores as the covariate

Source of Variation	Sum of Squares	Mean Square	*f*	*p*
Between group	230.51	230.51	112.84	.000
Error	177.72	2.04		
Total	10352.0			

To further examine the data on achievement, one additional statistical test was conducted. A paired-samples *t*-test was conducted to compare the treatment and control gain scores from the pretest to the posttest (Table 7). The result indicated that participants in both the treatment and control groups achieved significant gains from the pretest to the posttest, $t\ (44) = -19.24$, $p < .05$, and $t\ (44) = -14.67$, $p < .05$, respectively. These results suggest that both groups scored significantly higher after attending the implementation process. However, the treatment group, which attended the ARCS-based blended learning environment, reported a greater gain from the pretest to the posttest on the academic achievement test scores (with a mean increase of 50.33) than the control group (with a mean increase of 27.26). This finding supports the contention that the students in the treatment group, on average, outperformed the control group.

Table 7: Descriptive statistics and standard deviation of participants' pre-test and post-test scores (*N* = 90)

Group	Test	Total score	*M*	*SD*	*T*	*p*
Control (*n* = 45)	Pretest	100 (points)	32.13	8.56	-14.67	.000
	Posttest	100 (points)	59.39	9.66		
Treatment (*n* = 45)	Pretest	100 (points)	30.40	15.36	-19.24	.000
	Posttest	100 (points)	80.73	9.20		

5. Discussion and Conclusion

The present study was designed to ascertain whether learner motivation and performance could be affected by external conditions. The external conditions, in this case, were systematically applied motivation tactics based on the ARCS model. The results of this study offer important lessons for the use of the ARCS model in blended learning environments to increase students' motivation and academic achievement.

Learner motivation

It appears that the ARCS-based blended learning environment shows potential for addressing some of the motivational needs of students. The data show that the students in the treatment group were ahead of the control group on the posttest measure for this study. It can be concluded that the treatment group was motivated by the use of the ARCS motivation model. The positive results are consistent with prior empirical research on the effects of the ARCS model, including those reported by Song and Keller

(2001), Means, Jonassen and Dwyer (1997) and Huett et al. (2008b), suggesting that the ARCS model may improve learner motivation. In the light of the research results, ARCS model was found to be effective in blended learning environment.

The overall ARCS scores indicate that the ARCS model has a positive effect in a blended learning environment. Moreover, all subscale scores in the treatment group were higher than the scores in the control group. The results of motivation in this study are congruent with Huett et al.'s (2008a) findings that the ARCS motivation model can help instructors in terms of motivation. Huett et al. (2008a) found that motivational communication such as ARCS-based e-mail could have a significant impact on learner motivation in distance-learning situations at both the graduate and undergraduate levels. Like in distance education, motivation tactics were effective in blended learning environment.

According to Keller (1983), attention is one of the major motivational influences necessary for successful learning. In this study, there was a significant difference in attention between the students in the control and treatment groups. This result implies that ARCS-based blended environments can effectively be used to motivate learners by increasing their attention.

Keller (1987a) defines relevance as "those things which we perceive as instrumental in meeting the needs and satisfying the personal desires, including the accomplishment of personal goals" (p. 3). Relevance involves a connection between the subject matter to be taught and the learner's need to find that material personally meaningful (Huett et al., 2008b). Research has shown that relevance-enhancing strategies may be the most effective way of improving learners' performance and motivation (Means, Jonassen, & Dwyer, 1997). Depending on the findings, no significance was found between the relevance points of the groups.

Confidence is accomplished by helping students establish positive expectations for success. In addition, confidence is essential for motivation. Confidence is a necessary element in blended learning environment (Greener, S. L., 2008). The results of this study indicate that the confidence level of the treatment group differed significantly from the control group. Statistically significant differences were noted for the confidence subscale of the model, indicating that the ARCS motivation model can affect learners' confidence. The results of this study support the application of Keller's ARCS model when designing blended learning courses and suggest that the utilization of motivational design positively influences students' confidence.

There was a significant difference in learners' satisfaction between the control and treatment groups. Satisfaction, a component of motivation, refers to positive feelings about one's accomplishments and learning experiences. Satisfaction means that students receive recognition and evidence of success that support their intrinsic feelings of satisfaction, and they believe that they have been treated fairly (Keller, 2010). In blended learning environments, satisfaction is important for students (Overbaugh & Nickel, 2011; So & Brush, 2008). Moreover, it is found that satisfaction affects the academic achievement and attendance rate of the students in blended learning environment (López-Pérez, Pérez- López, Rodríguez-Ariza, 2011). This result suggests that motivational tactics can increase learners' satisfaction levels in blended learning environments.

This research study suggests the feasibility of improving overall learner motivation through external conditions such as motivational tactics. The research further supports claims about the effectiveness of the ARCS model as a viable tool for enhancing learner motivation in blended learning environments. From the obtained IMMS scores, it was found that ARCS model is quite effective for satisfaction and confidence which are important factors for students.

Academic achievement

The findings show significant differences between the control group and the treatment group in terms of learners' performance, based on the posttest scores. The treatment group's mean score was higher on all measures, which supports the contention that the students in the treatment group, on average, outperformed the control group on the posttest measures. It is notable that both the control and treatment groups' scores increased from the pretest to the posttest after attending the course for 3 weeks. However, the treatment group reported greater gains. This finding is in line with previous research findings suggesting that increases in motivation can translate into increases in achievement (Gabrielle, 2003; Méndez & González, 2011; Song and Keller, 2001).

In conclusion, the performance results of this study showed that motivation is a powerful force in learning. This study confirms that systematically designed and carefully applied tactics can improve performance in blended learning environments. We speculate that improved student motivation is likely to be responsible for improved performance in blended learning environments. Keller's ARCS model is an effective tool for building motivational enhancements into blended learning environments, and instructors should not hesitate to use Keller's ARCS model as a conceptual framework for new and emerging technologies. This study offers multiple motivation-enhancing tactics that can easily be modified or adapted to fit a wide range of applications for blended learning environments.

References

Astleitner, H., & Keller, J. (1995). A model for motivationally adaptive computer-assisted instruction. *Journal of Research on Computing in Education*, *27*(3), 270-280.

Bakar, K., Ayub, A., Luan,W., & Tarmizi, R. (2010). Exploring secondary school students' motivation using technologies in teaching and learning mathematics. *Procedia Social and Behavioral Sciences, 2*, 4650-4654.

Bliuc, A., Goodyear, P., & Ellis, R. (2007). Research focus and methodological choices in studies into students' experiences of blended learning in higher education. *The Internet and Higher Education*, *10*, 231-244.

Bolliger, D. U., Supanakorn, S., & Boggs, C. (2010). Impact of podcasting on student motivation in the online learning environment. *Computers and Education*, *55*, 714-722.

Campbell, D., & Stanley, J. (1963). *Experimental and quasi-experimental designs for research*. Chicago, IL: Rand-McNally.

Chen, K. C., & Jang, S. J. (2010). Motivation in online learning: Testing a model of self-determination theory. *Computers in Human Behavior*, *26*, 741-752.

Cooner, T. S. (2010). Creating opportunities for students in large cohorts to reflect in and on practice: Lessons learnt from a formative evaluation of students' experiences of a technology-enhanced blended learning design. *British Journal of Educational Technology*, *41*(2), 271–286.

Deci, E. L., & Ryan, R. M. (2000). The "What" and "Why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11* (4), 227-268.

Gabrielle, D. (2003). The effects of technology-mediated instructional strategies on motivation, performance, and self-directed learning. Tallahassee. Florida State University. Ph.D. dissertation.

Ginns, P., Prosser, M., & Barrie, S. (2007). Students' perceptions of teaching quality in higher education: the perspective of currently enrolled students. *Studies in Higher Education*, *32*(5), 603–615.

Howell, S. L., Saba, F., Lindsayc, N. K., & Williams, P. B. (2004). Seven strategies for enabling faculty success in distance education. *Internet and Higher Education*, *7*, 33–49.

Huett, J. B., Kalinowski, K., Moller, L., Huett, K.C. (2008a). Improving the motivation and retention of online students through the use of ARCS-based e-mails. *Journal of Distance Education*, *22*,159-176.

Huett, J. B., Young, J., Huett, K. C., Moller, L., & Bray, M. (2008b). Supporting the distant student the effect of ARCS-based strategies on confidence and performance. *The Quarterly Review of Distance Education*, *9*(2), 113-126.

Kebritchi, M., Hirumi, A., & Bai, H. (2010). The effects of modern mathematics computer games on mathematics achievement and class motivation. *Computers & Education*, *55*, 427-443.

Keller, J. M. (1983). Use of the ARCS model of motivation in teacher training. ERIC, ED 288520.

Keller, J. M. (1987a). Strategies for stimulating the motivation to learn. *Performance and Instruction, 26*(8), 1–7.

Keller, J. M. (1987b). The systematic process of motivational design. *Performance and Instruction 26*(9), 1–8.

Keller, J. M. (1999a). Motivational systems. In H. D. Stolovitch, & E. J. Keeps (Eds.), *Handbook of human performance technology*, 2nd Edition. San Francisco: Jossey-Bass Inc., Publisher.

Keller, J. M. (2000). How to integrate learner motivation planning into lesson planning: The ARCS model approach. VII Semanario, Santiago, Cuba 2000.

Keller, J. M. (2006). Development of two measures of learner motivation. *Unpublished manuscript*. Florida State University.

Keller, J. M. (2010). *Motivational design for learning and performance.* New York: Springer.

Lei, J. (2010). Quantity versus quality: a new approach to examine the relationship between technology use and student outcomes. *British Journal of Educational Technology*, *41*(3), 455–472.

Ley, K. (2006). Instructor competencies: Standards for face-to-face, online & blended settings (Rev. Educational Technology Committee v1.1 April 2010 9 3rd ed.). *Quarterly Review of Distance Education*, *7*(2), 195-199.< http://www.infoagepub.com/Quarterly-Review-of-Distance-Education.html > Retrieved 17.09.2011.

Lim, D. H., & Morris, M. L. (2009). Learner and instructional factors influencing learning outcomes within a blended learning environment. *Educational Technology & Society*, *12* (4), 282–293.

Means, T. B., Jonassen, D. H., & Dwyer, F. M. (1997). Enhancing relevance: Embedded ARCS strategies vs. purpose. *Educational Technology Research & Development*, *45*(1), 5-17.

Nel, E. & Wilkinson, A. C. (2006). Enhancing collaborative learning in a blended Learning environment: Applying a process planning model, *Systemic practice and action research 19*(6), 51-59.

Nunnaly, J. (1978). *Psychometric theory*. New York: McGraw-Hill.

Pérez, M. L., López, M.C. & Ariza, L. R. (2011). Blended learning in higher education: Students' perceptions and their relation to outcomes. *Computers and Education*, *56*, 818-826.

Rodgers, D. L., & Withrow-Thorton, B. J. (2005). The effect of instructional media on learner motivation. *International Journal of Instructional Media*, *32*(4), 333-340.

Rovai, A. P., & Downey, J. R. (2010). Why some distance education programs fail while others succeed in a global environment. *Internet and Higher Education*, *13*, 141-147.

Shivetts, C. (2011). E-Learning and Blended Learning: The Importance of the Learner A Research Literature Review. *International Journal on E-Learning*, *10*(3), 331-337.

So, H., & Brush, T. (2008). The effects of modern mathematics computer games on mathematics achievement and class motivation. *Computers & Education*, *55*, 427-443.

Song, L., Singleton, E. S., Hill, J. R., & Koh, M. H. (2004). Improving online learning: Student perceptions of useful and challenging characteristic. *Internet and Higher Education*, *7*, 59-70.

Song, S. H., & Keller, J. M. (2001). Effectiveness of motivationally adaptive computer-assisted instruction on the dynamic aspects of motivation. *Educational Technology Research and Development*, *49*(2), 5-22.

Stacey, E., & Gerbic, P. (2008). Success factors for blended learning. In Hello! Where are you in the landscape of educational technology?. *Proceedings ascilite Melbourne 2008*. <http://www.ascilite.org.au/conferences/melbourne08/procs/stacey.pdf> Retrieved 17.09.2011.

Wang, H. C., Chang, C. Y., & Li, T. Y. (2007). The comparative efficacy of 2D- versus 3D-based media design for influencing spatial visualization skills. *Computers in Human Behavior*, *23*, 1943-1957.

Wang, M., Shen, R., Novak, D., & Pan, X. (2009). The impact of mobile learning on students' learning behaviors and performance: Report from a large blended classroom. *British Journal of Educational Technology*, *40*(4), 673–695.

Wu, J., Tennyson, R. D., & Hsia, T. (2010). A study of student satisfaction in a blended e-learning system. *Computers and Education*, *55*, 155-164.

Yen, J., & Lee, C. (2011). Exploring problem solving patterns and their impact on learning achievement in a blended learning environment. *Computers & Education*, *56*, 138-145.