MOTIVATIONAL MEASURE OF THE INSTRUCTION COMPARED: Instruction Based on the ARCS Motivation Theory V.S. Traditional Instruction in Blended Courses

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ABSTRACT

The ARCS Motivation Theory was proposed to guide instructional designers and teachers who develop their own instruction to integrate motivational design strategies into the instruction. There is a lack of literature supporting the idea that instruction for blended courses if designed based on the ARCS Motivation Theory provides different experiences for learners in terms of motivation than instruction developed following the standard instructional design procedure for blended courses.

This study was conducted to compare the students' motivational evaluation of blended course modules developed based on the ARCS Motivation Theory and students' motivational evaluation of blended course modules developed following the standard instructional design procedure. Randomly assigned fifty junior undergraduate students studying at the department of Turkish Language and Literature participated in the study. Motivation Measure for the Blended Course Instruction (MMBCI) instrument was used to collect data for the study after the Confirmatory Factor Analysis (CFA). Results of the study indicated that designing instruction in blended courses based on the ARCS Motivation Theory provides more motivational benefits for students and consequently contributes student learning.

Keywords: Blended learning; ARCS motivation theory; instructional design

INTRODUCTION

The widespread availability of digital learning technologies increased the integration of computer-mediated instructional elements into the traditional classrooms (Bonk & Graham, 2005). Learning systems benefiting from technology are being developed at ever increasing rates (Keller, 2008). Changing learning needs of students and developments in technology are forcing educators to integrate technology in the teaching and learning to maximize student learning. Many universities offer distance courses to respond to the diverse needs of today's learners (Akdemir & Koszalka, 2008). Combining the benefits of face-to-face courses and distance courses, blended courses are used to deliver the instruction in more than one delivery format. It is imperative for educators to understand how to design and develop effective blended learning experiences that incorporate both face-to-face and computer-mediated elements (Bonk & Graham, 2005). Designing instruction for blended courses is a complicated process since increased number of factors involves in the equation.

Systematically designed instruction has been proven to affect student learning greatly (Gagne, Briggs & Wager, 1992). Incorporating systematic design, instructional design is concerned with understanding, improving, and applying methods of instruction (Reigeluth, 1983). Utilizing from instructional design theories and models, effective instruction can be designed and developed for blended courses. However even when prepared according to sound instructional design principles, instruction often does not stimulate students' motivation (Visser & Keller, 1990). It was pointed out that often "motivation" is neglected in the instructional design process (Keller, 1983). More importantly online part of the instruction in blended courses contains numerous motivational challenges (Keller, 1999). Combining face-to-face and online delivery systems, blended learning systems offer opportunities to integrate motivational support strategies in novel ways (Keller, 2008). It is abundantly clear that the environment can have a strong impact on motivation (Keller, 1999). Instructional designers must know how to integrate motivational methods and models into a variety of instructional situation (Keller & Litchfield, 2002).

Integrating motivation in the blended courses is a challenging task for instructional designers. The ARCS Motivation Theory was proposed to guide instructional designers and teachers who develop their own instruction to integrate motivational design strategies into the instruction. The ARCS model is a model for instructional design developed to enhance learner motivation (Capshew, 2005) and has been applied to courseware design (Suzuki, Nishibuchi, Yamamoto & Keller, 2004). ARCS Motivation Theory has four components. Attention, Relevance, Confidence and Satisfaction are the four conceptual components of the theory. Attention category refers to gaining learners' attention and sustaining active engagement of learners (Keller, 2008). Relevance category includes strategies that establish connections between instructional environment and past experiences of learners (Keller, 2008). Confidence category incorporates students' feelings and expectancy for success (Keller, 2008). The last category satisfaction includes strategies that help learners establish positive feelings about their learning experiences (Keller, 2008). Researchers have investigated the effectiveness of ARCS model in different learning environments. Song and Keller (2001) investigated the effects of a motivationally adaptive computer-assisted instruction (CAI) developed in accordance with systematic motivational design principles as represented in the ARCS model with fifty nine tenth-grade students. Three types of CAIs, motivationally saturated, adaptive, and minimized, were developed and completed by tenth-grade students. Motivation, effectiveness, continuing motivation, and efficiency were measured and compared in three types of CAIs.

Findings indicated that the ARCS model can be applied effectively to the design of motivationally adaptive CAI. Suzuki, Nishibuchi, Yamamoto & Keller, (2004) developed a web tool that allowed users to check and revise to improve their instruction based on the results of the user reaction survey. The web tool is capable of analyzing the questionnaire data and suggests strategies based on the ARCS motivation design to improve instruction. Users reported that web tool helped them to think motivational enhancement systematically in their instruction. In a single case study, Visser & Keller (1990) investigated the effects of motivational intervention developed based on the process outlined in the ARCS model of motivational design on participants' attitude and performance. Fifteen adult students attending in a staff development course participated in the study.

Results indicated that motivational messages designed based on the ARCS model positively affect students' attitude, performance, and consequentially their motivation to learn. Shellnut, Savage, and Knowlton (1999) reported the experiences of the multimedia course design team in applying the ARCS model to the process of designing, developing, and evaluating Computer-based Instruction (CBI).

The design team reported that incorporating ARCS model into the basic design will continue to provide a solid foundation in the design and development of CBI.

Studies conducted in face-to-face, computer-based, computer-assisted, and online environment demonstrated the benefits of utilizing ARCS model in motivation and learning. However there is a lack of literature supporting the idea that instruction for blended courses if designed based on the ARCS Motivation Theory provides different experiences for learners in terms of motivation than instruction developed following the standard instructional design procedure for blended courses. Therefore this study was designed to address the following research questions:

- **How does students' evaluation of the instructional modules for the components of the ARCS Motivation Theory change in blended course modules?**
- **Is there a difference in students' evaluation of attention between instructional modules developed based on the ARCS model and instructional modules developed following the standard instructional design procedure?**
- **Is there a difference in students' evaluation of relevance between instructional modules developed based on the ARCS model and instructional modules developed following the standard instructional design procedure?**
- **Is there a difference in students' evaluation of confidence between instructional modules developed based on the ARCS model and instructional modules developed following the standard instructional design procedure?**
- **Is there a difference in students' evaluation of satisfaction between instructional modules developed based on the ARCS model and instructional modules developed following the standard instructional design procedure?**

METHOD

Instructional Context

The study was conducted in a three-credit Instructional Technology and Material Development course offered at the department of Turkish Language and Literature of a public university located in the BlackSea region of Turkey in the Fall 2007 semester. The Moodle has been used to teach online part of the blended courses since 2006 in the university where the study was conducted. The compulsory Instructional Technology and Material Development course was divided in two sections.

Participants completed two hours theory and two hours practice sections of the course each week. Students were expected to learn basic processes of instructional design in the theory part of the course and develop an instructional material in their field of study in the practice part of the course.

Participants

The participants were junior undergraduate students enrolled at the four year public college. Sixty-one undergraduate students enrolling in a three-credit Instructional Technology and Material Development course participated in the study. Two sections of the course were taught to participants in the same semester by the same instructor. Students randomly selected one of these sections when registering in the course. Then researchers randomly assigned one section of the course as the experimental which had 32 registered students and the other section of the course which had 29 students as the control group. Then researchers identified 25 students in the experimental group and 25 students in the control group each as the study participants for data collection purposes in the six week period due to the absence of students in various parts of the study. 38% percent of the participants were male and 62% of the participants were female.

Instrument

Motivation Measure for the Blended Course Instruction (MMBCI) instrument developed by Akdemir & Colakoglu (2008) was primarily used for data collection. The MMBCI instrument was used to measure the motivational evaluation of instructional materials. Akdemir & Colakoglu (2008) used explanatory factor analysis when developing the instrument. They identified four factors namely attention, relevance, confidence and satisfaction which comply with four categories defined in the ARCS motivation model developed by Keller (1983). However, Exploratory Factor Analysis (EFA) is a method to examine underlying construction of the measured variables and reduce a large number of observed variables into the small number of factors (Tabachnick & Fidell, 1989). EFA is generally used as a theory generating rather than a theory testing procedure. In contrast to EFA, Confirmatory Factor Analysis (CFA) is used for the strong theoretical or empirical foundation that permits researchers examine their exact factor model to their observed data (Stevens, 1996).

The Confirmatory Factor Analysis was used with the sample used in the study in order to test the model fitness of the MMBCI instrument with ARCS model's four-factor structure. AMOS 7.0 statistical software package was used to conduct the Confirmatory Factor Analysis.

The first assumption of CFA is multivariate normality of the variables. Multivariate normality of the variables in the model is necessary to provide well-behaved analysis for the researchers (Dilalla, 2000). Also multivariate normality should be ensured for maximum likelihood fitting function.

The multivariate normality of the variables is presented at the Table. 1 Critical ratio of the both skewness and kurtosis for items of the instrument did not exceed the range from -2 to 2 except for the Item-10 and Item-4. Nevertheless multivariate normality of the all variables' critical ratio was 1.683 which is an acceptable value. Therefore maximum likelihood function could be put into operation for the given data.

Table: 1
Multivariate Normality of the Variables

Variable	Min	Max	Skewness	C.R.	Kurtosis	C.R.
V2	1	5	-0.152	-0.483	-1.196	-1.906
V3	1	5	-0.023	-0.074	-1.368	-2.181
V4	1	5	-0.861	-2.745	-0.177	-0.282
V5	2	5	-0.552	-1.761	0.278	0.444
V6	1	5	-0.414	-1.321	0.023	0.036
V9	1	5	-0.343	-1.094	-1.042	-1.661
V10	1	5	-1.091	-3.477	1.427	2.276
V11	1	5	-0.497	-1.585	-0.543	-0.865
V12	1	5	-0.641	-2.045	1.22	1.945
V13	2	5	-0.225	-0.717	-0.259	-0.413
V15	1	5	-0.555	-1.768	-0.16	-0.256
Multivariate					7.286	*1.683*

The second assumption for CFA is the sample size. In this study a model would not be generalized. Only the model fitness was tested for the specific sample to determine the trends of the components in ARCS Motivation Theory in the six-week period of the course. Therefore the first hypothesis was used to test the model fitness for the sample used in the study.

The study sample was obtained from two groups. One of them was control with 29 students and the other was experimental group with 32 students. Then the *maximum likelihood* function could be put into operation for the given data. In CFA models, there are three important points for avoiding misspecification:

- The wrong number of factors,
- The wrong pattern of loadings, and
- Unmodeled sub-factors.

Table: 2 Component Correlation Matrix

Component	*Satisfaction*	*Attention*	*Confidence*	*Relevance*
Satisfaction	1.000	.023	.178	.268
Attention	.023	1.000	.040	.102
Confidence	.178	.040	1.000	.156
Relevance	.268	.102	.156	1.000

Note: Extraction Method: Principal Component Analysis, Rotation Method: Oblimin with Kaiser Normalization

Hoyle (2000) suggested that using EFA solutions for CFA is good starting point for the researchers so the first model was chosen based on Principal Component Analysis solutions in this study.

The factor structure of the instrument for both oblique and varimax rotation was implemented to determine the component correlation matrix. The Principal Component Analysis (PCA) was conducted on the data and the 4-factor and 11-item were left in the instrument after the analysis. Then the 4-factor model of the instrument was designed in AMOS. After designing, the component correlation matrix was used to determine the correlations among components in the CFA model.

Then maximum likelihood estimation method was applied. Probability levels of all models were found not significant. This indicated that the covariance matrix and population covariance matrixes were not statistically different from each other.

Therefore p=0.179 leads us to reach the conclusion that we fail to reject the null hypothesis. Chi-square statistic was used in this study for model comparison. The lowest X^2 value was obtained for the Model-3. Therefore the Model-3 was preferred over other three models.

Table: 3
Table for Fit Indices of Three Models

	X^2	P	Df	RMSEA	Pclose	RMR	GFI	CFI	TLI	NFI	AIC
Model-1	49.492	0.144	40	0.063	0.342	0.142	0.875	0.976	0.968	0.892	101.492
Model-2	48.308	0.146	39	0.063	0.341	0.129	0.878	0.977	0.967	0.894	102.308
Model-3	45.853	0.179	38	0.059	0.387	0.068	0.883	0.980	0.972	0.900	101.853

Note: (RMSEA): Root Mean Square Error of Approximation; (GFI): Goodness of Fit Index; (TLI): Tucker-Lewis Index; (NFI): Normed Fit Index; (RMSR): Root Mean Square Residual; (CFI): Comparative Fit Index; (AIC): Akaike Information Criterion

When the Table.3 is examined the chi-square values are decreasing from the Model-1 to the Model-3. Correspondingly the probability levels of the models are increasing which makes the Model-3 better than other models. Also other fit indices' values (GFI, CFI, TLI and NFI) are increasing as well.

This is evident that the Model-3 is better than other models. Also the RMSEA value of the Model-3 is less than .06 which indicates that it is a well-fitting model (Kim, & Bentler, 2006).

Also the Pclose value of the RMSEA indicates that the RMSEA value is no greater than .05. Found RMSEA value is very close to the RMSEA value, .054, obtained in a study conducted to validate the Keller's IMMS survey (Huang, Huang, Diefes-Dux & Imbrie, 2006).

In summary, the Model-3 that was presented in the Figure: 1 was chosen over other models for the study. All four latent variables which were described in the ARCS model were also present in the Model-3 and they were correlated with each other.

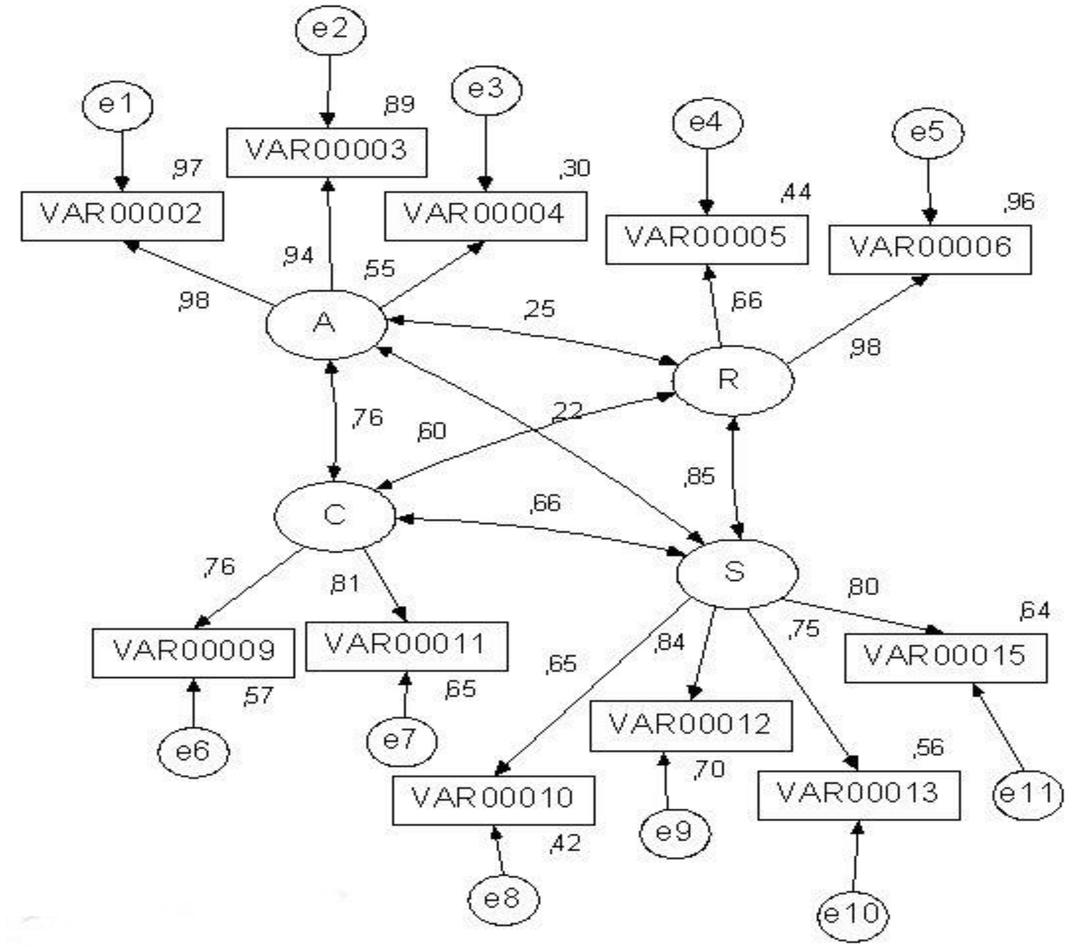

Figure. 1
Path Diagram of Model-3.
Note: A: Attention, R: Relevance, C: Confidence, S: Satisfaction

Intervention

Two different types of instruction were developed for the online part of the blended course. The experimental group (25 students) received instruction that was designed based on the ARCS Motivation Theory. Keller (1987) recommended strategies for designing instruction based on the ARCS Motivation Theory.

These strategies and examples used in the blended course modules were presented at the Tables 4 for the attention category, at the Table-5 for the relevance category, at the Table-6 for the confidence category, and at the Table-7 for the satisfaction category. The blended course modules developed for the control group (25 students) included only the presentation of the course content. Figures, tables and graphs were also used in the course modules of the control group.

Table: 4
Attention Strategies Used in Blended Course Modules

	Strategies Recommended for the Attention Category by Keller (1987)	Examples used in the Blended Course Modules
Perceptual Arousal	***Use surprise or uncertainly to gain interest.***	**Cartoons and movies were used at the beginnig of the course modules**
Inquiry	***Stimulate curiosity by posing challenging questions or problems to be solved.***	**Challenging questions were asked to sudents in the modules.**
Variability	***Sustain interest with variations in presentation style, human interest examples and unexpected events.***	**Themes and styles used in the blended course modules were changed in modules.**

Table: 5
Relevance Strategies Used in Blended Course Modules

	Strategies Recommended for the Relevance Category by Keller (1987)	Examples used in the Blended Course Modules
Goal Orientatio n	***Provide statements or examples of the utility of the instruction or present goals.***	**The objectives of the course were presented in the course modules.**
Motive Matching	***Make instruction responsive to learner motives and values by providing personal achievement opportunities, cooperative activities, leadership responsibilities and positive role models.***	**Questions making conections between objectives and students' future work were directed to students.**
Familiarit y	***Make the materials and concepts familiar by providing concrete examples and analogies related to learner's work.***	**Concrete examples were presented to students.**

Table: 6
Confidence Strategies Used in Blended Course Modules

	Strategies Recommended for the Confidence Category by Keller (1987)	Examples used in the Blended Course Modules
Learning Requirements	*Establish trust and positive expectations by explaining the requirements for success and the evaluative criteria.*	Evalaution criteria was presented at the course syslabus
Success Opportunities	*Increase belief in competence by providing many, varied and challenging experinces which increase learning success.*	Challenging questions were directed to the students in the discusion board.
Personal Control	*Use techniques that offer personal control and provide feedback.*	Learners completed each module in their learning phase. Feedbacks were provided after the exercises.

Table: 7
Satisfaction Strategies Used in Blended Course Modules

	Strategies Recommended for the Satisfaction Category by Keller (1987)	Examples used in the Blended Course Modules
Natural Consequences	*Provide problems, simulations, or work samples that allow students to see how they can now "real-world" problems.*	Real problem scnerios were presented and students developed solutions for problems.
Positive Consequences	*Use verbal praise, real or symbolic rewards, and incentives.*	After each expercise symbolic rewards were presented.
Equity	*Make performance requirements consistent with stated expectations, and provide consistent measurement standards for all learners' task.*	Course exams were covered all the areas taught in the blended course modules.

Procedure

Total of twelve course modules, six for the experiment and six for the control group, were developed for the study. Experimental group and the control group completed each module in one-week. The study was completed in six weeks.

Motivation Measure for the Blended Course Instruction instrument, which was confirmed after the Confirmatory Factor Analysis, was used to collect data from the experiment and control groups at the end of the each course module.

ANALYSIS

All items of the instrument were reviewed for any missing data or error. No problem was detected. Participants rated the each statement in the instrument ranging from 1= Strongly Disagree to 5=Strongly Agree. Participants' responses for the Attention, Relevance, Confidence, and Satisfaction categories were entered into the SPSS Version 13 for further analysis. Descriptive analysis and t-test for independent samples were conducted to investigate research questions.

RESULTS

The first research question investigated students' evaluation of the instructional modules for the components of the ARCS Motivation Theory in blended course modules in the six week period. Students' evaluation of the instructional modules developed based on the ARCS Motivation Theory (experimental treatment) indicated that modules developed for the experimental group took more attention of the students (see Figure 2, 3, 4, 5). Also, students' attention increased as the study progresses. Similarly students' evaluation of the instruction showed that students' responses for the relevance category progressively increased in the first four weeks of the study and then slightly decreased in the fifth and sixth week of the study. However students' responses were still higher in the last two week of the study than the initial week for the relevance category. Students' evaluation of the instruction revealed a steadily increase in the confidence from the first week of the study until the last week.

Finally students' satisfaction decreased in the second week but then increased progressively. However a slight decrease was observed for the students' satisfaction in the last week of the study. On the other hand, students' evaluation of the instructional modules developed following the standard instructional design procedure (non treatment) was different from students' evaluation of the instructional modules developed based on the ARCS Motivation Theory. Findings revealed that students' evaluation of instruction for the attention, relevance, confidence, and satisfaction fell below the initial week's evaluation for the ARCS categories (see Figure 2, 3, 4, 5). Especially for the attention and relevance categories, the gap gradually increases between the initial week's responses and subsequent weeks' responses. The dramatic decreases were especially observed in the first weeks of the course.

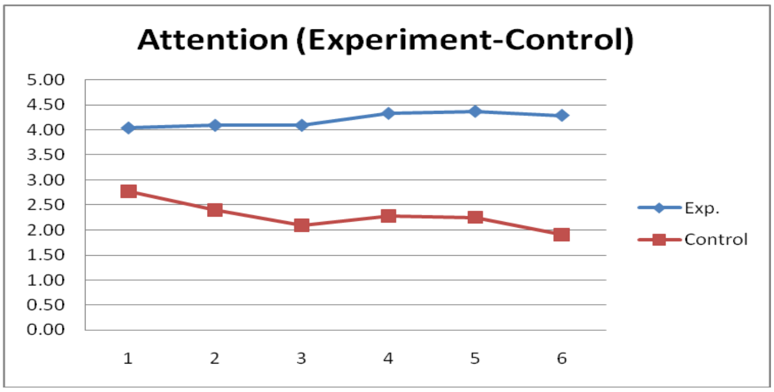

Figure: 2
Instructional Evaluation for the Attention Category

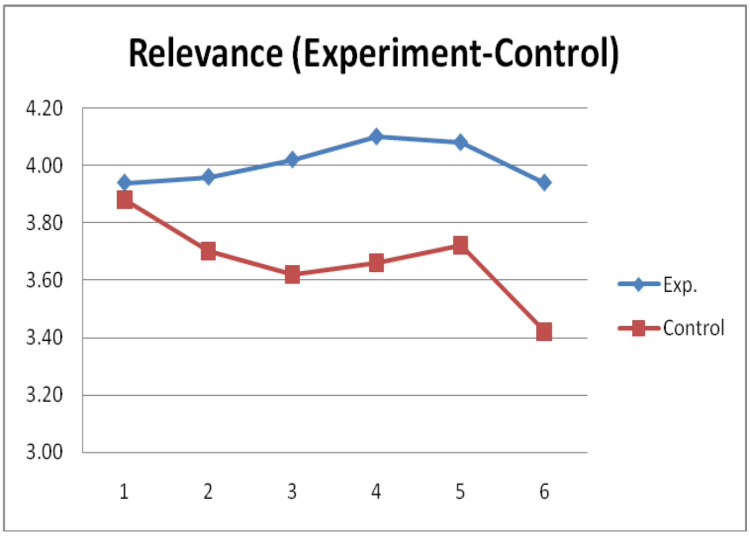

Figure: 3
Instructional Evaluation for the Relevance Category

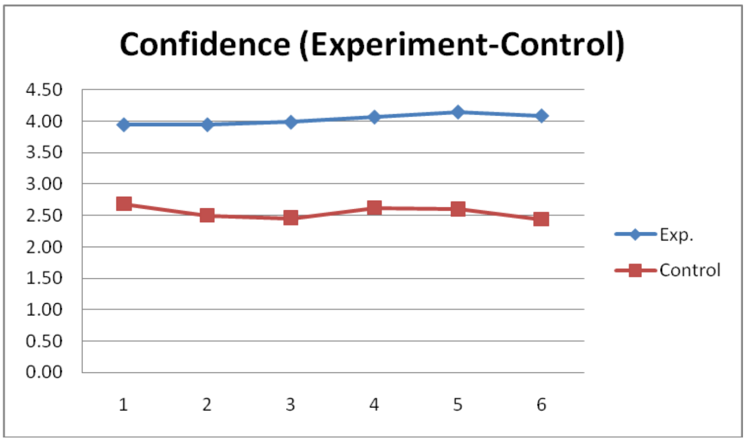

Figure: 4
Instructional Evaluation for the Confidence Category

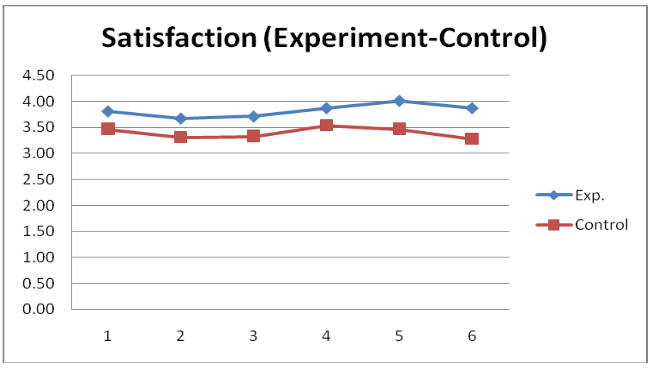

Figure: 5
Instructional Evaluation for the Satisfaction Category

The second research question investigated whether there is a difference in students' evaluation of attention between instructional modules developed based on the ARCS model and instructional modules developed following the standard instructional design procedure. Results of the t-test for independent samples revealed statistically significant differences found in students' responses when students' responses were compared in the six-week period for the attention category (Figure. 2 and Table: 8). The differences in students' evaluation of the modules between the experimental modules and control group's modules were increasing from the first week (Mean Difference=1.32) towards the last week (Mean Difference=2.38). Findings also revealed that students' evaluations in experimental group's modules increased from the first week's module (=4.09) to the last week's module (M=4.29). On the other hand students' evaluations in the control group's modules decreased for the attention category from the beginning of the study (M=2.77) to the end of the study (M=1.9). The third research question investigated whether there is a difference in students' evaluation of relevance between instructional modules developed based on the ARCS model and instructional modules developed following the standard instructional design procedure.

Table: 8
The Comparison of the Attention Category between Experimental and Control Group's Evaluation

		Levene's Test for Equality of Variances					
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference
Week-1	Equal variances assumed	21.144	.000	5.138	48	.000	1.32000
	Equal variances not assumed			5.138	30.141	.000*	1.32000
Week-2	Equal variances assumed	8.687	.005	9.197	48	.000	1.69333
	Equal variances not assumed			9.197	33.410	.000*	1.69333
Week-3	Equal variances assumed	3.440	.070	11.544	48	.000*	2.00000
	Equal variances not assumed			11.544	43.520	.000	2.00000
Week-4	Equal variances assumed	3.909	.054	11.083	48	.000*	2.05333
	Equal variances not assumed			11.083	40.246	.000	2.05333
Week-5	Equal variances assumed	9.698	.003	12.048	48	.000	2.12000
	Equal variances not assumed			12.048	36.487	.000*	2.12000
Week-6	Equal variances assumed	4.632	.036	15.169	48	.000	2.38667
	Equal variances not assumed			15.169	39.862	.000*	2.38667

*** $p < 0.05$**

Results of the t-test for independent samples revealed statistically significant differences found in students' responses when students' responses were compared in the six-week period for the relevance category (Figure: 3 and Table: 9). The differences in students' evaluation of the modules between the experimental modules and control group's modules were increasing from the first week (Mean Difference=0.06) towards the last week (Mean Difference=0.9). Findings also revealed that students' evaluations in experimental group's modules steadily increased in the first five weeks of the study. However students' evaluation in the last week was close to the first week's evaluation result. On the other hand students' evaluation of the modules developed following the standard instructional design procedure dramatically decreased from the first week's module (M=3.88) to the last week's module (M=3.04).

Table: 9
The Comparison of the Relevance between Experimental and Control Group's Evaluation

		Levene's Test for Equality of Variances					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Week-1	Equal variances assumed	3.258	.077	.292	48	.771*	.06000
	Equal variances not assumed			.292	41.537	.772	.06000
Week-2	Equal variances assumed	3.972	.052	1.463	48	.150*	.26000
	Equal variances not assumed			1.463	39.109	.152	.26000
Week-3	Equal variances assumed	2.661	.109	1.926	48	.060*	.40000
	Equal variances not assumed			1.926	43.425	.061	.40000
Week-4	Equal variances assumed	3.856	.055	2.279	48	.027*	.44000
	Equal variances not assumed			2.279	38.152	.028	.44000
Week-5	Equal variances assumed	2.412	.127	5.704	48	.000*	.82000
	Equal variances not assumed			5.704	44.037	.000	.82000
Week-6	Equal variances assumed	.819	.370	4.585	48	.000*	.90000
	Equal variances not assumed			4.585	44.178	.000	.90000

*** $p < 0.05$**

The forth research question investigated whether there is a difference in students' evaluation of confidence between instructional modules developed based on the ARCS model and instructional modules developed following the standard instructional design procedure.

Results of the t-test for independent samples showed statistically significant differences found in students' responses when students' responses were compared in the six-week period for the confidence category (Figure: 4 and Table: 10). The differences in students' evaluation of the modules between the experimental modules and control group's modules were increasing from the first week (Mean Difference=1.23) towards the last week (Mean Difference=1.68). Findings also indicated that students' evaluation in experimental group's modules slightly but steadily increased in the first five weeks of the study. In contrast students' evaluation of the modules for the control group slightly decreased from the first week's module (M=2.7) to the last week's module (M=2.4).

Table: 10
The Comparison of the Confidence Category between Experimental and Control Group's Evaluation

	Levene's Test for Equality of Variances						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
Week-1	Equal variances assumed	10.766	.002	5.276	48	.000	1.23333
	Equal variances not assumed			5.276	38.331	.000*	1.23333
Week-2	Equal variances assumed	2.845	.098	6.434	48	.000*	1.38667
	Equal variances not assumed			6.434	43.873	.000	1.38667
Week-3	Equal variances assumed	7.223	.010	7.703	48	.000	1.58000
	Equal variances not assumed			7.703	38.229	.000*	1.58000
Week-4	Equal variances assumed	5.769	.020	7.012	48	.000	1.50667
	Equal variances not assumed			7.012	37.810	.000*	1.50667
Week-5	Equal variances assumed	2.699	.107	8.671	48	.000*	1.58000
	Equal variances not assumed			8.671	40.753	.000	1.58000
Week-6	Equal variances assumed	4.685	.035	7.597	48	.000	1.68000
	Equal variances not assumed			7.597	39.449	.000*	1.68000

$* p < 0.05$

The last research question investigated whether there is a difference in students' evaluation of satisfaction between instructional modules developed based on the ARCS model and instructional modules developed following the standard instructional design procedure.

Results of the t-test for independent samples revealed statistically significant differences found in students' responses when students' responses were compared in the six-week period for the satisfaction category (Figure: 5 and Table 11). The differences in students' evaluation of the modules between the experimental modules and control group's modules were increasing from the first week (Mean Difference=0.29) towards the last week (Mean Difference=0.56).

Findings also revealed that students' evaluations in experimental group's modules slightly decreased in the first two weeks of the study and then increased.

Similar changes were observed for the students' evaluation in the control group. Similar trend was also observed in students' evaluation of the modules.

Students' evaluation of the modules increased from the first week's module (M=3.81) until the last week's module (M=3.87) for the experimental group and students' evaluation of the modules decreased from the first week's module (M=3.52) until the last week's module (M=3.31)

Table: 11
The Comparison of the Satisfaction Category between Experimental and Control Group's Evaluation

		Levene's Test for Equality of Variances					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Week-1	Equal variances assumed	.041	.841	2.059	48	.045*	.29000
	Equal variances not assumed			2.059	47.540	.045	.29000
Week-2	Equal variances assumed	1.092	.301	2.112	48	.040*	.38000
	Equal variances not assumed			2.112	44.738	.040	.38000
Week-3	Equal variances assumed	1.418	.240	2.059	48	.045*	.39000
	Equal variances not assumed			2.059	43.580	.045	.39000
Week-4	Equal variances assumed	2.285	.137	1.506	48	.139*	.28000
	Equal variances not assumed			1.506	42.816	.139	.28000
Week-5	Equal variances assumed	1.541	.220	3.957	48	.000*	.60000
	Equal variances not assumed			3.957	46.836	.000	.60000
Week-6	Equal variances assumed	3.741	.059	2.963	48	.005*	.56000
	Equal variances not assumed			2.963	41.279	.005	.56000

* $p < 0.05$

DISCUSSION AND CONCLUSION

Motivation is an academic factor that should be considered in the course design (Capshew, 2005). It was reported that instructional design incorporating instructional and motivational components are critical to achieve learning goals (Keller, 1999). This study investigated the effects of designing instructional modules based on the ARCS Motivation Theory in blended courses on students' motivation. Data analysis revealed that students' evaluation in blended courses modules developed based on the ARCS model and students' evaluation in blended course modules developed using standard instructional design process are statistically different for all components of the ARCS motivation theory.

Students' evaluation of instructional modules for motivation increased when the instructional modules for blended courses are designed based on the components of the ARCS motivation theory. Students experienced all motivational components of the ARCS Motivation theory in the instruction and utilized the benefits of the motivation in the instruction for their learning when students completed instructional modules developed based on the ARCS Motivation Theory.

While such improvements in motivation were observed in the experimental group, students in the control group which received the blended course instruction developed following the standard instructional design process perceived less motivational components in the instruction.

When the instruction for blended courses is designed following the standard instructional design procedure and motivational factors are neglected, motivational measure of the instruction for all components of the ARCS motivation theory decreased. Students in blended courses did not experience the motivation in the expected level in blended courses when they complete the instructional modules which were not designed based on the ARCS Motivation Theory.

This study confirmed Keller & Litchfield (2002)'s assertion that even the most accurate content and related activities can be ineffective without the systematic incorporation of motivation to improve student motivation. Motivation does not only stimulate students' effort (Capshew, 2005) but also positively influence learning and performance (Keller & Litchfield, 2002). Feng & Tuan (2005) found that using ARCS Motivation Theory improves students' level of motivation. Feng & Tuan (2005)'s findings support the results of this study. Similarly Chyung (2001) concluded that by enhancing motivational appeal of instruction, students perceive the instruction more interesting and relevant. Keller (1999) suggested that moivation can be inflenced by external events. This study demonstrated that when the blended course modules designed based on the startegies recommended in the ARCS Moivation Theory, motivation of the students improves. Instructional design is a challenging procedure which requires the consideration of all elements of the learning to bring about the desired change. Designing instruction for courses where more than one medium is used for the delivery is even more complex and important. Integrating motivation into the instructional design process improves the quality of the instruction.

It should be remembered that "*one consequence of motivation is to contribute to better learning*" (Keller, 1983). This study demonstrated that students in blended courses gain more learning benefits in terms of motivation when instruction is designed based the ARCS Motivation Theory. Similar results were achieved in the face-to-face (Visser & Keller, 1990), computer-based (Shellnut, Savage & Knowlton, 1999), computer-assisted (Song & Keller, 2001), and instruction developed in online environments (Suzuki, Nishibuchi, Yamamoto & Keller, 2004) which utilized the ARCS Motivation Theory. Therefore instructional designers and instructors should consider the integration of the ARCS Motivation Theory in their design consideration for blended courses so that learning environments can be managed to stimulate and sustain motivation (Keller, 1999). It is suggested that researchers in the future should replicate the study with samples in different context to make the results of this study more generalizable.

Authors note: The earlier version of this study was presented at the ED-MEDIA 2008 which was held in Vienna, Austria.

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REFERENCES

Akdemir, O. & Colakoglu, O. (2008). Measuring motivation in the instruction developed for blended courses. In *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2008* (pp. 10-15). Chesapeake, VA: AACE.

Akdemir, O. & Koszalka, T. (2008). Investigating the relationships among instructional strategies and learning styles in online environments. *Computers & Education*, 50 (4), 1451–1461.

Bonk, C. J. & Graham, C. R.(2005). *The handbook of blended learning: Global perspectives, local designs.* San Francisco: Pfeiffer.

Capshew, T. F. (2005). Motivating social work students in statistic courses. *Social Work Education*. 24(8), 857-868.

Chyung, Y. (2001). Systemic and systematic approaches to reducing attrition rates in online higher education. *The American Journal of Distance Education (AJDE), 15* (3), 36-49.

Dilalla, F. L. (2000). Structural equation modeling: uses and issues. *Handbook of Applied Multivariate Statistics and Mathematical Modeling*. Tinsley, H. E. A. & Brown, S. D. (Eds.). San Diego, Academic Press: 439–462.

Feng, S., & Tuan, H. (2005). Using arcs model to promote 11th graders' motivation and achievement in learning about acids and bases. *International Journal of Science and Mathematics Education, 3*(3), 463–484.

Gagne, R., Briggs, L. & Wager, W. (1992). *Principles of instructional design* (4th

Ed.). Fort Worth, TX: HBJ College Publishers.

Hoyle, R. H. (2000). Confirmatory factor analysis. *Handbook Of Applied Multivariate Statistics And Mathematical Modeling.* Tinsley, H. E. A. & Brown, S. D. (Eds.). New York: Academic Press: 465-497.

Huang, W. Huang, W. Diefes-Dux, H. Imbrie, P. K. (2006). A preliminary validation of attention, relevance, confidence and satisfaction model-based instructional material motivational survey in a computer-based tutorial setting. *British Journal of Educational Technology,* 37 (2), 243-259.

Keller, J. M. (1983). Motivational design of instruction. In Reigeluth, C. M. (Ed.), *Instructional-Design Theories and Models: An Overview of their Current Status.* Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Keller, J. M. (1999). Motivation in cyber learning environments. *International Journal of Educational Technology*, 1(1), 7–30.

Keller, J. M. & Litchfield, B.C. (2002). Motivation and performance. In R. A. Reiser & J. V. Dempsey (Eds.), *Trends and Issues in Instructioanal Design and Technology*. New Jersey: Merill Prenctice Hall.

Keller, J. (2008). First principles of motivation to learn and e3-learning. *Distance Education.* 29(2), 175-185.

Kim, K. H., & Bentler, P. M. (2006). Data Modeling: Structural Equation Modeling. In J. L. Green, G. Camilli, P. B. Elmore, A. Skukauskaite & E. Grace (Eds.), *Handbook of Complementary Methods in Educational Research*. New Jersey: Lawrence Erlbaum Association Publishers: 161- 175.

Reigeluth, C. M. (1983*). Instructional-design theories and models: An overview of their current status*. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Shellnut, B., Knowltion, A. & Savage, T. (1999). Applying the ARCS model to the design and development of computer-based modules for manufacturing engineering courses. Educational Technology Research and Development. 47(2), 100-110.

Stevens, J. (1996). *Applied multivariate statistics for the social sciences*. Mahwah, New Jersey, Lawrence Erlbaum Associates.

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

Suziki, K., Nishibuchi, A., Yamamoto, H., and Keller, J. M. (2004). Development and evaluation of a website to check instructional design based on the ARCS Motivation Model. J*ournal of the Japanese Society for Information and Systems in Education, 2(1),* 63-69.

Tabachnick, B. G. & L. S. Fidell (1989). *Using multivariate statistics*. California State University, Northridge, Harper Collins Publishers.

Visser, J. & Keller, J. M. (1990). The clinical use of motivaitonal messages: an inquiry into the validity of the ARCS model of motivational design. *Instructional Science*, *19*, 467–500.