

Validation of the CIS Scale to Measure Students' Extrinsic Learning Motivation in Indonesian Context

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Abstract. Motivation is one of the most important factors that determine students' success in the university. Extrinsic learning motivation is defined as students' learning motivation that comes from external situations such as the lecturers. Students are often motivated by their lecturers in terms of the lecturer's teaching methods and lecturer characteristics. Course interest survey (CIS) is a tool that can be used to measure students' extrinsic motivation. CIS is developed by Keller & Subhiyah (1993) based on ARCS extrinsic motivation theory. This study aims to adapt the CIS scale for undergraduate students in Indonesia. Participants in this study are 240 undergraduate students with an age range between 18 – 23 years old. The CIS scale was analyzed using second-order confirmatory factor analysis (CFA). The results show that the Indonesian version of the CIS scale consists of 4 constructs (attention, relevance, confidence, and satisfaction) which is similar to the original CIS scale. Therefore, the Indonesian version of the CIS scale can be used to measure extrinsic learning motivation in the Indonesian context.

Keywords: CIS scale; extrinsic learning motivation; undergraduate students

1 Introduction

Siamese orange (*Citrus nobilis* var. *Microcarpa* Hassk) has been widely cultivated as an effort Learning motivation is an important concept in the teaching and learning conduct in Higher Education 1–3. Students tend to learn enthusiastically when they have a consistent learning motivation 4. Motivation is defined as a drive that directs or sustains one's behavior 5. In a learning context of an educational institution, learning motivation is a drive that would direct students to sustain their learning behavior 6,7. Learning motivation would make every learning activity to be meaningful; thus, learning motivation make students more focused in conducting each of their learning activity 8. Several studies indicate that learning motivation is connected to the students' academic achievements in Higher Education 4,9.

Those studies stated that good learning motivation would improve students' learning achievements in an educational institution. Thus, learning motivation plays an important role in determining students' learning results and discussion on learning motivation is necessary for universities to obtain optimized learning results. In the discussion of learning motivation, it is also necessary to also include two types of learning motivations: intrinsic and extrinsic learning motivations 6,10–12. Intrinsic learning motivation refers to the drive that comes from inside the learner, while extrinsic learning motivation refers to the drive that comes from conditions from

outside 6,11. In the context of studies on learning motivation, most of them focused more on intrinsic motivation compared to the extrinsic one 4,13,14. However, extrinsic learning motivation is also important considering its impact on students' learning achievements 6. One of the important extrinsic learning motivations in teaching and learning activities in universities are the lecturers 4,14. Some studies found that extrinsic learning motivation originated from the lecturer may play an important role in the learning context of higher education.

Related to extrinsic learning motivation, the ARCS motivation theory from John Keller may provide the required theoretical approach 10,13. This theory states that learners perceptions towards the instructor efforts to create the extrinsic learning motivation on them which has four elements: A (Attention), R (Relevance), C (Confidence), and S (Satisfaction). A teacher is required to have these elements when he teaches the students. Attention (A) refers to whether a teacher can attract students' attention from his method of teaching. Relevance (R) refers to whether a teacher is able to establish the relevance or connection of the learning materials to students' needs. Confidence (C) refers to when a teacher is capable of promoting students' confidence to get involved in the learning activities while Satisfaction (S) refers to whether a teacher can deliver the feel of satisfaction to his students during the teaching and learning process. Studies on ARCS motivation found that ARCS motivation which comes from the teacher's efforts to design the teaching and learning situation actually influences students' learning achievements 4,14.

As one of the factors that may be impactful to students' learning achievements, it is necessary to further study the ARCS motivation in teaching and learning situations. Thus, it is necessary to have a research instrument that is capable to describe students' ARCS motivation. The instrument for extrinsic learning motivation was initially developed in English by John Keller with Subhiyah in 1993 (Keller 2010). To be used in the learning context of universities, it is necessary to adapt the instrument in Indonesian. The adapted version is expected to be able to measure Indonesian students' ARCS motivation caused by the teaching method conducted by the lecturers, in their efforts to provide ARCS motivation in the learning situation

2 Literature Review

ARCS Motivation

ARCS motivation is a concept on motivation postulated by John Keller on students' involvement in university learning activities 13. This theory is derived from the concept that a teacher must be able to design a learning method that motivates students to reach the learning objectives. ARCS motivation is defined as a student's perception of the teaching activities conducted by the teacher, involving four components, namely A (Attention), R (Relevance), C (Confidence), and S (Satisfaction).

These ARCS motivational components refer to attention as being able to attract students' focus to the learning materials through his teaching method, relevance as to whether the learning materials are connected to students' needs, confidence as to whether a teacher is able to help students to feel confident on themselves, and satisfaction as to whether the teacher can help students to feel satisfied towards the learning process 13. The learning situation that meets the ARCS elements would motivate students to achieve optimum learning achievements.

Regarding attention, a teacher is to help students to feel attracted to the learning materials 10,13. Several available techniques are techniques of perceptual arousal, inquiry arousal, and variability. By perceptual arousal technique, the teacher would arouse students' interests by non-verbal communication items, such as voice intonation, gesture, and pleasant facial expression when explaining something. Besides that, the perceptual arousal technique is also

conducted by using attractive information pieces about the learning materials and the use of humor when explaining 13. By inquiry arousal technique, the teacher is able to pique the students' curiosity towards the learning materials from the warm-up activity, problem-solving, and the use of multimedia 13. By variability technique, the teacher is to use various activities to help students in understanding the relevance of the learning materials and their needs.

Regarding relevance, a teacher is to help the students to see the relevance between the learning materials and students' needs and thus make the learning materials relevant and useful for the students 10,13. The techniques used to promote this are goal orientation, motive matching, and familiarity 13. Goal orientation connects the learning materials and students' future needs, such as the connection between learning materials and real work. The motive matching technique is conducted by creating a learning situation containing positive interpersonal relationships among the students, and thus making students who have good friendships would feel comfortable to learn in the class. The familiarity technique is conducted when the teacher tries to connect the instructions given to students with their daily experiences. Students tend to be interested if the information in the learning materials is related to events happening in their daily life.

Regarding confidence, a teacher is to create a learning situation capable of promoting confidence among the learners 10,13. Several available techniques are learning requirements, success opportunities, and personal control 13. The learning requirement technique aims at helping students to make realistic and concrete learning targets and thus increasing their confidence to meet the targets. The success opportunities technique emphasizes the teacher's role to present learning materials that are suitable to students' capability: not too easy for students to get bored, not too hard for students to get frustrated. The personal control technique focuses more on how the teacher can deliver the learning materials containing problem-solving and thus increasing students' confidence in their capability to understand the materials.

Regarding satisfaction, a teacher is expected to deliver learning materials to the extent that students would be satisfied with their learning achievements, resulting in enthusiasm to learn the materials further 10,13. Several available techniques for this purpose are natural consequences, positive consequences, and equity 13. The natural consequences technique is conducted when the teacher gives opportunities for the students to concretely apply what they have learned. This may take the form of a case study or simulation. Positive consequences are conducted when the teacher reinforces if students can attain the learning objectives. Reinforcements can be given in the form of rewards by giving praises or support to the students. Equity technique is conducted when the teacher ensures that all students would get the same treatments during learning situations, including the assessment of the learning achievements. The feeling of equality felt by the students would increase the satisfaction with the learning activities.

The techniques for promoting ARCS motivation explained above are for teachers to apply in order to trigger students' enthusiasm to study 10,13. When it is connected to the learning situation in universities, students with a perception that the lecturer could create a learning situation in accordance with ARCS components would be more enthusiastic during the learning process 4,14.

ARCS Motivation Scale

ARCS motivation scale is developed based on the ARCS motivation theory by John Keller with Subhiyah in 1993 (Keller 2010). This scale comprises 4 dimensions: Attention, Relevance, Confidence, and Satisfaction. This scale consists of 34 statements which are divided into 8 statements for Attention, 9 statements for Relevance, 9 statements for Confidence, and 9

statements on Satisfaction. The type of statements in the ARCS consists of 23 favorable statements and 9 unfavorable statements, which are distributed in each dimension of the ARCS motivation.

Each item would have 5 answer choices: score 1 (not true), 2 (slightly true), 3 (moderately true), 4 (mostly true), and 5 (very true). The α value on the whole scale is 0.95 with the following scores for each aspect: Attention ($\alpha = 0.84$), Relevance ($\alpha = 0.84$), Confidence ($\alpha = 0.81$), and Satisfaction ($\alpha = 0.88$). The blueprint for ARCS motivation scale and its dimensions are as follows:

Table 1. Blueprint ARC Motivation Scale

Items	Dimension (Items)				Total
	<i>Attention</i>	<i>Relevance</i>	<i>Confidence</i>	<i>Satisfaction</i>	
<i>Favourable</i>	1,10,15, 21,24,29	2,5,13,20, 22,23,28	3,9,27, 30,34	12,14,16,18, 19,32,33	23
<i>Unfavourable</i>	4,26	8,25	6,11,17	7,31	9
Total	8	9	8	9	34

The reliability test of this scale is conducted on 200 S1 and S2 students in the United States and it measures the teaching and learning situation facilitated by the teacher (Keller 2010). This scale has a correlation value of 0.47 with students' scores on current courses, while the scores for the aspects are as follow: Attention ($r = 0.19$), Relevance ($r = 0.43$), Confidence ($r = 0.51$) and Satisfaction ($r = 0.49$).

There are several studies using the ARCS model. In a study on online learning by Huett, Kalinowski, Moller, & Huett (2008) shows the α value of 0.932 with each aspect scores as in the following: Attention ($\alpha = 0.753$); Relevance ($\alpha = 0.804$); Confidence ($\alpha = 0.758$) dan Satisfaction ($\alpha = 0.851$). A study conducted by Robb (2010) in which 200 students in Georgia with the ARCS scale ARCS = 0.93 and the aspects scores are Attention ($\alpha = 0.84$); Relevance ($\alpha = 0.82$); Confidence ($\alpha = 0.67$) dan Satisfaction ($\alpha = 0.84$). Another study which conducted on 24 students in Selangor showed the value of 0.882 without mentioning any value on the dimension 17.

3 Research Methods

Procedure

Procedures conducted to validate the ARCS motivation scale are based on the procedures to adopt a measurement scale based on International Test Commission (ITC, 2018). The first step is the pre-condition: asking permission via email to John Keller to adapt the scale into Indonesian. Next, it is the test development test: translating ARCS motivation scale into Bahasa Indonesia which was conducted by 2 translators, then synthesizing the results into one (forward translation).

After conducting forward translation, the result would be translated back into English (backward translation) by 2 other translators, who are different from the first translators, to check whether the translated version is suitable with the original ARCS motivation scale. The next step is by asking the synthesizing the backward translation to be assessed by an expert reviewer. Here, the researcher sent the original ARCS motivation scale along with the Indonesian version and the backward translated version to 3 expert reviewers to assess their conformity.

After getting feedback from expert reviewers, a focus group discussion with 17 students who worked on the pre-final version of the ARCS motivation scale was conducted to provide feedback on the scale. After getting all the feedbacks, the researcher made several revisions to the pre-final version of ARCS motivation scale and then administered the final version of ARCS motivation scale to the 240 students to the complete-scale adaptation process.

Participants

The participants involved in filling in the Indonesian version of ARCS motivation scale numbered 240 students from a private university in Surabaya. The age of the participants is around 18 – 23 years old with a proportion of 53 males and 187 females. These students came from the Faculty of Psychology, Nursery, Pharmacy, Medicine, and Engineering.

Measures

The measuring tool for this research is ARCS motivation scale developed by John Keller and Subhiyah in 1993 (Keller 2010). This scale has been adapted to Bahasa Indonesia through the process of measurement scale adaptation process in accordance with the standard of the International Test Commissions 18. This scale covers the 4 dimensions of ARCS motivation: attention, relevance, confidence, and satisfaction. The alternative answers for each statement item are not true, slightly true, moderately true, mostly true, and very true. Data were to be analyzed using the confirmatory factor analysis based on the structural equation model 19.

4 Results and Discussion

Results showed that there are 22 valid items from the 34 original statements, namely attention dimension (6 items), relevance dimension (7 items), confidence dimension (3 items), and satisfaction dimension (6 items). Results of the CFA test with a loading factor less than 0.5 were found in 12 items; thus only 22 items are considered valid with a loading factor above 0.5. Results of the valid items with confirmatory factor analysis (CFA) are in table 2.

Table 2. Items in the Indonesian version of ARCS motivation scale

Dimension	Item	Total*
<i>Attention</i>	1,10,15,21,24,29	6
<i>Relevance</i>	2,5,13,20,22,23,28	7
<i>Confidence</i>	3,30,34	3
<i>Satisfaction</i>	12,16,18,19,32,33	6
Total		22

*Item has factor loadings > 0.5

Results of CFA consist of factor loadings and construct reliability of ARCS motivation scale is in table 3.

Table 3. Factor loadings and construct reliability of Indonesian version of ARCS motivation scale

Dimension	Item	Factor Loading	Construct Reliability	α Cronbach
Attention	A1 (1)	0,68	0,802	0,802
	A3 (10)	0,53		
	A4 (15)	0,66		
	A5 (21)	0,53		
	A6 (24)	0,59		

Relevance	A8 (29)	0,80	0,831	0,833
	R9 (2)	0,64		
	R10 (5)	0,69		
	R12 (13)	0,52		
	R13 (20)	0,70		
	R14 (22)	0,62		
	R15 (23)	0,55		
Confidence	R17 (28)	0,76	0,613	0,565
	C18 (3)	0,56		
	C24 (30)	0,53		
Satisfaction	C25 (34)	0,67	0,807	0,814
	S27 (12)	0,72		
	S29 (16)	0,75		
	S30 (18)	0,49		
	S31 (19)	0,76		
	S33 (32)	0,57		
Second-order CFA	S34 (33)	0,53	0,971	
	Attention	0,94		
	Relevance	0,98		
	Confidence	0,95		
	Satisfaction	0,91		
ARCS Motivation Scale				0,927

The test figure of CFA on the Indonesian version of ARCS motivation scale is in the following:

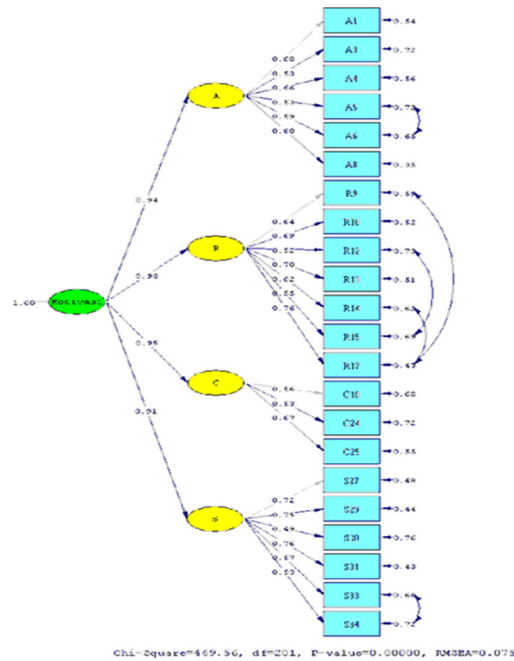


Fig.1. Confirmatory factor analysis Bahasa Indonesia version of ARCS motivation scale

The fit indices on the model of confirmatory factor analysis of ARCS motivation scale show that the model fulfilled the fit criteria in 4 categories: RMSEA (0.075), SRMR (0.058), NNFI (0.96), and NFI (0.94). The measurement model is considered fit when it fulfilled fit indices > 3 criteria 19. This shows that the Indonesian version of ARCS motivation scale is fit enough to measure ARCS motivation of students in Indonesia.

Discussion

Results showed that the Indonesian version of ARCS motivation scale fulfilled the fit model criteria of the measurement model. Prior studies have yet to use confirmatory factor analysis to test whether the dimensions of ARCS motivation scale are suitable to the built theoretical model 10,14,17,20. This research managed to prove that the ARCS measurement model which describes the ARCS dimensions is suitable for the population of higher education students in Indonesia.

The research conducted by John Keller mentioned that the value for α Cronbach of ARCS motivation scale is 0.95 13. Another study by Huet et. al (2008), Rob (2010), and Wah (2015) found that α Cronbach values for ARCS motivation scale are 0.932, 0.93, and 0.882 15–17. These results are in line with the current research that shows α Cronbach value for the Indonesian version of ARCS motivation scale is 0.927. This means that the ARCS motivation scale has a high-reliability value.

The dimension with the most eliminated items is the confidence dimension, namely the teacher's efforts to promote confidence among students. The fact that this item is eliminated the most means that there is a possibility of the statements for this dimension to have less varied results and thus reducing its suitability for the learning characteristics in Indonesia. Two of the eliminated items are number 6 "You have to be lucky to get a good grade in this course" and number 17 "It is difficult to predict what grade the instructor will give my assignments".

Regarding the other dimensions, it was found that the dimension of attention, relevance, and satisfaction only have 2-3 eliminated items, indicating that statements of ARCS motivation scale are capable to disclose ARCS motivation originated from lecturers. It is also consistent with the α Cronbach value for the Indonesian version of ARCS motivation of 0.927, indicating that the Indonesian version of ARCS motivation scale is capable of measuring lecturers' efforts to promote ARCS extrinsic motivation among students in Indonesia.

The measurement model fits in the Indonesian version of ARCS motivation scale, indicating a similarity between the learning situations in the USA and Indonesia; it seems that the lecturers in Indonesia have spent quite an effort to create a learning situation that filled in the elements of attention, relevance, confidence, and satisfaction. Several studies in Indonesian universities have indicated the lecturers' efforts to attract the students to focus on learning and promote confidence through problem-based learning, experiential learning, and guiding question methods 14,21,22. These mentioned findings further emphasize the similarity of situations between Indonesia and the USA, where the scale is being developed for the first time, and thus make it possible to adapt the ARCS motivation scale in the context of higher education in Indonesia.

The novelty of this research is the testing of ARCS motivation scale in the context of teaching and learning situations in the context of higher education in Indonesia. Besides that, the confirmatory factor analysis test also proves that ARCS dimensions indeed confirm that the theoretical model postulated by John Keller is suitable for higher education students in Indonesia. The limitation of this research is the limited variation of faculties in Indonesia and the test of this measurement tool in an online learning situation.

5 Conclusion

The Indonesian version of ARCS motivation scale is applicable to measure the ARCS motivation of students in Indonesia. The scale has a quite high reliability value and is proven to have 4 dimensions: attention, relevance, confidence, and satisfaction, in line with the theoretical model of ARCS motivation theory. Further study could aim to adapt this scale to a population with more varied faculties. Besides that, the adaptation of this scale to the context of online learning is also required to make it more relevant to the current learning situation.

References

- [1] Hakkarainen, P. Learning Motivation and Activity Contexts. *Scand. J. Educ. Res.* 38, 195–207 (1994).
- [2] Littlejohn, A., Hood, N., Milligan, C. & Mustain, P. Learning in MOOCs: Motivations and self-regulated learning in MOOCs. *Internet High. Educ.* 29, 40–48 (2016).
- [3] Zhou, X. & Tian, L. Study on learning motivation for innovative talents of local normal universities. *J. Interdiscip. Math.* 20, 1401–1405 (2017).
- [4] Sumargi, A. M., Christanti, F. . & Simanjuntak, E. Analisis Motivasi Belajar Ekstrinsik dan Pengaruhnya Pada Prestasi Belajar Mahasiswa. *Insa. Media Psikol.* 9, 199–214 (2007).
- [5] Feldman, R. S. *Essentials of Understanding Psychology*. (McGraw-Hill, 2015).
- [6] Santrock, J. W. *Educational Psychology*. (McGraw-Hill, 2018).
- [7] Pan, Y. & Gauvain, M. The continuity of college students' autonomous learning motivation and its predictors: A three-year longitudinal study. *Learn. Individ. Differ.* 22, 92–99 (2012).
- [8] Burden, P. R. & Byrd, D. M. *Methods for effective teaching: Meeting the needs of all students*. (Pearson International Edition, 2010).
- [9] Oz, H. Academic Motivation and Academic Achievement among Preservice English Teachers: A Structural Equation Modeling Approach. *Anthropol.* 25, 240–248 (2016).
- [10] Li, K. & Keller, J. M. Use of the ARCS model in education: A literature review. *Comput. Educ.* 122, 54–62 (2018).
- [11] Elliot, S. N., Kratochwill, T. R., Cook, J. L. & Travers, J. F. *Educational Psychology : Effective Teaching, Effective Learning*. (McGraw-Hill, 2000).
- [12] Lin, Y.-G., McKeachie, W. J. & Kim, Y. C. College student intrinsic and/or extrinsic motivation and learning. *Learn. Individ. Differ.* 13, 251–258 (2003).
- [13] Keller, J. M. *Motivational Design for Learning and Performance : The ARCS Model Approach*. (Springer, 2010).
- [14] Simanjuntak, E. Guiding Questions Method and Extrinsic Learning Motivation of First-Year University Students. *ANIMA Indones. Psychol. J.* 30, 148 (2015).
- [15] Huett, J. B., Kalinowski, K. E., Moller, L. & Huett, K. C. Improving the Motivation and Retention of Online Students Through the Use of ARCS-Based E-Mails. *Am. J. Distance Educ.* 22, 159–176 (2008).
- [16] Robb, C. *The Impact of Motivational Messages on Student Performance in Community College Online Courses*. (University of Illinois at Urbana-Champaign, 2010).
- [17] Wah, L. K. The effects of instruction using the arcs model and Geogebra on upper secondary students' motivation and achievement in learning combined transformation. *Asia Pacific J. Educ. Educ.* 30, 141–158. (2015).
- [18] ITC. *ITC Guidelines for Translating and Adapting Tests (Second Edition)*. *Int. J. Test.* 18, 101–134 (2018).
- [19] Hair, J. F., Black, W. C., Babin, B. J. & Anderson, R. E. *Multivariate Data Analysis*. (Pearson, 2014).
- [20] Turel, Y. K. & Ozer Sanal, S. The effects of an ARCS based e-book on student's achievement, motivation and anxiety. *Comput. Educ.* 127, 130–140 (2018).

- [21] Dibiyasakti, B. A., Rahayu, G. R. & Suhoyo, Y. Tingkat Pelaksanaan Problem-Based Learning di Fakultas Kedokteran Universitas Gadjah Mada Berdasarkan Pembelajaran Konstruktif, Mandiri, Kolaboratif, dan Kontekstual. *J. Pendidik. Kedokt. Indones. Indones. J. Med. Educ.* 2, 44 (2013).
- [22] Setiawan Bakar, I. P. Efektivitas Experiential Learning dalam Meningkatkan Pemahaman Materi Psikologi Perkembangan. *PEMBELAJAR J. Ilmu Pendidikan, Keguruan, dan Pembelajaran* 4, 23 (2020).