

## **The Impact of Applying the ARCS Model to the Design of E-learning Materials on the Learning Motivation of Second-Grade Students**

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### **ABSTRACT**

The present study was conducted to explore the impact of e-learning materials designed in accordance with the attention, relevance, confidence and satisfaction (ARCS) model for the lessons of a second-grade Arabic language subject on student motivation to learn. The study also sought to gauge the magnitude of this impact. A mixed methods approach to research design was adopted where the results were derived from data of both quantitative and qualitative nature. A cohort of 25 female students attending a second-grade class in an elementary school in the Eastern province of Saudi Arabia was selected to participate in the study. The results showed that attention, relevance, and confidence had large impacts on the motivation to learn of the sampled students. The satisfaction component also had an effect on these students' motivation to learn, but the magnitude of that impact was assessed as moderate. In respect to the qualitative data collected to capture the perspective of the mothers of the sampled students in regard to the impact of the ARCS-based materials on their daughters' motivation to learn, three themes were induced and labeled cognitive skills, learner behavior and positive emotion. These three themes and their subthemes are highly congruent with the quantitatively-based findings. The implications of the findings of this study were discussed.

**Keywords:** ARCS model, motivational design, online learning, student motivation, e-learning materials.

### **Introduction**

The eruption of the novel coronavirus disease (Covid-19) inflicted many drastic and unprecedented changes on various sectors at the global level. The education sector was not an exception. In a response to such a global trauma, almost all countries shifted from the traditional mode of teaching and learning with its focus on classroom-based communication between teachers and students to the online mode of delivery (Aldhahi et al., 2021). As a result of this transition, the emergency remote model of teaching has dominated the delivery of learning in universities or schools, rendering electronic learning to be the norm in recent times.

The Ministry of Education (MOE) in Saudi Arabia joined the global efforts to curb the spread of the pandemic and thus followed suit in adopting such transformation. MOE offers teachers and students several e-learning resources to support class activities, the most important of which is the National Education Portal (iEN). This e-learning platform comprises an extensive library of electronic textbooks readily available to students as well as teachers to access. Numerous induction training sessions were provided to teachers on how to develop e-learning materials and to conduct online teaching. Online classes generally constitute a challenge for students. Compared with those enrolled in face-to-face classes, students attending online learning tend to drop out of courses and procrastinate in submitting assignments due to the lack of motivation associated with weak instructional designs (Malik, 2014). Abou El-Seoud et al. (2014) suggest that attempts to incorporate information and communication technology into the learning process should take into consideration student motivation to learn since it is a decisive factor of the success or failure of online instruction.

Several psychology-based models and theoretical frameworks have been incorporated into the field of education to explain, examine and understand the construct of student motivation to learn. Examples of such models include the expectancy-value, self-determination, need, and goal-orientation theories (Cook & Artino, 2016). Another important motivational model is the attention, relevance, confidence, and satisfaction model (ARCS), which has gained wide popularity in the education literature for the study of student motivation (Dincer, 2020; Humaid, 2018; Refat et al., 2020). The widespread use of the ARCS model can be attributed to its flexibility in the sense that it can be applied in different learning environments, such as face-to-face, computer-based, and online learning, and that its categories can be adjusted to students' culture, age, gender, and educational purpose (Li & Keller, 2018). Combining instructional designs with ARCS strategies is claimed to have the potential to boost student motivation (Keller, 2010). Keller and Suzuki (2004) indicated that the ARCS model has been validated worldwide as a tool for identifying the motivational requirements of e-learning, hence improving student motivation to learn in e-learning settings.

A plethora of studies have empirically explored the effects of the ARCS model on the learning motivation of high school and university students (Ibrahim, 2019; Turel & Sanal, 2018; Wang et al., 2020). Nevertheless, little attention has been paid to the motivational requirements of students, which are more difficult for e-learning than for conventional learning. Moreover, there exists a paucity of research on the examination of the ARCS application in the domain of the design of instructional materials for online elementary classrooms, particularly second-grade ones. Therefore, the present study is expected to contribute toward bridging this gap in such a way that its findings would assist in extending our knowledge of the usefulness of the ARCS model for the design of e-learning materials for second-grade subjects. Moreover, it is anticipated that the results of this study would provide an empirically-based insight into the motivation of elementary school students in general and second-grade students in particular that could inform future research in the area of e-learning in developing countries.

### **Research Purpose and Question**

The present study seeks to delineate whether technology-based materials designed according to the ARCS model of motivation have an impact on the motivation to learn of second-grade students. In this context, an impact is most often measured by the difference in the motivational level of the targeted students before and following the use of technology-based learning materials of a subject designed according to the ARCS model. Therefore, the following research question was formulated:

- Does the use of technology-based learning materials designed based on the ARCS model have an impact on the motivation to learn of second-grade students?  
Determining that an impact has occurred is not enough from a practical standpoint. The magnitude of the impact (effect size) needs to be specified as well. It is crucial to be cognizant about whether the time and resources invested in the design of technology-based materials are cost-effective. As a result of this, the following research question was developed:
- What is the magnitude of the impact of using technology-based learning materials designed in accordance with the ARCS model on the motivation to learn of second-grade students?  
The scope of this study was extended to include the behavioral manifestations related to the motivation of second-grade students from the viewpoint of their parents. In an e-learning environment, parents are regarded as partners to teachers, and thus their involvement and engagement in the process of their children's learning is essential and of great significance to the effectiveness of learning (Sari & Mainstays, 2020). The parents are expected to assume an active role in facilitating, mentoring, supporting and directing the learning of their children. During the critical times of Covid-19, parents have taken on the responsibility for ensuring that the learning of their children continues seamlessly. Thus, an understanding of the perspective of the mothers of the students conveniently selected to participate in the study appears to be of paramount importance. The rationale for focusing on the mothers only stems from the fact that in Saudi culture as well as other cultures, mothers of students are the ones who are mostly engaged with the learning of children, particularly during their early years of education. Moreover, from a societal standpoint, interaction with the mothers was considered to be much easier and convenient for the research team in terms of accessibility and acceptability. As a result of this, the following research question was developed:
- What are the effects of ARCS-based e-learning materials on the motivation to learn of second-grade students from the perspective of their mothers?

### **Literature review**

#### **E-learning Materials and Motivation**

The last two decades have witnessed a wide acceptance and utilization of information and communication technology across educational systems worldwide. This technology has served as a tool for facilitating learning and as a change agent for achieving the principal objectives and goals of education (Sharma & Srivastava, 2019). The advent of information technology offered educators ample opportunities to introduce technology-based learning (or e-learning) materials to classrooms. Such materials generally represent an integral category of the learning process since they play an immensely important role in promoting student learning and assisting in the accomplishment of the goals and objectives of learning.

Learning materials can be broadly defined as anything that teachers can use to facilitate the teaching and learning process (Harsono, 2015). Due to the pervasive availability of information and communication technology and the remarkable expansion of the internet in recent years, learning materials have become available in abundance and readily accessible by the masses. As mentioned above, the Covid-19 pandemic hugely impacted the education sector in every country at all levels and abruptly forced teachers as well as students to adapt to remote learning. That state of affairs created a burden on the part of teachers to develop, design and prepare learning materials suitable for e-

learning in terms of meeting the expectations of students and simultaneously accomplishing the goals and objectives of learning. These materials are technology-based since they basically typify study resources published in digital format (e.g., electronic textbooks, educational videos, and electronic tests) and provided through electronic devices, such as computers, tablets, and smart phones.

Learning materials are classified into two types: concrete and abstract. The concrete type of learning materials refers to objects that are available to the senses, such as streets and buildings, whereas the abstract type refers to objects that are not available to the senses, such as ideas and concepts. McNeil and Uttal (2009) believed that it is more effective to use concrete materials with young students. This belief was substantiated by the conclusion of Jaakkola and Veermans's (2014) empirical study which found that concrete and abstract representations for elementary school learners notably differ from those for college students and that concrete representations are more suitable for young students. In designing learning materials, educators are expected to pay more attention to the potential effect of concrete materials on student learning and to systematically investigate the type and amount of direction that students need when using such materials (McNeil & Uttal, 2009). Dincer (2020) also stated that when the design of learning materials is at stake, it is imperative that the experience of teachers and the cultural characteristics of targeted students are taken into account. Therefore, the absence of such considerations would impose a dent on the positive relationship between learning materials and student motivation to learn.

E-learning materials are interactive tools used in the implementation of online learning, and in this sense, they represent a functional link between an assigned textbook in a curriculum and multimedia to offer support for students. Klement et al., (2013) indicated that e-learning materials are a new type of educational materials that use pedagogical information from various media sources, such as hypertext, graphics, videos, sound recordings, animation and simulation. Most teachers at all educational levels have encountered serious challenges with carrying out the tasks required for the development and design of e-learning materials due to insufficient experience with available instructional technologies, poor competencies with the use of digital instructional formats, and inadequate online teaching infrastructure (Alea et al., 2020; Carrillo & Flores, 2020). Additionally, learning readiness, communication and the role of parents have also been identified as factors that pose obstacles to most teachers in all aspects of the online teaching environment (Tamin & Mohamad, 2020).

Technology-based materials essentially serve as a tool to foster student motivation to learn, which represents the driving force for ensuring the continuity of the learning process and providing guidance pertaining to the achievement of learning objectives (Puspitarini & Hanif, 2019). Student motivation to learn involves student engagement and excitement and in turn is linked directly to academic achievement. Thus, it is vital for educators to utilize learning materials that motivate students in the learning process and meet their expectations.

### **Motivation to Learn**

Generally, motivation can be defined as an internal force or desire that stimulates, energizes, and directs goal-oriented behavior (Ngunjiri, 2020). In a learning context, motivation can be an inner drive that stimulates, energizes and directs a student to learn. Motivation to learn is a critical construct for determining a student's level of engagement in the learning environment. Anderson et al. (2004) state that lack of engagement in class activities simply reflects a deficit in a student's motivation to learn. Moreover, motivation to learn was found to be positively correlated with learning achievement (Uyulgan & Akkuzu, 2014), which represents a benchmark for the success of students in the learning process (Junita & Kartikowati, 2018). There exist two dimensions of motivation to learn: intrinsic (primary) and extrinsic (secondary). Intrinsic motivation refers to a student's desire or will to succeed in performing a specific task for its own sake and for the pleasure and satisfaction that the student derives from acting on that task. Vallerand et al. (1992) categorize intrinsic motivation into three groups. The first group is intrinsic motivation to know, which refers to a student's execution of a task for the pleasure and satisfaction that they experience from learning new things. The second group is intrinsic motivation to accomplish, which refers to a student's engagement in a task for the pleasure and satisfaction that they derive from attempting to achieve something. The final group is intrinsic motivation to experience stimulation, which refers to a student's involvement in a task for the purpose of stimulating sensation, such as excitement, pleasure and enjoyment. Contrastingly, extrinsic motivation refers to contingent rewards that a student expects to receive from performing a particular task (Benabou & Tirole, 2003). This form of motivation is subject to the reinforcement and constraints that a student has experienced or faced (Zghlul & Al-Hindawi, 2015).

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It has been reported that students who are intrinsically motivated are more successful than those who are extrinsically motivated, and that high-performing students have a high level of intrinsic motivation (Uyulgan & Akkuzu, 2014). Dincer (2020) argued that a student can accept responsibility for their personal learning and be creative and interested in their assigned tasks if they possess a high level of intrinsic motivation. Brophy (2004) suggested a set of motivational strategies that educators can pursue in order to effectively stimulate students' engagement in learning: namely, satisfy students' expectations of success, enhance existing intrinsic motivation, offer extrinsic motivation and nurture student motivation to learn. Such strategies would not be fruitful if learning materials failed to improve the motivation of students to learn.

Extensive efforts have been exerted to explain the theoretical underpinnings of the construct of motivation to learn. Cook and Artino (2016) provided an in-depth overview of the most popular motivation theories in recent years, including the expectancy-value theory (EVT), social-cognitive theory (SCT), goal-orientation theory (GOT), and self-determination theory (SDT). These theories inherently overlap and have concepts in common. EVT nurtures the presumption that motivation to learn is influenced by two salient factors: expectancy of success and perceived value. The former involves the extent to which a student believes that they will be successful if they exert an effort to perform a specific task, while the latter involves the extent to which a student perceives their personal importance, value, or intrinsic interest in performing the task.

SCT emphasizes that the learning of a student is a function of reciprocal interactions among a host of personal, behavioral and environmental factors. According to SCT, motivation to learn depends largely on the concept of self-efficacy, which is dynamic and context-specific. It refers to the subjective judgement of a student in regard to their ability to actually complete a particular task at a certain level. SCT contends that students rely on self-regulated feedback about their learning and performance. GOT postulates that a student engages in a task with certain goals in mind, specifically mastery goals, performance-approach goals or performance-avoidance goals. These goals indicate that a student is inclined to get to grips with the content of their task, perform better than others, or avoid failing in their task. The mastery goals are concerned with stimulating interest and promoting learning. The performance-approach goals relate to the achievement of better grades, whereas the performance-avoidance goals relate to evading failure.

Finally, SDT evolved from the intrinsic and extrinsic dimensions of motivation. It posits that intrinsic motivation represents the positive potential of human nature, and it reflects a natural propensity toward learning associated with cognitive and social developments (Ryan & Deci, 2000). According to SDT, sustaining intrinsic motivation requires fulfillment of three psychological needs: namely, competence, autonomy, and relatedness. Competence refers to a student's feeling of being able to execute a particular task, whereas autonomy refers to a student's feeling that they are free to follow their own interests without being controlled, mostly by their parents or teachers. Relatedness is associated with a student's feeling of social support and sense of trust in individuals in their social circle.

Extrinsic motivation, on the other hand, is of three types: external regulation, introjection regulation, and identification regulation. These types of extrinsic motivation regulate a student's learning behavior and are arranged on a continuum of self-determination ranging from reluctance, to passive compliance, to active personal commitment. The external regulation type is based on the contention that a student's learning behavior is regulated by external elements such as rewards and punishments. The introjection regulation type involves a student's

internalization of justifications derived from past contingencies that lie behind their behavior. Lastly, the identification type regulates the internalization of extrinsic motives of a student when they perceive learning as valuable (Ryan & Deci, 2000).

**ARCS Model of Motivation Design**

Originally proposed by Keller throughout the 1980s in a series of published manuscripts, the ARCS model exemplifies a systematic problem-solving approach for designing the motivational aspects of the learning process. The model was constructed on the basis of a vast synthesis of motivational, cognitive and behavioral theories and concepts (Bin-jomman & Al-Khattabi, 2018). It puts predominant emphasis on designing instructionally sound learning materials that stimulate and sustain student motivation to learn.

ARCS is basically an acronym that refers to the chief motivational categories of the model: Attention (strategies that stimulate and sustain students’ curiosity and interests), Relevance (strategies that connect educational materials to students’ interests, needs and motives), Confidence (strategies that help students feel competent and be capable of achieving success), and Satisfaction (strategies that offer intrinsic reinforcement and external rewards). The first three categories are regarded as important for establishing students’ motivation to learn, whereas the fourth category is necessary to enhance students’ feelings of about their learning experiences (Keller & Suzuki, 2004). Each of these four categories are arranged into several forms of subcategorization schemas that are conceptually structured on psychological grounds. Table 1 was borrowed verbatim from Visser and Keller (1990) to depict the categories and subcategories of the ARCS model and the process questions that designers of instructional materials should tackle.

Table 1  
 Motivational categories and subcategories of the ARCS model

Categories and subcategories		Process questions
<b>Attention</b>		
A.1	Perceptual arousal	What can I do to capture the learner’s interest?
A.2	Inquiry arousal	How can I stimulate an attitude of inquiry?
A.3	Variability	How can I maintain the learner’s attention?
<b>Relevance</b>		
R.1	Goal orientation	How can I best meet my learners’ needs?
R.2	Motive matching	How and when can I provide my learners with appropriate choices, responsibilities and influences?
R.3	Familiarity	How can I tie the instruction to the learner’s experiences?
<b>Confidence</b>		
C.1	Learning requirements	How can I assist in building a positive expectation for success?
C.2	Success opportunities	How will the learning experience support or enhance the students’ beliefs in their competence?
C.3	Personal control	How will the learners know their success is based on their efforts and abilities?
<b>Satisfaction</b>		
S.1	Natural consequences	How can I provide meaningful opportunities for learners to use their newly acquired knowledge and skill?
S.2	Positive consequences	What will provide reinforcement to the learner’s successes?
S.3	Equity	How can I assist the students in anchoring a positive feeling about their accomplishments?

Keller (2010) defined motivational design as the process of arranging resources and procedures to beget changes in student motivation to learn. The model is based primarily on the premise that student motivation to learn is significant to the structuring of learning materials and the preparation of learning instructions (Keller, 2010). It proposes strategies to aid in fostering student motivation in the learning process and provides direction for the integration of such strategies into the design of learning materials (Rafet et al., 2020). Keller (1987) differentiated

between motivational and instructional designs. He perceived the motivational design to include a systematic process resulting in the development of learning activities that could positively influence the level of student motivation to learn. This process is concerned with establishing a bond between learning instructions and a student’s goals. In contrast, instructional design is related to elements that influence the quality and quantity of a student’s ability to acquire and use new skills and knowledge.

In a review of 27 studies on the use of the ARCS model in the design of instructional materials, Li and Keller (2018) found that such use increased student motivation, improved students’ academic achievements and encouraged positive behaviors of students. Chang and Chen (2015) examined the application of the ARCS model to information literacy in a blended educational environment. They found that the ARCS-based digital materials and motivational design for learning to be essential factors for effective achievement of learning outcomes. Lee and Hao (2015) explored the effect of combining the ARCS model, game-based learning, humor, and animation on students’ motivation toward science subjects and found a significant difference in learning between the experimental and control groups.

Hao and Lee (2019) designed and evaluated the effect of using four games designed based on the ARCS model on student motivation toward learning the English language. The experimental group achieved higher scores in all categories of the ARCS model, and the differences between the scores of the experimental and control groups were statistically significant in both the pre-and post-tests. The researchers uncovered no significant difference between the two groups in regard to the effectiveness of learning. In their explanation of this finding, the researchers stated that the sampled students could have different game preferences. Liu and Chu (2010) investigated how games developed according to the categories of the ARCS model affected the English language learning of seventh-grade students. They found that the integration of games into the English course brought a better learning experience and increased student motivation to learn. Chang et al. (2020) conducted an experiment to investigate the impact of a somatosensory English learning system designed according to the categories of the ARCS model on the motivation to learn of 70 third and sixth grade students in Taiwan. The results of the study showed that the proposed learning system had a positive effect on students’ motivation to learn and learning outcomes.

**Methodology**

To answer the research questions of this study, the mixed method research design was employed. In this type of research design, elements of the quantitative and qualitative research approaches are combined “for the broad purposes of breadth and depth of understanding and corroboration” (Schoonenboom & Johnson, 2017, p.109). The quantitative research method was pursued to identify the differences in student motivation to learn before and after using the ARCS model in designing new technology-based materials. The qualitative approach was followed for the purpose of understanding the effect of the use of the ARCS model on the motivation to learn of the students who participated in this study from the perspective of their mothers. These two approaches were applied sequentially where the quantitative design was initially implemented. The decision to use the mixed method design was made on the ground that such a design can allow us to benefit from the advantages of both approaches, enhancing the integrity of the findings of the study and strengthening its conclusion.

**Design of New Materials**

Following the guidelines and strategies of the ARCS model, a new set of technology-based materials for the lessons of a second-grade Arabic language subject entitled My Language (ML) was designed. The primary purpose of developing these materials was to improve the ML lessons in a manner that maximizes gains from multimedia to promote the Arabic language skills of second-grade students in reading, writing, verbal questioning, and grammar. The IM subject with the newly developed technology-based materials for its lessons was labeled Enhanced My Language (EML). The Genially platform, which is a free online software widely utilized for creating interactive visuals, such as images, presentations and infographics, was incorporated in the EML materials as a support tool for the delivery of the content of its lessons. The new technology-based materials designed in accordance with the ARCS model and used in the EML lessons will be referred to as the EML materials hereafter. Moreover, the intervention refers to the use of these materials. The ARCS strategies used in the design of EML are summarized in Table 2.

Table 2  
 Strategies used in developing learning materials for EML

ARC Category	Design Phase			
	Define	Design	Develop	Evaluate

<b>Attention</b>	Attract students' attention towards the learning materials	Use students' favorite cartoon characters Design attractive slides Develop perceptual arousal strategies Utilize attractive and interesting games	Use pictures of Disney princesses Use famous Arab cartoon characters Use Genially platform to design materials and games Develop perceptual arousal questions	Interest survey Lesson observation Focus group IMMS
<b>Relevance</b>	Connect the lesson to students' lives Use simple language and familiar examples	Ask students about their experiences with the topic Present the content through cartoons and kids' songs	Ask questions about national geographical locations Use YouTube Use freepik website	Interest survey Lesson observation Focus group IMMS
<b>Confidence</b>	Increase students' expectations of success	Present lesson objectives in a manner that boosts students' confidence Allow students to achieve success through games	Provide direct verbal feedback Use green for correct answers and red for wrong ones Use Genially for games and animations	Interest survey Lesson observation Focus group IMMS
<b>Satisfaction</b>	Offer intrinsic and extrinsic reinforcements	Promote fun and joyful learning experience Provide positive feedback Offer various positive reinforcements Give students chance to express their true feelings	Use YouTube for clapping and cheering sounds Offer star stickers and certificates Use Whiteboard website to allow students express their feelings	Interest survey Lesson observation Focus group IMMS

### Pre-design information

The process for implementing the ARCS model starts with an extensive effort to be exerted by designers to form motivational objectives which guide the design and development of motivational strategies (Visser & Keller, 1990). To this end and several months prior to the design and development of the EML materials, important information was gathered via an interest survey and class observation method.

### Interest Survey

An interest survey can be viewed as a tool for gaining insights into what primarily draws students' attention and interests. Such insights are of vast importance for the design of learning materials since they revolve around the learning needs and preferences of students. During the school year preceding the actual intervention, an interest survey was developed and distributed electronically to the mothers of a convenient sample of 22 second-grade girl students from the same class in the same school selected as a site for the present study. Each mother was asked about her daughter's favorite movies, colors, games, and cartoons. The gathered information was utilized in the development of the EML materials.

### Classroom observation

Concomitant with the distribution of the interest survey, the classroom observation approach was employed to assist in the process of gathering information about students' interactions in the classroom and in the assessment of the teaching methods adapted by the teacher of the ML subject. The assessment was based on the categories of the ARCS model. Prior to the class observations taking place, the subject teacher was contacted and informed about the aims of the study and the importance of the observations for improving the instructional materials for the subject.

One member of our team attended six lessons (classes) as an observer, and a summary of the recorded observations is disclosed in Table 3.

Table 3  
 Summary of class observations

ARCS Category	Assessment	Class Observations
<b>Attention</b>	Not Achieved	The teacher relied only on materials presented in the electronic textbook of the course. There is a deficiency in the use of interesting methods in the classroom to attract students' attention.
<b>Relevance</b>	Achieved	The teacher used simple language and familiar examples and linked the materials to the students' experience.
<b>Confidence</b>	Relatively Achieved	The teacher offered the students opportunities for success, such as allowing them to answer several questions, however, in all exercises, no on time feedback to support the right answers and correct the wrong ones. The teacher provided the students with the answers at the end of the class.
<b>Satisfaction</b>	Relatively Achieved	The teacher used one method to enhance the satisfaction of the students who were encouraged only by words such as good and great.

### Participants

The sample of this study was drawn from an elementary school for girls in the Eastern province of Saudi Arabia. A second-grade cohort of 25 female students was conveniently selected. The focus on this grade level was based on our previous experience as former teachers of the ML curriculum. Our observation that the teachers of this curriculum in the selected school only deliver their materials according to the electronic version of the ML assigned textbook accounts for another justification of limiting the focus of this study to second-grade students. The mothers of the selected 25 children participated in this study indirectly through their assistance of their daughters to fill in the data collection instrument and directly through their participation in our effort to collect the qualitative data.

### Data collection

Consistent with the mixed method design, a hybrid approach to collect the data for this study was adapted. This approach consisted of two methods of data collection: the Instructional Materials Motivation Survey (IMMS) and focus group.

### IMMS

The original version of IMMS is a 36-item measure consisting of four subscales: attention (12 items), relevance (9 items), confidence (9 items) and satisfaction (6 items) (Keller, 1999). The items of the survey were measured on a 5-point Likert scale ranging from not true (1) to very true (5). Out of the 36 items of IMMS, 10 items were reverse-scored items, which means that a low score is indicative of high motivation with the item. Ghawas (2009) translated the IMMS to Arabic and provided sufficient evidence for the validity and reliability of the Arabic version of this instrument. The reported value of Cronbach  $\alpha$  for this version was 0.981. This score reflects that the scale is highly internally consistent. Used in this study, this version requires a one group pretest-posttest study design to identify differences in the level of student motivation to learn before and after using the EML materials. This design was deemed appropriate for achieving the main purpose of this study since it allowed for computing the impact of the intervention. The Arabic version of IMMS was sent electronically to the participants through their mothers in the first week of the 2020-2021 school year in which EML was administered (pretest) and in the eleventh week of that school year (posttest).

### Focus group

A focus group is a type of qualitative research that typically entails discussions among several individuals who have previous knowledge of or experience with the topic of interest. A focus group technique was used in this study to capture the perspective of the mothers in respect to the effect of the use of the EML materials on their children's motivation. On the tenth week of the school year, three video conferencing sessions were conducted, with



each session lasting about 45 minutes. A total of 21 mothers participated in these sessions which offered rich and detailed information regarding the experiences of their daughters with the EML materials, as well as their opinions, feelings, and attitudes toward these materials. During the focus group sessions, the mothers were asked the following two open-ended questions: What are the most appealing features of the EML materials? And, how would you characterize your daughter’s motivation in regard to the Arabic language subject?

**Ethical Considerations**

Prior to executing the data collection phase, an approval for launching the study was obtained from the Department of Development and Planning at the General Directorate of Education in the Eastern Province of Saudi Arabia. In the e-mail with which the data collection instrument was attached, the mother of each of the selected girl students was assured confidently and anonymity and asked to provide a consent form prior to participating in the study.

**Data analysis**

**Quantitative data**

For the quantitative segment of the adopted research design, descriptive statistics (means and standard deviations) for each ARCS category (subscale) were computed. Since the sample is purposive, the non-parametric Wilcoxon signed rank technique was used to test the null hypothesis that there is no statistically significant change in the scores of each of the subscales before and after the intervention. The effect size of each of the four ARCS categories was calculated. Sawilowsky’s (2009) classification of effect sizes was adapted to assess the magnitude of each of the computed effects. This categorization is as follows: very small effect (0.01), small effect (0.01 and less than 0.2), medium effect (0.2 and less than 0.5), large effect (0.5 and less than 0.8), very large effect (0.8 and less than 1.2) and huge effect (greater than 1.2). The larger the value of the effect size, the stronger the relationship between the ARCS category and student motivation to learn. The *p* value for statistical significance was set to less than 0.05. All calculations were performed by using SPSS 20 software.

**Qualitative data**

A thematic analytical approach was followed to analyze the data collected during the focus group sessions about the mothers’ perspective on the impact of the use of the EML materials on the motivation to learn of their daughters. This approach comprises six stages for conducting a thematic analysis: namely, transcribing audio data into text data, thoroughly reading the transcribed text for familiarity, grouping similar ideas into themes, reviewing the emergent themes, labeling the themes, and finally writing the report (Braun & Clarke, 2006). Each member of the research team separately analyzed the qualitative data, and then a meeting was held to reach consensus on the inductively derived themes and their labels. A schematic method of triangulation was employed to increase the credibility and validity of our results by testing for the convergence between our quantitatively- and qualitatively-based results (Noble & Heale, 2019). Based on this method, the collected data from the focus group was triangulated by the information obtained from the IMMS survey.

**Results**

**Quantitatively-Based Results**

In the initial stage of analyzing the collected IMMS data, the overall internal consistency of the IMMS was computed. As measured by Cronbach’s alpha, the reliability scores of the IMMS were 0.84 for the pretest and 0.91 for the posttest. Since these scores are above the acceptable level of 0.70, it was concluded that the IMMS used in this study has a relatively high reliability. Descriptive statistics of the IMMS subscales are shown in Table 4. All subscale mean scores of both the pretest and the posttest are high (above 3.67), and the scores of the posttest are higher than those of the pretest. However, the positive differences between the before and after mean scores are not suitable for making a statistical inference unless tested for significance. The Shapiro-Wilk test was used to test for the normality of the distribution of each of the four subscales of IMMS. The results showed that three of the four IMMS subscales are not normally distributed; therefore, the nonparametric Wilcoxon signed rank test emerged as appropriate for answering the first two research questions of this study.

Table 4  
**Descriptive statistics for before and after scores**

Category	Test	Subscale		Scale	
		Mean	SD	Mean	SD
Attention	Pre	4.16	0.24	4.25	0.23
	Post	4.38	0.25	4.45	0.24

<b>Relevance</b>	Post	4.34	0.29	4.35	0.43
	Pre	4.24	0.42		
<b>Confidence</b>	Post	4.48	0.41	4.13	0.31
	Pre	4.02	0.29		
<b>Satisfaction</b>	Post	4.23	0.26	4.23	0.43
	Pre	4.28	0.36		
	Post	4.51	0.48		

The results of the Wilcoxon test disclosed in Table 5 show that all Z scores are highly statistically significant. Based on these scores, the null hypothesis that there is no statistically significant change in the motivation to learn of the 25 second-grade female children who participated in this study was rejected. Thus, it was concluded that the intervention had a positive impact on the motivation to learn of the sampled students. The magnitude of the impact of an ARCS category on the motivation to learn of the students was calculated by dividing the category's Z score from the Wilcoxon test by the square root of N, where N equals the number of pairings multiplied by two. The resulting scores then were assessed in accordance with Sawilowsky's criteria of effect size mentioned earlier. The effect sizes of attention and relevance on student motivation to learn are the same (0.60). This value falls close to the midpoint of the 0.5-0.8 interval, meaning that attention as well as relevance has a large impact on student motivation to learn. The magnitude of the impact of the confidence category (0.53) is near the lower limit of that interval, meaning that its effect size is large, but can be viewed relatively large as compared to attention or relevance. The satisfaction category of the ARCS model has a moderate impact (0.46) on the sampled students' motivation to learn, falling within Sawilowsky's categorization of effect sizes as 0.2-0.5.

Table 5  
 Results of Wilcoxon signed rank test for differences between before and after scores

Scale	Rank	N	Mean Rank	Sum of Ranks	Z score	p	Effect Size
<b>Attention</b>	Negative	0	0.00	0.00	-4.23	0.000	0.60
	Positive	23	12.00	276.00			
	Tie	2					
<b>Relevance</b>	Negative	1	2.00	2.00	-4.24	0.000	0.60
	Positive	23	12.96	298.00			
	Tie	1					
<b>Confidence</b>	Negative	3	7.00	21.00	-3.78	0.000	0.53
	Positive	21	13.29	279.00			
	Tie	1					
<b>Satisfaction</b>	Negative	3	5.67	17.00	-3.29	0.000	0.46
	Positive	17	11.35	197.00			
	Tie	5					

**Qualitatively-Based Results**

Twenty-one of the mothers of the 25 girl second-grade students (84%) participated in three focus group sessions. The intent behind holding these meetings was to collect data to answer the third research question of this study, that is, to capture the mothers' perspective in respect to the extent of the contribution of the EML materials to the enhancement of their children's motivation to learn. The gathered information via these meetings was extensively deliberated by the research team members and a consensus was reached on three major themes labeled as cognitive skills, learner behavior and positive emotion. These themes, their subthemes and descriptions of the

uncovered subthemes are revealed in Table 6. The overall perception of the mothers that can be induced from the identified themes is that the use of the EML materials had a positive impact on their daughters' motivation to learn in certain aspects. Nearly 70% of the mothers believe that the use of the EML materials improved their daughters' attention, and the vast majority of these mothers (90%) view that these materials increased their daughters' interaction with their classmates. About 86% of the mothers hold the perception that the use of the EML materials boosted their daughters' satisfaction with their learning experience of the Arabic language, and 76% of these mothers indicated that the EML materials increased their daughters' feelings of joy and excitement. In a lesser degree and according to the mothers' perspective, the materials used in EML lessons helped their daughters cognitively and behaviorally in terms of memorizing delivered information (33%) and of being independent in their learning (52%).

Table 6  
 Themes and subthemes of the perspective of the mothers of the participants (N=21)

Themes	Subthemes	Descriptions
<b>Cognitive Skills</b>	Sustained attention	17 mothers (68%) reported that the intervention had a positive effect on their daughters' attention
	Working memory	7 mothers (33%) reported that the intervention had a positive effect on their daughters' ability to recall information
<b>Learner Behavior</b>	Learner interaction	19 mothers (90%) reported that the intervention had a positive effect on their daughters' interaction in the classroom
	Learning independence	11 mothers (52%) reported that the intervention had a positive effect on their daughters' self-reliance
<b>Positive Emotion</b>	Satisfaction and attitude	18 mothers (86%) reported that the intervention had a positive effect on their daughters' level of satisfaction
	Joy and excitement	16 mothers (76%) reported that the intervention had a positive effect on their daughters' feelings of joy and excitement

## Discussion

In response to the Covid-19 pandemic, almost all countries shifted to online learning, including Saudi Arabia. The research team initially observed that teachers of a second-grade Arabic language subject in their school struggled with the transition from the orthodox mode of education to online teaching. The majority of these teachers suffer from a deficiency in their computer skills and creativity, and thus, they focus their efforts on teaching only around the assigned textbook presented in an electronic form. The research team took the initiative and designed new instructional materials for the lessons of the Arabic language subject based on the strategies of the ARCS model to render them more interesting and attractive to students. The newly designed curriculum called Enhanced My Language (EML) was implemented. This study thus purports primarily to find out whether the use of the EML materials served their purpose in terms of fostering the motivation to learn of the targeted second-grade girl students. On this background, the present study was constructed.

E-learning materials play an essential role in the learning process since they have a considerable influence on student motivation to learn, which is linked to academic success (Puspitarini & Hanif, 2019). The reviewed literature shows that e-learning materials designed in accordance with the ARCS model are effective in promoting student motivation to learn. The quantitative and qualitative results of this study are strikingly consistent with this literature. Though with varying degrees of magnitude, all four categories of the ARCS model were found to significantly influence the motivation to learn of the students to whom the newly-designed materials had been assigned.

The attention and relevance had the highest effect size, indicating that the EML materials were more relevant to students' interests and attractive to their attention. The strategies of attention followed in the design of EML presented in Table 2 made the EML materials engaging, eye-catching, concrete, appealing and stimulating to

students' curiosity. These strategies focused on delivering a variety of materials during the EML lessons to gain students' attention. Examples of these materials included vibrant illustrations and cartoons of famous characters. Another example is the Genially platform, which was used to create engaging games and animations for students. It is self-evident that children find games a source of excitement and enjoyment. Along with the colorful pictures and cartoons, the inclusion of games and animations into the EML materials offered students with intrinsic motivation to feel excited and thus be more attentive during their online learning.

On the other hand, relevance-related strategies pursued in the design of EML materials rendered these learning tools to be more germane to students' lives. These strategies mainly revolve around the content of the EML lessons. The extent of the relevance effect largely depends on the student's perception that the EML content is useful to them and corresponds to their own interests. To be in line with how students perceive that content, the EML materials were presented in a simple language with familiar examples. For that purpose, the EML materials included stories, pictures and kids' songs, creating an interactive environment for learning. Furthermore, during the design phase of the EML materials, an emphasis was committed to bestowing on students the impression that the EML content of a lesson is worth knowing and relates to things that they have seen, engaged in or thought of. The calculated large effect size of the relevance category of the ARCS model can be attributed to the vast efforts devoted to incorporate all the relevance-related elements into the EML design. Student perception that the content of the EML lessons matches their interests and is relevant to their lives signified an intrinsic motivation for promoting students' motivation to learn, ultimately enhancing their academic success, which is in turn indicative of the success of the e-learning process.

The confidence category of the ARCS model is concerned with strategies that aid students in forming positive expectations for success (Keller, 2010). These expectations are essential for students to feel academically competent, that is, to build their confidence in their capabilities to learn the content of the assigned materials for a lesson. Thus, the primary aim of the ARCS-based confidence strategies is to enhance students' perception of their abilities to understand the assigned materials of the EML lessons and to be confident that they are able to pass a test on what is presented in these lessons. It is important to mention here that a student must believe that a desirable outcome results from their own abilities and effort, not from external factors. Otherwise, their confidence in their abilities will not improve (Keller, 1999, 2010). In this sense, the confidence strategies are closely related to the concept of self-efficacy, which refers to a person's perception of their capability to succeed in performing a particular task (Bandura, 1986).

The generated effect size of the confidence category in this study was large, but not as large as that of either attention or relevance. This large effect size can be attributed to the well-organized nature of the EML materials and the offering of direct feedback to students regarding their participation in class. The organization of the EML materials helped the sampled students feel confident that they would be able to readily learn the content of the EML lessons. The immediate verbal feedback that the sampled students received in class was intended to reinforce desirable behaviors, and thus it contributed to their perception that they had the level of competence required to participate vigorously in class activities. Such an impression thus served as an extrinsic motivation for the sampled students to feel confident that they own what it takes to have their expectations satisfied.

The satisfaction component of the ARCS model encompasses the feelings of a student about their learning experience and accomplishment. According to Keller (2010), it is not enough for a student to have their curiosity and interests stimulated in class, be interested in the content of the learning materials, and confident about their ability to succeed. The student needs to receive recognition and see evidence of success so that their intrinsic feelings of satisfaction are reinforced. This support for satisfaction requires the presence of tangible rewards that can be tendered in the form of grades, tokens of accomplishment, or certificates. The student needs to have a continuing desire to learn in order to have a satisfying learning experience.

In this study, the calculated effect size of the satisfaction component of the ARCS model was assessed as moderate. The participants of this study found enjoyment in studying the EML materials and were pleased with being rewarded for their performance in class. They also viewed the EML materials as well-designed and as containing exercises that gave them a satisfying feeling of achievement. The satisfaction element of the ARCS model is mainly concerned with extrinsic motivation, and it appears that there exists an overlapping among the ARCS model's strategies. This traversing could explain the lower magnitude of the effect of the satisfaction strategies as compared to the effect sizes of the other three components. For instance, the offering of star stickers or playing clapping and cheering sounds makes a student feel rewarded, but at the same time, such tokens boost the student's confidence in their ability to accomplish. Moreover, direct positive feedback can be viewed as an intrinsic motivator, but simultaneously, the student could view it as an extrinsic reward for their effort. Several studies have recommended

the use of a shortened version of the original IMMS (Loorbach et al., 2015; Wang et al., 2020). The abridged version of IMMS could be more focused, and thus the overlapping could be kept to a minimum.

The induced perspective of the mothers is markedly in line with the results obtained from the analysis of the quantitative data. Three overarching themes emerged from the thematic analysis of the data collected via the focus group method: *namely*, cognitive skills, learner behavior and emotional value. The uncovered cognitive skills theme encompasses two important subthemes: sustained attention and working memory. Cognitive skills are generally the core brain-based skills that a student needs to perform their tasks (Zghlul & Al-Hindawi, 2015). Sustained attention simply refers to allowing a student to focus and pay attention during a class period, whereas working memory refers to allowing a student to retain information while using it for the execution of a cognitive task. More than two thirds of the mothers who attended the focus group sessions reported that the intervention helped their daughters to be vigilant, whereas only one third of these mothers indicated that the intervention enhanced the working memories of their daughters. These two cognitive skills are important for improving a student's academic performance. One mother stated that, *"Usually, anything can distract my daughter from working on her school assignments, but now I have noticed that she is more vigilant and spends longer time on her homework."* In regard to working memory, another mother said, *"for the past couple of weeks, my daughter talks to her older brother in details about what they studied in school almost on a daily basis. She remembers everything said in the (online) class, and that makes me happy."*

The second theme that emerged from analyzing the qualitative data is learner behavior. Two subthemes fall under the learner behavior theme: learning independence and learner interaction. Learning independence basically refers to a student's ability to act, think, and work on their school assignments autonomously, whereas learner interaction refers to a student's engagement in a classroom environment by asking questions and discussing topics related to the content of a lesson. One mother said, *"It seems to me that she is enjoying her learning. Now, she works on her homework on her own, and she does not come to me that much to help her. This is something different from before, where I had to spend some time helping her."* Another mother uttered that. *"I know my daughter is shy, but lately I noticed she is no longer that shy in the class, and I think the games could have something to do with that."* The vast majority of the mothers (90%) believe that the intervention helped their daughters to be more engaged in the learning activities of the lessons and more than half of these mothers (52%) view that the intervention made their daughters more autonomous and dependent on themselves to work on their assigned tasks.

Positive emotion is the last theme that was induced from the qualitative data of this study. This theme comprises two subthemes labeled as satisfaction and attitude and joy and excitement. A positive emotion generally refers to an emotional reaction of a student that produces a positive effect, and thus, it can stimulate intrinsic and extrinsic motivation (Pekrun et al., 2011). It has been found that emotions mediate the impact of learning strategies on students' level of satisfaction and that the interaction between learning strategies and behavioral engagement greatly affects student satisfaction (Wu et al., 2012). In an educational context, satisfaction can refer to a student's positive affective reaction resulting from being appraised for performing a particular class-related task (Bhattacharjee, 2001). Moreover, in the same context, an attitude could refer to a set of beliefs or behaviors that a student holds toward learning. Jung and Reid (2009) listed three types of attitudes: attitudes toward learning itself, attitudes toward the subject being studied, and attitudes toward the content of the subject. The development of these attitude forms is crucial for learning to succeed; without positive attitudes, a student will not be motivated to learn, and thus, disappointing learning outcomes prevail.

The majority of the participating mothers in this study (86%) indicated that the intervention increased their daughters' level of satisfaction with their learning, and that more than three quarters of these mothers (76%) believe that the intervention made their daughters' learning experience more enjoyable and exciting. One mother stated that, *"When the time of the (online) class is over, she asks me, Mom is the class finished? For me, she appears to be enjoying her time and wants to stay longer. Sometimes her question makes me feel a little bit sad."* Another mother said, *"My daughter really enjoys hearing the clapping and cheering sounds when the teacher praises her for her answers. When she gets the praise, she hugs me. I really love that.... Actually, she told me she wants to be an Arabic language teacher."*

It has been stated that the integration of qualitative and quantitative-based findings is beneficial in checking the validity and credibility of these findings (Fetters et al., 2013). The triangulation method used in this study points to a high degree of convergence between the quantitatively and qualitatively-based results of this study. The quantitatively-based results showed that the EML materials had a statistically significant impact on the sampled students' motivation to learn through the mediation of the components of the ARCS model. The inductively-uncovered perspective that the mothers of the sampled students hold is in a clear congruence with the results

deductively derived via the analyses of the quantitative data. Based on this viewpoint, the conclusion that the EML materials fostered the sampled students' motivation to learn was reached.

As a result of the intervention, the sampled students are more vigilant and tentative in regard to their learning. They find great enjoyment and excitement in their learning. They are more engaging in class activities and feel a high degree of autonomy in performing their assignments. Their working memory is enhanced, and they hold positive attitudes toward their learning as well as toward the Arabic language subject. All these cognitive and behavioral relationships result in having students who are satisfied with their learning experience, implying that these students are highly motivated to learn either intrinsically or extrinsically or both. The only divergence of the mothers' perspective is that it does not explicitly reveal whether the EML materials influenced the confidence of their daughters in their learning abilities. However, it can be asserted that a student will not be feeling independent unless they are confident of their abilities to perform the task at hand.

### **Conclusion and Implications**

The present study represents an attempt to improve second-grade students' motivation to learn Arabic language in a Saudi Arabian elementary school purposefully selected as a research site. In addition to its anticipated contribution to the existing literature on the application of the ARCS model, this study has a potential implication for practice. The quantitatively and qualitatively-based findings of this study are encouraging, and thus, it can be suggested that this study be relied on as a pilot study for a more comprehensive investigation embarked on with the aim of determining whether the use of ARCS-based materials in Arabic language lessons is a worthwhile pursuit. That is, this study is replicated at a large scale. The ARCS model has been effectively utilized in the design of a wide range of subjects, such as English (Chang et al., 2020), mathematics (Karakis et al., 2016), physics (Ghbari, 2016), chemistry (Feng & Tuan, 2005) and computer skills (Alhassan, 2014). Therefore, it is advisable that a mega endeavor be undertaken in Saudi Arabia on the basis of the proposed comprehensive study to use the ARCS strategies in the design of technology-based materials for all subjects at all educational levels.

The need for such an ambitious venture can be supported by the fact that e-learning presently embodies a fundamental element of the Saudi Arabian educational system. It is prudent to continue to take advantage of what modern information and communication technology can offer to ameliorate education as a public commodity, making it closely relevant to the interests and expectations of future generations. It is important to emphasize here that utilization of information and communication technology does not necessarily mean a shift to distance education. These are two separate issues. Rather, the focus here is on using technology in the classrooms to enrich the learning experiences of students and render these experiences more exciting and enjoyable. In his assessment of how technology-based materials can influence learning behaviors of students, Alenezi (2020) concluded that the greater the use of such learning materials, the higher the academic achievement of students. This conclusion can be substantiated by declaring that sustaining and elevating students' academic performance can be optimally achieved when such materials are designed in a manner that fosters students' motivation to learn and eventually increases their chances of academic success.

At the end, despite its potentially practical implication, this study suffers from a couple of limitations, mostly methodological in nature. The sample of this study was purposefully drawn from one class in one school from one geographical region of Saudi Arabia, implying that the sample is not representative of the population of second-grade students enrolling in Arabic language classes in the country. Moreover, the small sample size of the study undermines the power of its statistical tests, since the identification of significant relationships is known to require a sample to be large in size. Due to the sampling bias combined with the small size of this study's sample, the findings of this study are not generalizable to the population of second-grade students in Saudi Arabia, making its recommendation subject to being taken with caution. These methodological limitations can be overcome in the recommended comprehensive study by using large samples randomly drawn from all geographical regions of Saudi Arabia.

### **References**

- Alenezi, A. (2020). The role of e-learning materials in enhancing teaching and learning behaviors. *International Journal of Information and Education Technology*, 10 (1), 48-56.
- Aldhahi, M., Alqahtani, A., Baattaiah, A., & Al-Mohammed, H. (2021). Exploring the relationship between students' learning satisfaction and self-efficacy during the emergency transition to remote learning amid the coronavirus pandemic: A cross-sectional study. *Educ and Info Technologies*, <https://doi.org/10.1007/s10639-021-10644-7>.
- Abou El-Seoud, M. S., Taj-Eddin, I., Seddiek, N., El-Khouly, M., & Nosseir, A. (2014). E-learning and students' motivation: A research study on the effect of e-learning on higher education. *International Journal of Emerging Technologies in Learning*, 9 (4), 20-26.

- Alea, L. A., Fabrea, M. F., Roldan, R. D. A., & Farooqi, A. Z. (2020). Teachers' Covid-19 awareness, distance learning education experiences and perceptions towards institutional readiness and challenges. *International Journal of Learning, Teaching and Educational Research*, 19 (6), 127-144.
- Anderson, A., Hamilton, R. & Hattie, J. (2020). Classroom climate and motivated behaviour in secondary schools. *Learning Environments Research*, 7 (3), 211-225.
- Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology*, 4 (3), 359-373.
- Benabou, R., & Tirole, J. (2003). Intrinsic and extrinsic motivation. *The Review of Economic Studies*, 70, 489-520.
- Bhattacharjee, A. (2001). An empirical analysis of the antecedents of electronic commerce service continuance", *Decision Support Systems*, 32 (2), 201-214.
- Bin-jomman, S., & Al-Khattabi, M. (2018). Measuring the effect of use web 2.0 technology on Saudi students? Motivation to learn in a blended learning environment. *International Journal of Advanced Computer Science and Applications*, 9 (3), 73-79.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3 (2). Pp. 77-101.
- Brophy, J. (2004). *Motivating students to learn*, 2<sup>nd</sup> Ed, Mahwa, New Jersey: Lawrence Erlbaum Associates.
- Carmen Carrillo, C., & Flores, M. A. (2020). Covid-19 and teacher education: A literature review of online teaching and learning practices. *European Journal of Teacher Education*, 43 (4), 466-487.
- Chang, N., & Chen, H. (2015). A Motivational analysis of the ARCS model for information literacy courses in a blended learning environment, *Libri*, 65 (2), 129-142.
- Chang, Y., Lin, P., & Lu, Y. (2020). Development of a Kinect-based English learning system based on integrating the ARCS Model with situated learning. *Sustainability*, 12, 1-16.
- Cook, D., & Artino, A. (2016). Motivation to learn: An overview of contemporary theories. *Medical Education*, 50 (10), 997-1014.
- Dincer, S. (2020). The effects of materials based on ARCS model on motivation: A meta-analysis. *Elementary Education Online*, 19 (2), 1016-1042.
- Feng, S. L., & Tuan, H. L. (2005). Using ARCS model to promote 11<sup>th</sup> graders' motivation and achievement in learning about acids and bases. *International Journal of Science and Mathematics Education*, 3, 463-484.
- Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs-principles and practices. *Health Serv Res.*, 48 (6 Pt 2), 2134-2156.
- Ghawas, M. (2009). The effect of designing distance learning materials according to the Keller model on learners' motivation and academic achievement. (Unpublished Master's dissertation). Manama, Bahrain: Arabian Gulf University.
- Ghbari, T. A. (2016). The effect of ARCS motivational model on achievement motivation and academic achievement of the tenth-grade students. *The New Educational Review*, 43 (1), 68-77.
- Harsono, Y. M. (2015). Developing learning materials for specific purposes. *Teflin Journal*, 18 (2), 169-179.
- Hao, K. C., & Lee, L. C. (2019). The development and evaluation of an educational game integrating augmented reality, ARCS model, and types of games for English experiment learning: an analysis of learning. *Interactive Learning Environments*, 1-14.
- Humaid, A. (2018). A new look at the Keller model of motivational design (ARCS): An Applied Model. *Educational Sciences*, 45 (3), 101-117.
- Ibrahim, A. (2019). Designing a mobile learning environment according to the ARSC motivational design model and its impact on the development of achievement, educational satisfaction, and achievement motivation for professional diploma students with a "shallow-deep" learning style. *Journal of Education*, (68), 2975-3084.
- Jaakkola, T., & Veermans (2014). Effects of abstract and concrete simulation elements on science learning. *Journal of Computer Assisted Learning*, 31 (4), 300-313.
- Jung, E. and Reid, N. (2009). Working memory and attitudes. *Research in Science and Technological Education* 27 (2):205-223**
- Junita, D., Suarman, S., & Kartikowati, S. (2018). Accomplishment motivation and soft skill related to learning achievement. *Journal of Educational Sciences*, 2 (2), 83-89.
- Karakis, H., Karamete, A., & Okçu, A. (2016). The effects of a computer-assisted teaching material, designed according to the ASSURE instructional design and the ARCS model of motivation, on students' achievement levels

- in a mathematics lesson and their resulting attitudes. *European Journal of Contemporary Education*, 15 (1), 105-113.
- Keller, J. M. (1999). Motivation in cyber learning environments. *Educational Technology International*, 1 (1), 7-30.
- Keller, J. M., & Suzuki, K. (2004). Learner motivation and E-learning design: A multinationally validated process. *Journal of Educational Media*, 29 (3), 229-239.
- Keller, J. M. (2010). *Motivational Design for Learning and Performance the ARCS model approach*. New York, NY: Springer.
- Keller, J. M., & Kopp, T. W. (1987). An application of the ARCS model of motivational design. In Reigeluth, C. M. (Ed.), *Instructional theories in actions: Lessons illustrating selected theories and models*. Hillsdale, New Jersey: Lawrence Erlbaum, pp. 289-320.
- Klement, M., Dostal, J., & Maresoca, H. (2013). Elements of electronic teaching materials with respect to student's cognitive learning styles. *Procedia – Social and Behavioral Sciences*, 112, 437 – 446.
- Lee, L. C., & Hao, K. C. (2015). Designing and evaluating digital game-based learning with the ARCS motivation model, humor, and animation. *International Journal of Technology and Human Interaction*, 11(2), 80-95.
- Li, K., & Keller, J. M. (2018). Use of the ARCS model in education: A literature review. *Computers & Education*, 122, 54-62.
- Liu, T. Y., & Chu, Y. L. (2010). Using ubiquitous games in an English listening and speaking course: Impact on learning outcomes and motivation. *Computers & Education*, 55 (2), 630-643.
- Loorbach, N., Peters, O., Karreman, J. & Steehouder, M. (2015). Validation of the Instructional Materials Motivation Survey (IMMS) in a self-directed instructional setting aimed at working with technology. *British Journal of Educational Technology*, 46 (1), 204-218.
- Malik, S. (2014). Effectiveness of arcs model of motivational design to overcome non completion rate of students in distance education. *The Turkish Online Journal of Distance Education*, 15 (2), 194-200.
- McNeil, N. M., & Uttal, D. H. (2009). Rethinking the use of concrete materials in learning: Perspectives from development and education. *Child development perspectives*, 3 (3), 137-139.
- Ngunjiri, M. (2020). The influence of teacher-students' interaction on motivation to learn mathematics among high school students in Laikipia county, Kenya. *American Journal of Educational Research and Reviews*, 5 (78), 1-6.
- Noble, H. & Heale, R. (2019). Triangulation in research, with examples. *Evidence-Based Nursing*, 22, 67-68.
- Pekrun, R., Goetz, T., Frenzel, A. C., Barchfeld, P., & Perry, R. P. (2011). Measuring emotions in students' learning and performance: the Achievement Emotions Questionnaire (AEQ). *Contemp. Educ. Psychol.*, 36, 36–48.
- Puspitarini, Y. & Hanif, M. (2019). Using learning media to increase learning motivation in elementary school. *Anatolian Journal of Education*, 4 (2), 53-60.
- Refat, N., Kassim, H., Rahman M., & Razali, R. (2020). Measuring student motivation on the use of a mobile assisted grammar learning tool. *PloS ONE*, 15 (8), 1-20.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55 (1), 68-78.
- Sari, D. K. & Maningtyas, R. T. (2020). Parents' involvement in distance learning during the Covid-19 pandemic. *Advances in Social Science, Education and Humanities Research*, 487, 94-97.
- Schoonenboom, J., & Johnson, R. B. (2017). How to construct a mixed methods research design. *Köln Z Soziol*, 69 (Supp 2), 107-131.
- Sharma, L., & Srivastava, M. (2019). Teachers' motivation to adopt technology in higher education. *Journal of Applied Research in Higher Education*, 12 (4), 673-692.
- Sawilowsky, S. S. (2009). New effect size rules of thumb. *Journal of Modern Applied Statistical Methods*, 8 (2), 597 – 599.
- Tamin, N. H., & Mohamad, M. (2020). Google classroom for teaching and learning in Malaysia primary school during movement control order (MCO) due to Covid-19 pandemic: A literature review. *International Journal of Multidisciplinary Research and Publications*, 3 (5), 34-37.
- Turel, Y. K., & Sanal, S. O. (2018). The effects of an ARCS based e-book on student's achievement, motivation and anxiety. *Computers & Education*, 127(December), 130-140.
- Uyulgan, M., & Akkuzu, N. (2014). An overview of student teachers' academic intrinsic motivation. *Educational Sciences: Theory and Practice*, 14 (1), 24-32.
- Vallerand, R., Pelletier, L., Blais, M., Briere, N., Senecal, C., & Vallieres, E. (1992). The academic motivation scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, 52, 1003-1017.



- Visser, J., & Keller, J. M. (1990). The clinical use of motivational messages: An inquiry into the validity of the ARCS model of motivational design. *Instructional Science*, 19, 467-500.
- Wang, S., Christensen, C., Xu, Y., Cui, W., Tong, R., & Shear, L. (2020). Measuring Chinese middle school students' motivation using the reduced Instructional Materials Motivation Survey (RIMMS): A validation study in the adaptive learning setting. *Frontiers in Psychology*, 11(August), 1-8.
- Wu, C., Jing, B., Gong, X., Mou, Y. & Li, J. (2021). Student's learning strategies and academic emotions: Their influence on learning satisfaction during Covid-19 pandemic. *Front. Psychol.*, 12, 1-13.
- Zghlul, I., & Al-Hindawi, A. (2015). *An Introduction to Psychology*. University Book House.