Original Research Article

Research on the Construction and Application of Mathematics Large Unit Teaching Model in Junior High School Based on ARCS Motivation Model

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Abstract

Learning motivation is one of the important factors that affect students' mathematics learning. It is one of the challenges that junior high school mathematics unit teaching faces to effectively improve students' learning enthusiasm in mathematics unit classroom. ARCS motivation model is an important theoretical model that focuses on the relationship between instructional design and students' motivation, and can effectively stimulate and maintain students' learning motivation in subject teaching. Based on this, this study applies ARCS motivation model to junior high school mathematics big unit teaching classroom, and discusses the strategies of motivating junior high school mathematics big unit teaching motivation under ARCS motivation model, that is, effective introduction of teaching, selection of related content, phased task driving and multiple feedback evaluation; The teaching mode of junior high school mathematics big unit under ARCS motivation model is constructed, that is, analyzing the demand and setting the goal; Generate strategies and integrate teaching; Implement strategy and encourage design; Unit evaluation and evaluation results. This research is an in-depth exploration of cultivating students' autonomous learning ability in large-scale unit teaching, and is committed to improving the teaching effect of large-scale units and implementing the new requirements of compulsory education curriculum standards.
Keywords: ARCS motivation model; Large unit teaching; Junior middle school mathematics.

1. INTRODUCTION

The era of knowledge economy has come. In order to meet the demand for talents in the new era, we should give full play to the educational function of school curriculum and cultivate students' autonomous learning ability through the main position of mathematics class. Mathematics curriculum standard for compulsory education (2022 edition) emphasizes the value of mathematics, and requires teachers to stimulate students' interest in learning and enhance their learning confidence in the classroom. In addition, the new curriculum standard also emphasizes the optimization of content organization and the realization of high-quality structural integrity teaching. It can be seen that large unit teaching has become the direction of curriculum optimization adhered to in the new curriculum standard. In the teaching process, stimulating students' learning motivation and mobilizing their enthusiasm for large-unit learning have gradually become one of the focuses of attention.

ARCS motivation model originated from a motivation system design idea put forward by Keller (1979) in the United States. As a systematic theory of motivation design and teaching design, it has been widely used in the field of education and teaching, and the effect of stimulating and maintaining learning motivation has been fully verified (Keller, 1987). ARCS motivation model is a model based on various motivation viewpoints, which uses scientific and systematic methods to stimulate students' learning motivation. It plays an important role in helping students cultivate their interest in learning mathematics, set learning goals, and establish their confidence and sense of accomplishment in doing math problems. Based on the constructivist learning theory, large-unit teaching requires occupying a high position, aiming at the "big" position, and carrying out structured overall design teaching of complete knowledge units to promote students' construction and understanding of learning content and develop students' mathematical ability and literacy. However, in the

Citation: Yongwei Yang, Xiaoqin Xu, Fengyan Xie (2024). Research on the Construction and Application of Mathematics Large Unit Teaching Model in Junior High School Based on ARCS Motivation Model. *J Adv Educ Philos, 8*(7): 473-479.

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current large-unit teaching, teachers are mostly based on "speaking and practicing", and the class is difficult. While paying attention to the structuring of teaching content, they ignore the cultivation of students' interest in learning and the stimulation and maintenance of their motivation, which may lead to problems such as students' learning status and poor teaching effect, thus affecting students' grades.

Therefore, this paper will focus on large-unit teaching activities, optimize large-unit teaching with ARCS motivation model, stimulate students' endogenous motivation, promote students' deep understanding of the essential content of large-unit mathematics, and improve the teaching effect of large-unit mathematics, so as to provide reference for large-unit mathematics teaching in middle schools.

2. ARCS Motivation Model and Large Unit Teaching Overview
2.1 Large Unit Teaching
Large-unit teaching is a systematic and structured teaching mode, which decomposes and controls teaching materials, reorganizes and integrates related knowledge under the guidance of big themes and big concepts, and designs, implements and evaluates the knowledge system as a whole according to the internal logic of knowledge (Xu, 2024). Professor Cui Yong Kui believes that a large unit takes "unit" as a structural unit, and a unit is a learning event and a complete learning story. Therefore, a unit is a micro-course. According to Liang *et al*., (2023), large-unit teaching is based on the theory of cognitive psychology, focusing on the law of students' cognitive development and the systematic construction of knowledge. Through teaching design and strategies that conform to students' cognitive laws, we can promote students' deep learning, pay attention to students' cognitive understanding and interest needs, create teaching situations that reflect the theme of large units, use tasks to drive students' autonomous learning, design teaching exercises that point to comprehensive applications, and implement dynamic evaluation at the same time, so as to achieve the integration of "teaching-learning-evaluation", promote the transfer of students' cognitive understanding and interest, and make students' mathematics core literacy find new growth points. This paper holds that after large-scale unit teaching, students form an understanding and understanding of the knowledge system, and knowledge is no longer "fragmented". Large-scale unit teaching can improve teaching effect and learning quality from all aspects. Pre-unit design is the key, while post-unit construction is the purpose. It pays attention to evaluation, stimulates learning motivation and realizes the consistency of teaching and learning and evaluation.

2.2 ARCS Motivation Model
ARCS motivation model (see Figure 1) is an important theoretical framework focusing on the relationship between instructional design and students'

motivation, which includes four key elements: Attention, Relevance, Confidence and Satisfaction (Keller, 1987).
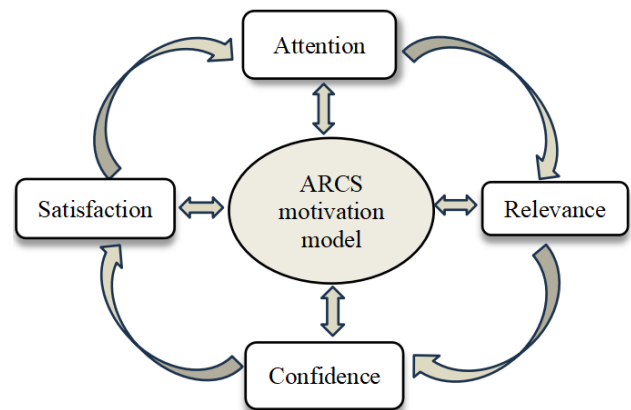

Figure 1: ARCS Motivation Model Diagram

Specifically elaborated as the following four dimensions:
1) **Attention**: Attention is a prerequisite for learners to start learning activities. Park, et al., (1996) highlighted that Teaching should give appropriate variable factors to stimulate students' thirst for knowledge and realize the variety of classroom.
2) **Relevance**: The teaching content should be related to the existing knowledge in students' cognitive structure and adapt to students' life, so that learners will have a stronger willingness to learn actively (Chen, 2023).
3) **Confidence**: The main factors that restrict self-confidence are ability perception, control perception and expectation of success. In teaching, students should be provided with opportunities to approach or succeed, so that students can have enough confidence in the learning tasks to be completed.
4) **Satisfaction**: In teaching, students should be actively guided to evaluate their self-cognition, and they should also be given positive feedback in time, so that they can get satisfaction in their study and then maintain their learning motivation.

In 1988, Keller and Suzuki (1988) introduced the ARCS motivation model into teaching, focusing on the problem of "how to stimulate and maintain students' learning motivation through teaching design", and summarized the process of motivation design and the application steps of this model. When using the model, we should pay attention to understanding the current situation of learners' motivation level, analyze the possible causes of their motivation, stimulate their perceptual desire, help them establish the correlation between learning content and values, gain self-confidence, gain satisfaction, and give full play to their initiative to complete learning transfer. Therefore, ARCS motivation model can help teachers design teaching activities scientifically and effectively, integrate

teaching resources, take students' active learning as the main line, and apply what they have learned to analyze and solve practical problems.

3. Application Advantages of Motivation Model in Junior High School Mathematics Unit Teaching
3.1 ARCS Motivation Model for large Unit Teaching Guidance

ARCS motivation model is to analyze the generation mechanism of motivation in practice and put forward appropriate teaching strategies accordingly. It holds that the generation of learning motivation depends on four motivation processes, namely attention, relevance, self-confidence and satisfaction, which are both progressive and highly correlated. Liu *et al*., (2015) pointed out that in the perspective of ARCS motivation model, motivation is not the ultimate goal, but the ultimate goal is to effectively maintain learners' learning motivation and let learners experience the satisfaction of learning, thus promoting learners' learning transfer.

In the teaching design of large units, teachers can design teaching objectives, teaching contents and evaluation according to the four dimensions of ARCS model. By setting challenging learning objectives, selecting content closely related to students' lives, providing diversified learning methods and implementing diversified evaluation strategies, teachers can stimulate students' learning motivation more effectively and improve their learning effect.

3.2 ARCS Motivation Model is Highly Compatible with Large Unit Teaching

Xie (2023) noted out that ARCS motivation model is highly compatible with large unit teaching in concept and practice. ARCS model stimulates and maintains students' learning motivation by paying attention to four dimensions: attention, relevance, confidence and satisfaction, while large-unit teaching emphasizes taking the theme as the core, organizing and connecting learning content, and promoting students' deep learning. In large unit teaching, teachers can attract students' attention, enhance the relevance of content and improve students' self-confidence and satisfaction by designing interesting lead-in, establishing content related to students' knowledge background, setting appropriate learning objectives and providing timely feedback, which is consistent with the four dimensions of ARCS model.

4. Design of Motivation Strategy for Large Unit Teaching Based on ARCS Motivation Model

Through effective large-unit teaching design, sufficient understanding of it and, consequently, fail to implement it effectively in their classrooms. For students' attention and interest in large-unit teaching are aroused, and their learning motivation is stimulated. Relevance keeps learning motivation, on the one hand, it should be related to the students' existing knowledge; On the other hand, it should be related to the students' existing experience. Self-confidence comes from helping students to build a moderate expectation of success. In specific teaching, teachers can design the teaching content in different levels and complete the task-driven large units in stages, so as to ensure that students can build their self-confidence in large-unit learning while building knowledge and completing learning tasks, and experience the satisfaction brought by building the overall knowledge framework with units, thus generating the desire to continue large-unit learning.

4.1 Effectively Lead into Teaching-stimulate Attention "A"

Arousing perception is a prerequisite for learners to start learning activities. In the process of teaching introduction, we should pay attention to creating situations and reflect the exploration of new knowledge and the formation process of thinking. First of all, we must awaken students' learning motivation, we can attract students' attention by means of novel stories, novel case calculations and other forms. Secondly, the background information created should be adapted to the teaching content, so that students can feel that mathematics is everywhere as much as possible. Finally, it should be noted that the stimulating materials or interesting background information selected when attracting people should not be too long, so as not to distract students' attention and not to arouse students' "attention".

4.2 Select the Related Content-establish the Related "R"

Research question one aimed to explore the nature of Junior High School teachers' practices in large unit teaching, it is necessary to carefully set up inquiry activities with moderate difficulty and in line with students' cognitive characteristics, select the contents that are closely related to students, and help students explore new knowledge with old learning methods or experiences, so as to stimulate students' internal driving force. Seek various ways of inquiry activities and establish the connection between knowledge structure and literacy. The connection of knowledge structure can be established horizontally or vertically. Teachers need to make full preparations for teaching, analyze the structure of teaching materials, plan the theme of large units, integrate the contents of teaching materials, break the traditional knowledge units, form literacy units, clarify the integrity of knowledge system and give encouragement to students, thus maintaining students' learning motivation. The connection between literacy mainly means that through the study of large unit content, students can understand their thoughts, make clear the similarity of research paths or methods, know the core of what they have learned, that is, the knowledge they have learned is closely related to themselves, strengthen students' self-awareness in teaching, reorganize and process knowledge, and then establish connections to promote the improvement of students' literacy level.

4.3 Step-by-step Task Drive-enhancing Self-Confidence "C"

Self-confidence makes learners' learning state continue to be maintained. According to ARCS motivation model theory, in order to establish students' learning information, students should first have a certain understanding of the learning content. Secondly, according to the teaching links, set up "ladder-type" tasks to give students a relaxed learning situation, appropriately provide students with opportunities to achieve results, and gradually cultivate students' confidence. After the big unit task is finished, guide students to correctly attribute the task results and enjoy the joy of success, so that it is easier to enhance students' self-confidence and realize the dual driving force of students' internal motivation and external motivation.

4.4 Multiple Feedback Evaluation-creating a Sense of Satisfaction "S"

What challenges do teachers encounter at the Junior High School in practicing SBA in Bawku municipality? The teachers were asked to rate their satisfaction refers to the feelings that learners get when they reach a given learning goal or complete a preset task. When learners feel satisfied in learning, their thirst for knowledge will be further strengthened, and they will actively participate in the whole process of large unit learning. In large unit teaching, teachers can adopt two ways: internal reinforcement and external stimulation to satisfy students. Because different students have different expectations of learning results, we should pay attention to the diversification of evaluation methods in teaching, which can be given by teachers or mutual evaluation among students. In addition, the evaluation dimensions should be diversified, not only paying attention to the mastery of knowledge, but also comprehensively evaluating students' problem-solving ability, large-unit classroom participation and language expression ability, so as to make the evaluation objective and comprehensive and truly make students feel satisfied.

5. Junior High School Mathematics Big Unit Teaching Mode Construction

Motivation design is one of the important contents in ARCS motivation model. Professor Keller divides motivation design into four parts, as shown in Figure 2, which are analyzing motivation problems, designing motivation strategies, implementing motivation strategies and evaluating the effect of strategy implementation.

According to the design process of ARCS motivation model (Keller, 2010), as shown in the Figure 2, construct the teaching mode of junior high school mathematics big unit under ARCS motivation model, as shown in the Figure 3, which integrates teaching design and motivation design into the classroom teaching of mathematics big unit, corresponding to four stages, namely, analysis, design, development and evaluation, in

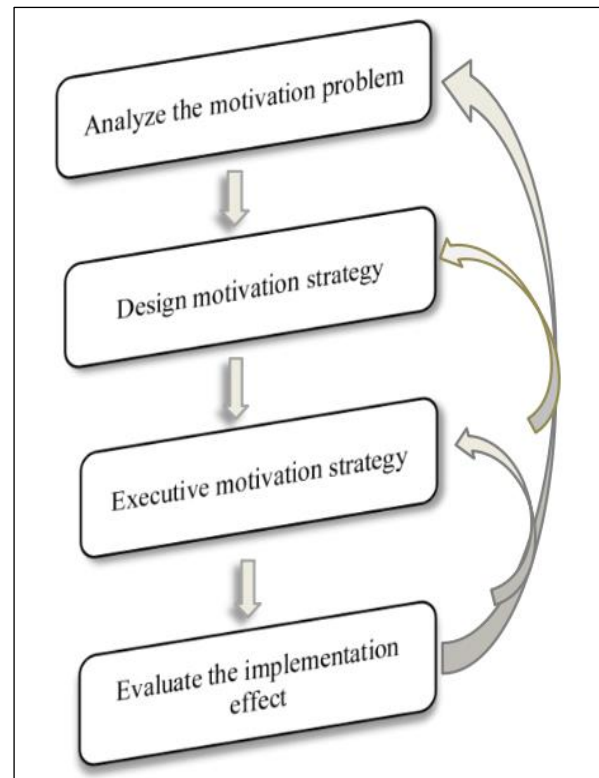order to stimulate students' motivation for learning big unit mathematics.

Figure 2: ARCS Motivation Model Design Process

5.1 Analyze the Demand and Set the Target

Because the mathematics discipline pays attention to reasoning and verification, and the knowledge is abstract, the cognitive level of junior middle school students is still in the development stage (Sun, 2016). Therefore, it is necessary to make full preparations for the curriculum design of junior high school mathematics unit teaching. First of all, we must determine the four elements of large-scale unit teaching, namely, mathematics curriculum standards, textbooks and students, obtain relevant information, grasp the characteristics of mathematics disciplines, and analyze the learning situation; Secondly, analyze the existing motivation of students, find out the reasons for the motivation problems, and analyze the characteristics of learners; Finally, analyze the teaching content, according to the existing knowledge and teaching experience, determine the theme of large unit, refine the concept of large unit, determine the sub-theme of unit, analyze the integrity of teaching materials, find out the advantages of stimulating motivation of teaching materials, and determine the adaptive design ideas according to different types of large unit themes; Analyze the factors that affect students' mathematics motivation.

The combination of large unit teaching and motivation design needs to clarify the purpose of motivation design. Combined with the requirements of compulsory education mathematics curriculum standard

(2022 edition) and unit theme planning, set appropriate large-unit teaching objectives and learning objectives, stimulate students' attention, and formulate large-unit objectives, including large-unit teaching objectives and motivation objectives. Under the big unit goal, it is necessary to clarify the teaching goal in class. In addition, it is also necessary to formulate the motivation goal, and analyze the potential factors affecting students' learning motivation from the four dimensions of attention, relevance, self-confidence and satisfaction under the ARCS motivation model, including external factors and internal factors, so as to put forward more appropriate teaching plans. Develop evaluation methods to determine whether the evaluation motivation goal is achieved (Visser, *et al*., 1990).

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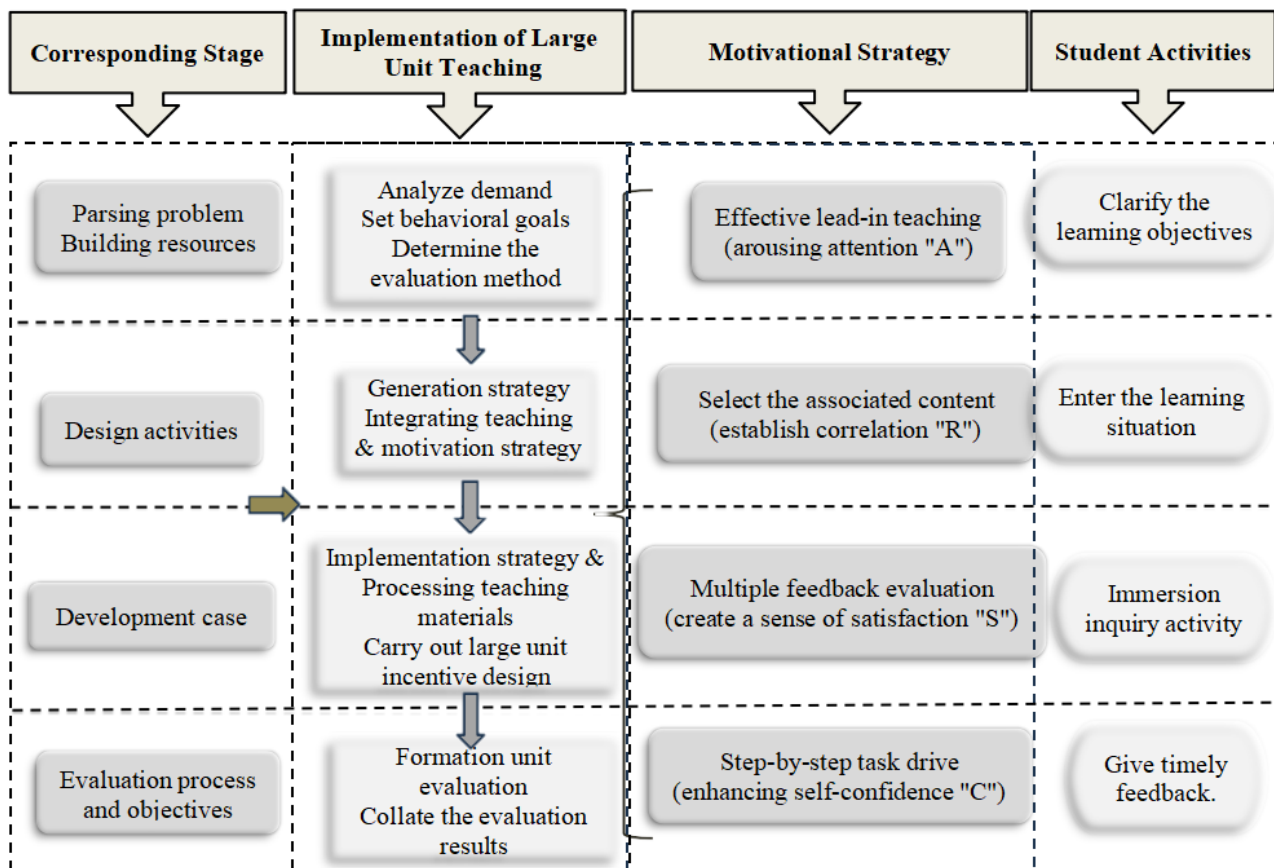

Fig. 3 Teaching Mode Diagram of Junior High School Mathematics Large Unit under ARCS Model

5.2 Generate Strategies and Integrate Teaching

Because of the individual differences of students and the different teaching contents, we should choose and design the motivational strategies of large-unit teaching that are suitable for the teaching contents, and combine the different motivations of students to generate appropriate motivational strategies and determine the comprehensive methods to maintain motivation. Integrate the generated motivation strategy with the teaching strategy, and develop the incentive teaching design.

5.3 Implement Strategies and Encourage Design

It is the key to ensure the quality of teaching design and practice to fully analyze the teaching elements in the early stage of large unit teaching. On the basis of improving the investigation and analysis of the previous teaching plan, it is the most important to develop the teaching design of large unit teaching

incentives. The designed motivation strategy of large-unit teaching is deeply integrated with the content of large-unit teaching, and integrated into all aspects of large-unit teaching, which is organically combined with teaching points, including "the design of question string" and "the setting of group inquiry activities" (Huang, 2024). Large-unit teaching needs to be completed online and offline. Among them, offline takes large-unit classroom as the main position, and with the help of Schiavo whiteboard, geometry sketchpad and FLASH software, the deep integration of information technology and large-unit teaching is realized. Online teaching resources are mainly teaching videos and extended resources before and after class, which can better promote the completion of large unit learning goals and motivate students to learn actively.

5.4 Unit Evaluation and Evaluation Results
With the deepening reform of basic education teaching, how to establish a scientific evaluation system of large-unit teaching is a key problem to be solved urgently (Lu, 2021). How to implement teaching evaluation should take into account the laws and characteristics of large-unit teaching, and establish diversified assessment standards in teaching evaluation. After the completion of large-scale unit teaching, unit evaluation is carried out, which not only evaluates the achievement of large-scale unit teaching objectives, but also evaluates the completion of motivation objectives to obtain students' feedback. Determine the effect of motivation after large unit learning, find out the weak links in teaching according to the evaluation information, modify and adjust the implemented strategies, and carry out mutual evaluation between teachers and students, and evaluate students' satisfaction.

CONCLUSION
Learning motivation is a psychological process to stimulate, orient and maintain learning behavior under the guidance of teaching objectives, and it is the direct reason and internal motivation to promote learners' learning. Large-unit teaching has changed the original traditional teaching mode and explored the innovation of construction and integration, which is the inevitable trend of educational development and reform under the new curriculum reform and the objective requirement of subject teaching in the era of core literacy. Under the guidance of ARCS motivation model, large-unit teaching can arouse learners' attention, establish the relationship between learning and internal needs, enhance learners' confidence and gain learning satisfaction. The large-unit teaching based on ARCS motivation model is worth further exploration and research.

ARCS motivation model provides an effective way to stimulate junior high school students' mathematics learning motivation in junior high school mathematics unit teaching, which is inseparable from teaching design, and gives guidance and evaluation to teachers on how to stimulate students' learning motivation in the classroom, which has strong practicability. Based on the ARCS motivation model, this paper puts forward a large-unit teaching motivation strategy, and constructs a large-unit teaching model under ARCS. Teachers should apply this strategy and model to teaching practice in combination with specific knowledge content, specific learning situation and specific class types, and constantly reflect on it in order to achieve the best teaching effect and realize high-quality classroom.

Adhering to the guidance of Socialism with Chinese characteristics Thought in the new era, and closely following the "Top Ten Education" system of ideological and political work in schools, organically integrating ideological and political education into the training process of professional talents to form a synergistic effect can promote the realization of the "three-round education" function of discrete mathematics course teaching. Firstly, this paper analyzes the necessity and significance of implementing course ideological politics in discrete mathematics. Then, starting from the design concept of course ideological politics, it revises the teaching syllabus of discrete mathematics, establishes a scientific teaching evaluation system and perfects the course assessment method. Starting from the content of the teaching materials, this paper gives the implementation means of ideological and political education in discrete mathematics courses from the aspects of excavating ideological and political resources and designing ideological and political cases, hoping to break the independence of traditional ideological and political courses and enhance students' understanding of ideological and political education by integrating ideological and political education into professional courses.

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