



# Research on Gamification Teaching Based on ARCS Motivation Model—Taking the Mid-Level “Web Page Production and Practical Training” as an Example

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## Abstract

Gamification techniques can be used in the classroom to motivate and engage students significantly. “Web Page Production and Practical Training” is a compulsory course for secondary computer majors with solid practicality. In the context of education, this study shows how gamification has the potential to increase engagement and promote higher-order learning. However, according to the actual survey results so far, the teaching effect of this course could be more satisfactory because it has not stimulated students’ motivation to learn. Because of this urgent problem, this paper combines Professor Keller’s ARCS motivation model with gamification teaching to construct gamified teaching based on ARCS motivation mode. It is applied to actual teaching, and the results show that this model can improve the motivation level of middle vocational computer students to learn the “Web Page Production and Practical Training” course.

## Subject Areas

Computer Vision, Information and Communication Theory and Algorithms, Self-Stabilization, Autonomic Computing, Technology

## Keywords

ARCS Motivational Model, Gamified Teaching, Web Page Production and Practical Training

## 1. Introduction

An increasing number of games and game-like components [1] are increasingly

influencing the modern world [2]. In the present era, the field of education has been compelled to adjust to a novel educational environment characterized by the presence of digital natives; given this context, it becomes imperative for the teaching-learning process to embrace innovative pedagogical approaches, such as gamification [3]. The use of game mechanics and game thinking to engage users and find solutions to problems is known as gamification [1]. The primary objective of this approach is to enable user experiences that exhibit attributes of playfulness and gamification, motivate desired user behaviors, ultimately augment overall user satisfaction [4], and increase student involvement in educational environments [5]. Education is made more accessible, stimulates students' cognitive interests, and boosts learning motivation through computer networks, web-based applications, and interactive services [6]. Motivation is a cognitive process that initiates and sustains actions toward achieving specific goals [7]. Utilizing self-determination theory (SDT) as a macro-level framework is an established approach to understanding the significance of motivation within education [8].

Recent research has demonstrated that gamification strategies can effectively steer students toward educational objectives, such as promoting collaboration [9] [10]. Game technologies have the potential to facilitate the enhancement and modification of e-learning models within higher education institutions, thereby effectively supporting students' learning experiences [11]. Research conducted in marketing has shown that integrating game dynamics into corporate websites can significantly enhance member engagement, thereby increasing the number of corporate members [12]. Student engagement has been acknowledged as a critical indicator of academic success in education [5].

Students work together in a collaborative setting to accomplish a specific educational goal, with the teacher acting as a facilitator; this process is known as collaborative learning [9]. The widespread use of technology and the shift toward digitalization in educational institutions and pedagogy are obvious [13]. After being introduced a decade ago, gamification is continually growing in popularity in educational research [14] [15] and has evolved into a didactic approach that encourages motivation and participation [15]. The essential gamification elements include rules, competition, opposition, obstacles, and storytelling presentation [16].

Moreover, acquiring knowledge is inherently facilitated, significant, and influential as it prioritizes student inquiries as its central focus, fosters the development of 21<sup>st</sup>-century skills among students, tackles societal concerns, and is utilized in conjunction with information and communication technologies (ICTs) [17]. New and innovative ways to engage students in learning and address the expanding requirements of education are constantly being created by technological developments and their rapid development [18]. At the same time, entrepreneurship education and training are prioritized on worldwide policy agendas to encourage economic growth, battle unemployment, and build social capital [19]. ICTs have increased opportunities for formative assessment and for giving

students access to content and learning resources [20].

The ARCS (attention, relevance, confidence, and satisfaction) model, developed by [21], is a comprehensive framework that integrates various motivational and volitional concepts and theories. It serves as a basis for a tested motivational design process that has been applied successfully in numerous contexts [22]. If we consider gamification in light of educational theory and philosophy, this unbridled enthusiasm is inadequate [13]. Gamification techniques have been previously developed and utilized within collaborative learning and learning systems [23]. To solve this critical challenge, this paper combines Keller's ARCS motivation model with gamification teaching to develop gamified instruction based on the ARCS motivation mode and implements it in practical classroom instruction.

## 2. The Teaching Status of the Course “Web Page Production and Practical Training” for Secondary Vocational Computer Majors

This paper uses the questionnaire survey method (see **Supplementary I** for the questionnaire) and the interview method (see **Supplementary II** for the interview outline) to investigate and analyze the teaching status of the “Web Page Production and Practical Training” course of the secondary vocational computer major.

### 2.1. Questionnaire Reliability and Validity Analysis

#### 2.1.1. Reliability Analysis

Questionnaire reliability refers to the degree of consistency of the results obtained when repeated measurements of the same object using the same method, and the reliability of the questionnaire affects the reliability and stability of the questionnaire [24]. This questionnaire uses the alpha reliability coefficient method in SPSS software to analyze the reliability of the 20 scale questions in the questionnaire, and the analysis results are shown in **Table 1** below. The measured reliability factor  $\alpha$  was  $0.967 > 0.7$ , which demonstrated that the results of this questionnaire were less different, the data quality was excellent, and the reliability was high.

#### 2.1.2. Questionnaire Validity Analysis

Validity refers to the accuracy of the data measured by measurement, and the validity of the questionnaire affects the degree of consistency between the data collected in the questionnaire and the content to be examined [24]. The validity of the data was measured using SPSS software, and the results are shown in **Table 2** below. The significance of the questionnaire data is  $p < 0.05$ , and the KMO value is  $0.656 > 0.6$ , which means that the results of the pre-test questionnaire

**Table 1.** Reliability statistics.

Alpha coefficient	Number of items
0.967	20

are consistent with the content you want to study, and the questionnaire data can be further analyzed and interpreted.

## 2.2. Questionnaire Analysis

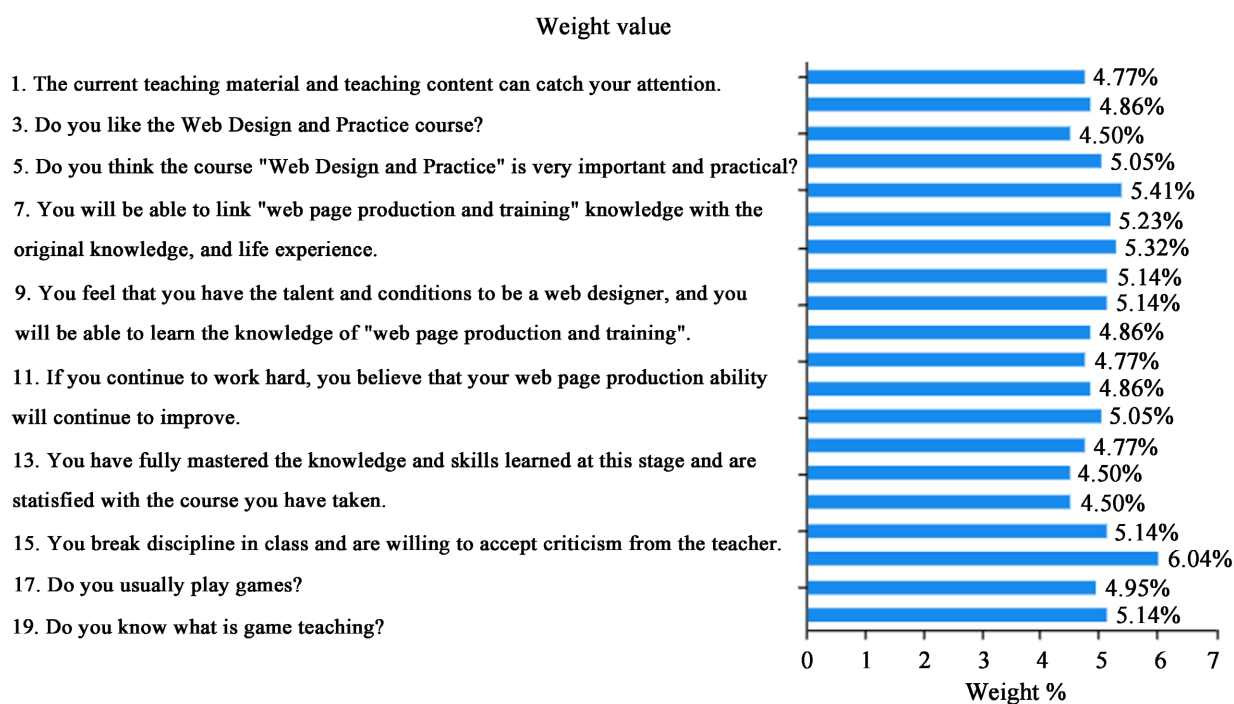
The questionnaire was distributed to students of Class 1 Grade 1 intermediate vocational computer network of Guizhou Vocational and Technical College of Economics and Trade, with 30 students in the class, and 30 questionnaires were received. As shown in **Figure 1**, the data in the questionnaire show that the teaching status of the “Web Page Production and Practical Training” course is not ideal, on the one hand, because the teaching methods of teachers are too traditional and old, and secondly, the teaching content is not combined with actual needs, resulting in students’ interest and desire to learn is very low.

## 2.3. Interview Survey Analysis

In response to this study, the author interviewed the class teacher who taught the course “Web Page Production and Practical Training” and randomly interviewed

**Table 2.** KMO and Bartlett tests.

Name	Factor load coefficient
KMO sampling appropriateness quantity	0.656
Bartlett sphericity test approximate Chi-square	883.216
Freedom	190
Saliency	0.000



**Figure 1.** Weight analysis graph.

seven students.

The first is teacher interviews. The teacher interview is held in the office, and the interview time is after listening to the teacher's lesson. Interview; first, for the introduction method, the teachers in this class have only a few novel techniques; almost all directly explain the knowledge and then carry out practical operations. Second, in terms of attracting students' attention, except for open classes, which use blended teaching to attract students' attention, the rest of the courses need to be more scripted and pay more attention to students' needs. Third, because secondary vocational students lack enthusiasm for the classroom, teachers' confidence is also affected, so they hardly pay attention to self-confidence and learning satisfaction but complete their courses and teaching tasks step by step. Through interviews with classroom teachers, it can be seen that the current teaching status of teachers in the middle vocational "web page production and practical training" course is not ideal due to the poor enthusiasm of the student group, which in turn seriously affects the teaching enthusiasm of teachers, many advanced teaching methods even if used, the effect is not significant, over time, teachers' teaching tends to harden.

Secondly, random interviews were conducted with seven students in the class, the interview time was evening self-study, and the interview location was the computer room. Only two of the seven students chose their major, and the other five students followed the arrangements of their families and did not participate in related activities and competitions. In addition, apart from the knowledge teaching of textbooks, there is no other way to learn the knowledge related to web page production, and the learning status could be better. And the course will not likely be used in life, and I will be too good at working in this profession. From the results of student interviews, it can be seen that secondary vocational students do not have a clear understanding of their careers, which leads to unsatisfactory learning in professional courses, which is mainly due to the low correlation between courses and self-development, so it is necessary to help students re-sort the correlation between courses and self-development, and then improve their enthusiasm for learning.

### **3. Research on Gamification Teaching Based on ARCS Motivation Model—Taking Middle-Level “Web Page Production and Practical Training” as an Example**

#### **3.1. Construction of Gamified Teaching Model Based on ARCS Motivation Model**

##### **3.1.1. ARCS Motivation Model**

The ARCS motivation model was proposed by Keller in 1983 to create effective motivation strategies and learning environments by analyzing learners' motivation to stimulate and maintain students' motivation and willingness to learn. In the ARCS conceptual category, A stands for Attention, R refers to Relevance, C refers to Confidence, and S refers to Satisfaction [25] [26].

There are corresponding sub-category strategies under the four dimensions of

motivational strategies in ARCS [24] [25], and the following sub-category strategies (as shown in Table 3) are selected as teaching aids based on the needs of this study, and their purpose and methods are clarified.

### 3.1.2. Gamification Teaching

The term gamification has been widely used since 2011 to apply gamification elements, frameworks, thinking, and mechanics to non-gaming areas such as business and education. Gamification teaching is a branch of gamification research and development in education, which mainly refers to a teaching mode that organically combines game activities with traditional teaching activities according to specific strategies and methods [27].

There are three primary forms of gamified teaching, and one is to use game activities as a tool to assist teaching and set up corresponding game activities in each teaching link to provide support for classroom teaching and promote the achievement of teaching goals. The second is gamified element gamification teaching, which designs teaching activities and the entire classroom as a game using game elements and mechanisms such as points, badges, tasks, and rankings. It is suitable for courses where the teaching objectives are relatively abstract, the teaching links are relatively small, and the learning content is alienated from the student's life experience and of low interest. The third is the

**Table 3.** ARCS motivational strategies.

Dimension	Subcategory	Purpose	Method
Attention	A1 perceptual arousal	Generate interest	A1: Introduction of materials with novel and diverse designs
	A2 exploratory arousal	Inspire inquiry	A2: Set the problem, material analysis
	A3 variation	Maintain attention	A3: Change teaching methods and teaching languages
Relevance	R1 target orientation	Meet demand	R1: Jointly formulate teaching objectives and clarify the practical significance of web page production and practical training
	R2 motivation matching	Appropriate impact	R2: The choice of teaching content matches the actual needs
	R3 familiarity	Contact Old Knowledge	R3: Use teaching language, examples, relevant to the student's experience
Confidence	C1 learning requirements	Expect success	C1: Clarify task evaluation criteria and teachers express expectations
	C2 chance of success	Competent confidence	C2: Provide teaching tasks or activities of moderate difficulty
	C3 personal control	Work hard to reap the rewards	C3: Provide feedback to guide students to attribution correctly
Satisfaction	S1 internal hardening	Provide opportunities for use	S1: Provide a platform for web page production and practical training
	S2 External Rewards	Strengthen success	S2: Showcase student cases, praise, and reward
	S3 equal	Experience success	S3: Adhere to fairness, timely feedback, self-evaluation, and other evaluations

synthesis of the above two types of gamified teaching under the framework of the gamification mechanism, the use of educational games to support the achievement of teaching goals, and the timely integration of gamification elements to form a complete gamification of the entire classroom [28] [29].

### 3.1.3. Teaching Model Construction

This paper draws on the research results of ARCS motivation mode and gamification teaching, selects the middle vocational “Web Page Production and Practical Training” as the course background, refers to the general steps of gamification teaching, integrates the strategic elements of ARCS motivation mode into the corresponding teaching links, and constructs gamified teaching based on ARCS motivation mode, and the model construction composition is shown in Figure 2 [30].

## 3.2. Preparation Stage for Gamification Teaching

### 3.2.1. Analysis of the Academic Situation

The teaching experiment is aimed at 21-level computer network students of Guizhou Vocational and Technical College of Economics and Trade. The student’s overall learning enthusiasm is average. They have particular prior experience in learning the “Web Page Production and Practical Training” course; that is, they have studied the course before taking this teaching experimental course. Therefore, it will be easier for students to participate in this teaching lab class, including understanding code and keyboard proficiency.

### 3.2.2. Analysis of Teaching Materials

First, the analysis of the target elements of teaching materials. The textbook

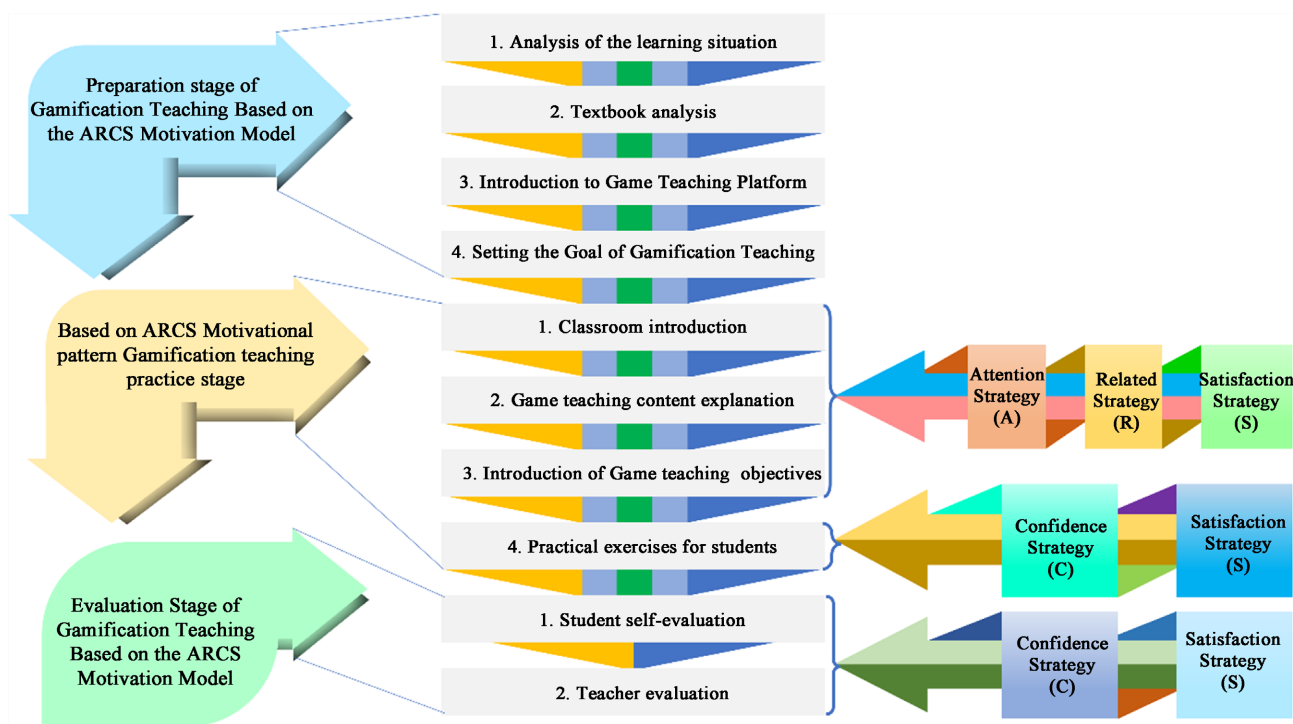
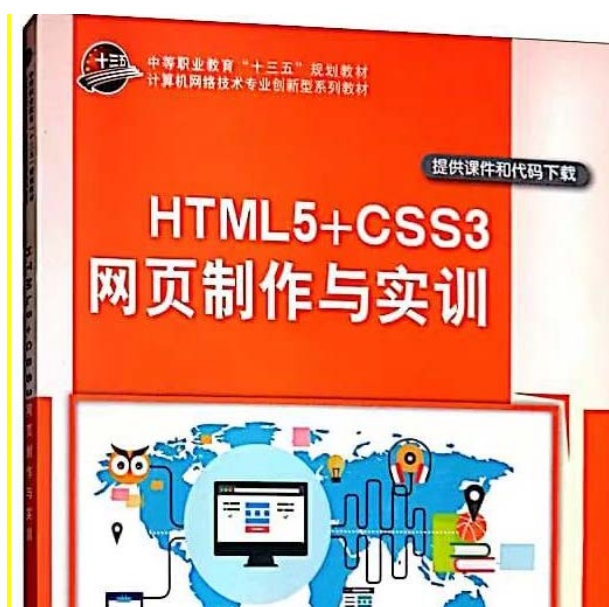


Figure 2. Gamification teaching model diagram based on ARCS motivation model.

selected for this teaching experiment course is the “13<sup>th</sup> Five-Year Plan” textbook “Web Page Production and Practical Training” for secondary vocational education, as shown in **Figure 3**. This book is written according to the “project-task” driven teaching model, using several practical projects as a carrier to guide students to complete the project and master the methods and skills of web page production. Finally, it leads students to complete project training to cultivate students further practical ability and innovative ability.

Second, the analysis of the content elements of teaching materials. The book is divided into eight items, and an appendix; for each item. There is a focus on theory and practice (as shown in **Table 4**).

Third, the analysis of the implementation elements of teaching materials. In the process of teaching implementation, it is first necessary to determine the



**Figure 3.** Textbook “Web Page Production and Practical Training” of the 13<sup>th</sup> Five-Year Plan for Secondary Vocational Workers.

**Table 4.** Analysis of content elements of textbooks.

Table of contents	Course content	Teaching method
Project 1	HTML foundation	Focus on theory
Project 2	HTML5 builds websites	Focus on theory
Project 3	Create Web forms for mobile devices	Focus on practice
Project 4	HTML5 multimedia design	Focus on practice
Project 5	Use the canvas element to draw	Focus on practice
Project 6	CSS styling basics	Focus on practice
Project 7	CSS positioning and layout	Focus on practice
Project 8	HTML5 design microsites	Focus on practice
Appendix	Introduction to JavaScript	Focus on theory



teaching links, teaching content, teaching activities (teaching activities here involve teachers and students), and learning resources. Among them, the teaching links include three links: students' pre-class preview, in-class teaching (including board book design and class discussion), and homework assignment; the teaching content is divided into eight projects and a supplementary; teachers mainly teach teaching activities, and students take notes and carry out corresponding hands-on exercises; in addition to textbooks, learning resources include corresponding hardware and software, such as computers and Dreamweaver CS6.0.

Fourth, this book aims to expand students' vocational skills, master the production methods and skills of web pages, cultivate students' ability to collect, analyze and express information, and further develop students' practical ability and innovation abilities. Therefore, the analysis of evaluation elements can be carried out around the above aspects, and evaluating students through specific features can make the evaluation results more objective and in line with curriculum standards and teaching objectives.

### 3.2.3. Introduction to the Gamified Teaching Platform

The gamified teaching platform used in this institute is CSSBattle. CSSBattle is a code golf game developed for CSS enthusiasts, where players can visually copy targets with minimal CSS code. CSSBattle is built using React, Firebase, Firestore, and SCF. As shown in **Figure 4**, on the target page, the player can encode in the editor area on the left; when the player starts typing, the output area in the middle will start rendering the code, and when the output is confident that the result matches the target image, the stand-alone Submit button submits and views the score.

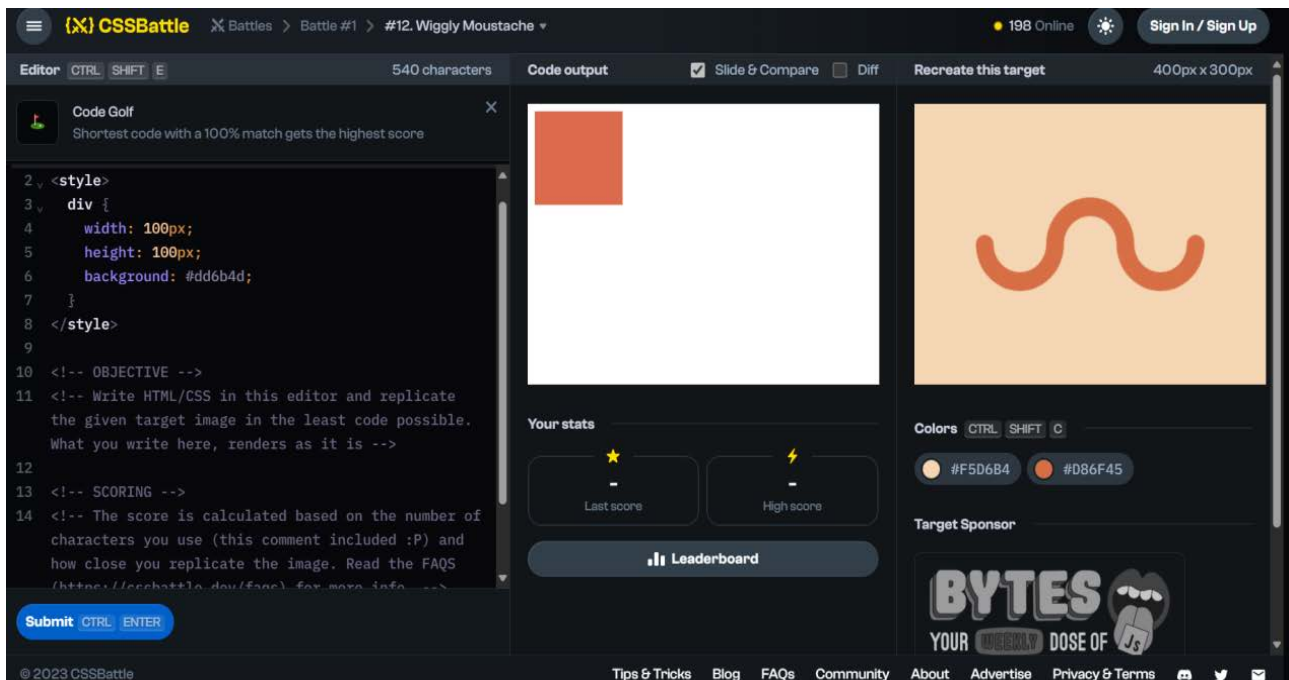



Figure 4. CSSBattle platform.

### 3.2.4. Establish Gamification Teaching Goals





Based on students' current learning level, this gamification teaching aims to complete the learning of Battle#1, help students better understand the CSSBattle platform, and pave the way for subsequent breakthrough learning. Through practical learning, master CSS language skills, improve the level of web page production, and enhance learning confidence and Satisfaction.

The following section provides an extensive summary of the procedures involved, presented in table form. More specifically, **Table 5** illustrates the gamified teaching practice stage in classroom import, **Table 6** indicates the explanation of gamified teaching content, **Table 7** outlines the gamified teaching goals,

**Table 5.** Classroom import.

Classroom import	ARCS motivational strategies	Gamified teaching activities	
		Teacher activities	Student activities
Classroom Import 1	A1, R2	Play students a video of the CSSBattle platform, and the level of this lesson is the first task of BATTLE #1. 	Watch the video and extract interface operation information and operation flow.
Classroom Import 2	A2, R1	1) Teacher's question: Students, in the first level, can you match the web page production language with the web presentation interface? 2) Students, this lesson aims to learn the use of label selectors in CSS (Cascading Style Sheets) and the setting of background color, height, and width in the box according to the video content.	1) Students raise their hands to answer the teacher's questions. 2) Through the teacher's explanation of the objectives of this lesson, students know what they need to learn and master in this lesson. In addition, students can also put forward their proposals for the content of the teaching objectives, such as the background color can be replaced with other colors, the width, height, and margins of the box can be set to other values, and other suggestions related to the teaching of this lesson, and jointly formulate the teaching objectives of this lesson.
Classroom Import 3	A3, R3	Teachers must review the relevant knowledge, including DIV elements in HTML, the definition of CSS tag selectors, and their uses. The teaching language is concise and vivid; for example, when describing the relationship between HTML and CSS, you can describe it as follows: HTML is equivalent to a state where a person has not yet chosen suitable clothes and jewelry, and then CSS is needed to help him achieve the dressing process.	Through the teacher's explanation and description, students review the relevant knowledge they have learned before, and if they still have doubts, raise their hands to ask the teacher, and only after they fully understand it will they begin to enter today's classroom for learning.

**Table 6.** Explanation of gamification content.

Gamified teaching content	ARCS motivational strategies	Gamified teaching activities	
		Teacher activities	Student activities
CSSBattle #1 and the CSS language	R2	<p>When the video imported by the class is finished, the teacher explains the code language one by one:</p> <p>1) Tag selector in CSS style: you need to <code>&lt;style&gt;&lt;/style&gt;</code> add <code>&lt;body&gt;</code> a tag selector in the middle to set the style of the main part of the web interface;</p>  <p>2) Add the background tag <code>&lt;body&gt;</code> in the tag selector and set the color to <code>#5d3a3a</code> so that the background color of the design page will be consistent with the background color of the landing page;</p>  <p>3) <code>&lt;body&gt;</code> Add margin tags to the label selector and set the value to 0; that is, the outer margin is 0 for the top, bottom, left and right;</p>  <p>4) Change the width value in the label selector to 200 px and the <code>&lt;div&gt;</code> height value to 200 px; through the height and width settings, the rectangle in the middle will take on the current shape;</p> 	<p>Students further understand the operation process according to the teacher's step-by-step explanation and the one-to-one correspondence between code language and web page renderings. If you have questions during this process, you can raise your hand, and the teacher will answer them patiently.</p>

## Continued

5) Change the <div> background value in the tag selector to #b5e0ba so that the rectangle in the middle part shows the current color;



```

1 <div></div>
2 <style>
3   body{
4     background: #5d3a3a;
5     margin: 0;
6   }
7   div {
8     width: 200px;
9     height: 200px;
10    background: #b5e0ba;
11  }
12 </style>

```

6) Finally, click the submit button in the interface to submit the work; you can get the current work score. The teacher will record the score of everyone's work as a scoring record of the usual grade.



```

1 <div></div>
2 <style>
3   body{
4     background: #5d3a3a;
5     margin: 0;
6   }
7   div {
8     width: 200px;
9     height: 200px;
10    background: #b5e0ba;
11  }
12 </style>
13
14 <!-- OBJECTIVE -->
15 <!-- Write HTML/CSS in this editor and replicate
16    the given target image in the least code possible.
17    What you write here, senders as it is -->
18
19 <!-- SCORING -->
20 <!-- The score is calculated based on the number
21    of characters you use (this comment included :P)
22    and how close you replicate the image. Read the
23    instructions for more details -->

```

**Table 7.** Introduction to gamification teaching objectives.

Introduction to gamified teaching objectives	ARCS motivational strategies	Gamified teaching activities	
		Teacher activities	Student activities
The goal of gamified teaching of BattleCSS with combined CSS language	R1, C1	<p>The teacher introduces the gamification teaching objectives of this lesson to the students:</p> <ol style="list-style-type: none"> <li>1) Review the web design language HTML of Project 1 and Project 2 of “Web Page Production and Practical Training”;</li> <li>2) Review the classification of CSS style sheets in the six tasks of the “Web Page Production and Practical Training” project;</li> <li>3) Learn the rules for using tag selectors in Project 6 CSS language;</li> <li>4) Learn the label selector &lt;body&gt;&lt;/body&gt; and &lt;div&gt;&lt;/div&gt; and how to use it in the six tasks of the “Web Page Production and Practical Training” project;</li> <li>5) Learn how to use CSS style sheet background tags in task three of project six of “Web Page Production and Practical Training”;</li> <li>6) Learn the concept of box model in CSS positioning and the use of margin tags in task 2 of the “Web Page Production and Practical Training” project;</li> <li>7) Use the game to learn CSS language with the CSSBattle platform.</li> </ol>	<p>According to the teacher's explanation of the gamification teaching objectives of this lesson, students can reasonably put forward personal suggestions, provide help for the practical construction of gamification teaching goals, and also pave the way for individuals to understand further and accept gamification teaching goals.</p>

**Table 8.** Practical exercises for students.

Hands-on exercises for students	ARCS motivational strategies	Gamified teaching activities	
		Teacher activities	Student activities
CSSBattle platform hands-on exercises	C2, S1	1) The teacher will share the entrance end of the CSSBattle platform with the students and first let the students familiarize themselves with the interface; if there are questions or do not understand the interface, you can raise your hand, and the teacher will answer for them; 2) After being familiar with the operation interface and operation process of the CSSBattle platform, edit the code interface according to the steps explained by the teacher of the video import; 3) In the process of code editing, pay attention to the comparison between the real-time interface and the target interface to ensure its consistency, and raise your hand if you have questions or encounter difficulties during the operation, and the teacher will give guidance.	Students enter the CSSBattle platform under the teacher's guidance, familiarize themselves with the interface, and start practical exercises, raising their hands to signal to the teacher when they encounter problems.

**Table 9.** Evaluation stage of gamified gamification teaching.

Gamified teaching evaluation	ARCS motivational strategies	Evaluation of the subject	
		Teacher evaluations	Student self-evaluation
Evaluate this gamified teaching activity	C3, S2, S3	1) Teachers count the completion of students' practical operations, including whether they have completed and scored, which can help teachers obtain feedback results on students' learning in a timely manner; 2) According to the statistical results, teachers guide students to make correct attribution, which is attributed to personal seriousness and effort; 3) Praising students who have done well will help set an example and strengthen the learning effect.	1) Students conduct a self-evaluation of their practical operation process and results, and the evaluation level is very satisfactory, satisfied, dissatisfied, and very dissatisfied; 2) Correct attribution according to the guidance of teachers to form internal self-evaluation; 3) Establish a correct sense of role models, use role models as the strength, make positive evaluations of self, and continuously improve learning methods and improve learning satisfaction based on correct internal attribution.

**Table 8** showcases the practical exercises assigned to students and **Table 9** show the gamification teaching evaluation stage.

## 4. Results

After the end of this teaching experiment, to test the implementation effect, a feedback questionnaire was issued entitled—Gamification Teaching Based on ARCS Motivation Model (Taking Middle-level “Web Page Production and Practical Training” as an Example) Implementation Effect and Satisfaction Questionnaire, as shown in **Supplementary III**. A total of 30 questionnaires were distributed, 28 were recovered, the reliability and validity of the questionnaires were tested, and the specific analysis results are as follows.

### 4.1. Reliability

This questionnaire uses the alpha reliability coefficient method in SPSS software

to analyze the reliability of the seven scale questions in the questionnaire, and the analysis results are shown in **Table 10** below. The measured reliability factor  $\alpha$  was  $0.702 > 0.7$ , demonstrating that the results of this questionnaire were less different, the data quality was excellent, and the reliability was high.

#### 4.2. Validity Test

This questionnaire uses SPSS software to measure the validity of the data, and the results are shown in **Table 11** below. The significance of the questionnaire data is  $p < 0.05$ , and the KMO value is  $0.708 > 0.7$ , which means that the results of the pre-test questionnaire are consistent with the content you want to study, and the questionnaire data can be further analyzed and interpreted.

#### 4.3. Implementation Effect Evaluation and Analysis

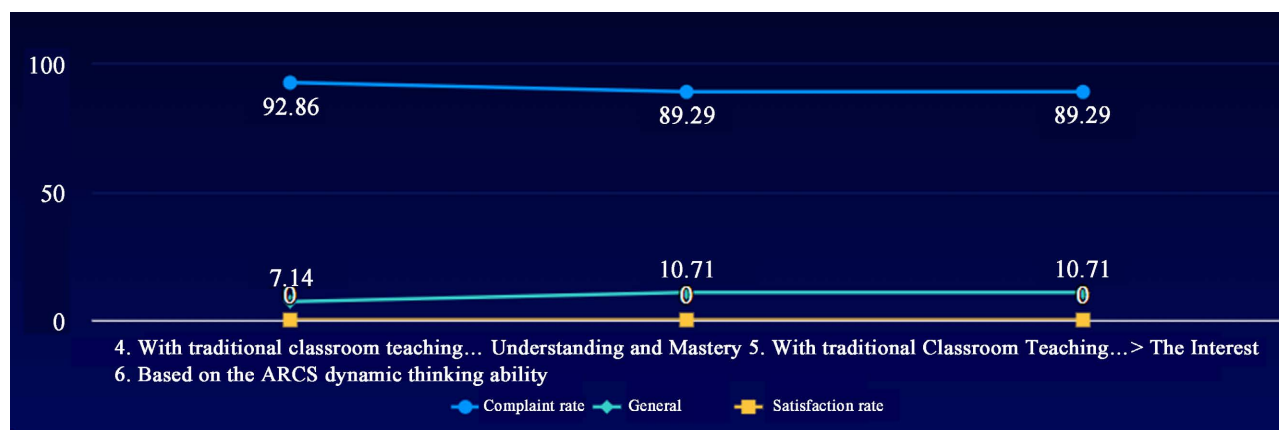
According to **Figure 5**, the satisfaction rate of the fourth, fifth, and sixth questions are all above 89%, indicating that compared with traditional classroom teaching, the gamified teaching mode based on the ARCS motivation model is more helpful for students to integrate and refine the knowledge points of “Web Page Production and Practical Training”. It is easier to understand and master

**Table 10.** Reliability test.

Alpha coefficient	Number of items
0.702	7

**Table 11.** Validity test.

Name	Factor load coefficient
KMO sampling appropriateness quantity	0.708
Approximate Chi-square	94.563
Freedom	15
Saliency	0.000



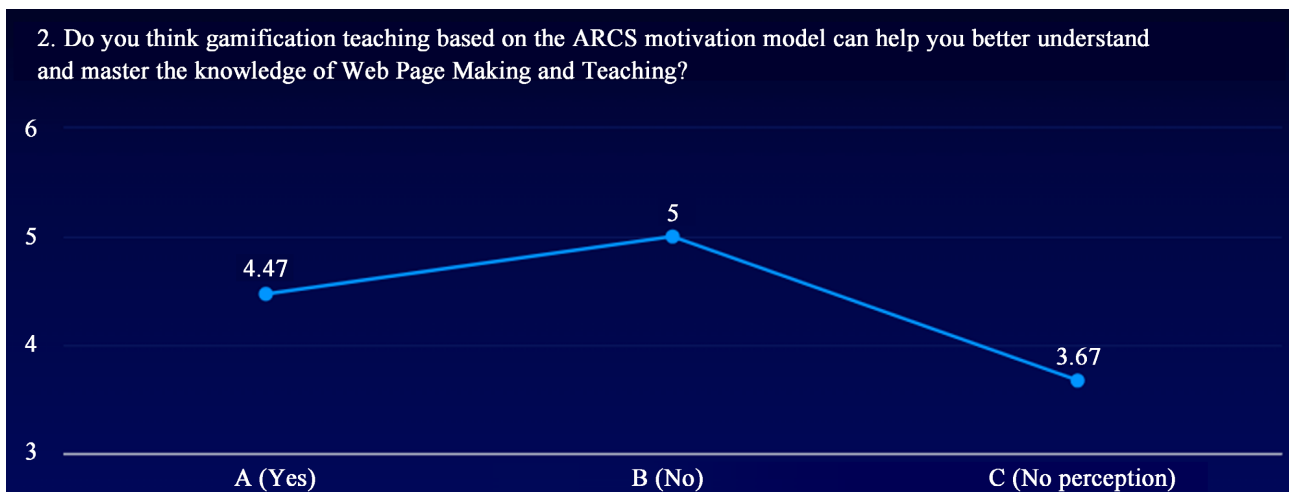
**Figure 5.** Satisfaction rate.

the critical content. Compared with traditional classroom teaching, gamified teaching based on the ARCS motivational mode is more conducive to stimulating the interest in learning “Web Production and Practical Training”. In addition, students also believe that gamified teaching based on the ARCS motivational model helps improve the ability to analyze and solve problems and expand scientific thinking. The above conclusions and data show that compared with the traditional teaching mode, the teaching mode used in this study can stimulate students’ interest in learning and help the understanding of knowledge and cultivate and expand disciplinary thinking.

According to **Figure 6**, it can be seen that 50% of students believe that gamified teaching based on the ARCS motivational model cannot help them better understand and master the knowledge of “Web Production and Practical Training”, which shows that as a new teaching mode, students cannot adapt quickly in the short term, so this teaching research needs to be optimized.

## 5. Conclusions

This teaching experiment began to boost secondary vocational students’ motivation for learning, gathered a ton of literature, and ultimately established a foundation for improving secondary vocational computer students’ motivation to take the course “Web Page Production and Practical Training”. This is equivalent to narrowing the scope of research, so that the author has a more directional sense when doing relevant research, but in the actual operation process encountered many problems; first of all, in the teaching of experimental courses, not every student has serious participation, the main reason is because of the students’ usual scattered learning habits, so at this point, the teaching experiment implementer should pay more attention to this part of the students, can be reminded appropriately, and help let every student participate in the curriculum. Secondly, in terms of the enthusiasm for filling in the satisfaction questionnaire after the implementation of teaching, most of the student’s enthusiasm



**Figure 6.** Effectiveness of teaching mode.

for filling in is not very high, so the feedback questionnaire only collected 28 copies (30 experimental subjects), which requires that after the end of the on-site teaching experiment, the teacher should let the students fill in the questionnaire, which is also the author did not do very well, the feedback questionnaire was not issued in time, missed the best time, resulting in the recovery of the questionnaire is not so smooth. Finally, the results of this teaching study may have some sense of distance and difference compared with the author's initial expectations, which also shows the actual reliability of this experiment and can also motivate the author to continue research in this direction, continue to optimize teaching programs, and better help students improve their motivation to learn.

Through this research, the author realized that I want to help secondary vocational students improve their motivation to learn. In addition to the selection of theoretical methods, according to the literature, more time should be spent on the research and improvement of practical teaching, so in the future, the author will pay more attention to the analysis of in-depth practical education and better integrate theory and practical instruction. Of course, it is also hoped that more researchers can refer to the teaching methods of this paper for reasonable operation and optimize and create more advanced and effective teaching models to help students improve learning motivation, self-confidence, and satisfaction.

### Authors' Contributions

Conceptualization: HY; methodology: HY; software: HY; writing—original draft preparation: HY and WL; writing—review, and editing: HY and WL; supervision and funding acquisition: HY and WL. All authors have read and agreed to the published version of the manuscript.

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### Conflicts of Interest

The authors declare no conflicts of interest.

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## Supplementary I: Questionnaire on the Teaching Status of the Middle Vocational “Web Page Production and Practical Training” Course

Dear students,

Hello! Thank you for participating in this survey. This survey aims to understand the teaching status of “Web Page Production and Practical Training” courses in secondary vocational colleges. This survey is completely anonymous; the survey results are limited to teaching and research and will not harm your life and work; please answer with Confidence according to your actual situation; thank you for your participation and cooperation, thank you!

### 1. Attention Dimension (4 questions in total)

1. Current teaching materials and teaching content can attract your attention. ( )

A fully conforms to B and conforms to C, generally D does not conform to E

2. The current teacher’s teaching style can grab your attention. ( )

A fully conforms to B and conforms to C, generally D does not conform to E

3. You like the “Web Creation and Practical Training” course. ( )

A fully conforms to B and conforms to C, generally D does not conform to E

4. You listen carefully and pay attention. ( )

A fully conforms to B and conforms to C, generally D does not conform to E

### 2. Related dimensions (4 questions in total)

5. You find the course “Web Creation and Practical Training” fundamental and practical. ( )

A fully conforms to B and conforms to C, generally D does not conform to E

6. The knowledge learned in “Web Creation and Practical Training” will help you develop your career in the future so that you will study this course seriously. ( )

A fully conforms to B and conforms to C, generally D does not conform to E

7. You can link the “Web Production and Practical Training” knowledge with your original knowledge and life experience. ( )

A fully conforms to B and conforms to C, generally D does not conform to E

8. You can actively complete various learning tasks in class. ( )

A fully conforms to B and conforms to C, generally D does not conform to E

### 3. Dimension of self-confidence (4 questions)

9. You feel that you have the talent and conditions to be a web designer, and you must be able to learn the knowledge of “Web Production and Practical Training”. ( )

A fully conforms to B and conforms to C, generally D does not conform to E

10. The best time you performed in class and homework resulted from your efforts. ( )

A fully conforms to B and conforms to C, generally D does not conform to E

11. If you keep working hard, you believe that your web page production ability will continue to improve. ( )

A fully conforms to B and conforms to C, generally D does not conform to E

12. You want your teacher to let you answer questions or demonstrate actions to evaluate your class performance. ( )

A fully conforms to B and conforms to C, generally D does not conform to E

### 4. Satisfaction dimension (4 questions in total)

13. You have fully mastered the knowledge and skills learned at this stage and are satisfied with learning the course.

( )

A fully conforms to B and conforms to C, generally D does not conform to E

14. Teachers often have diverse praise and encouragement, and you will love professional learning more. ( )

A fully conforms to B and conforms to C, generally D does not conform to E

15. You break discipline in class and are willing to accept criticism from your teacher. ( )

A fully conforms to B and conforms to C, generally D does not conform to E

16. When completing class tasks and homework, the teacher's praise information feedback satisfies you. ( )

A fully conforms to B and conforms to C, generally D does not conform to E

Gamification Teaching Dimension (4 questions)

17. Do you usually play games? ( )

A often plays B, sometimes C occasionally plays D, and can't play at all

18. What type of games do you like to play ( )

A Large-scale single-player game on a computer B Online or mobile game C Casual mini-games on a computer or mobile phone D Other

19. Do you understand what gamification teaching is? ( )

A understands that B has heard of it, but does not know much about C, does not understand but is interested, and D does not understand and is not interested

20. Do you think your interest in learning will increase if we learn by playing games? ( )

A will improve significantly, B will improve somewhat, C may be better, D will not at all

## Supplementary II: Interview Outline

### Teacher interview outline

Purpose of the interview:

Interview subjects:

Interview time:

Interview location:

1. What kind of import method do you use to attract students' interest?
2. What teaching methods or teaching methods do you use to attract students' attention?
3. What efforts have you made to make teaching content relevant to students' own needs?
4. In what ways do you optimize and improve your teaching strategies and increase student confidence?
5. What are the ways you use to improve student satisfaction?

### Student interview outline

Purpose of the interview:

Interview subjects:

Interview time:

Interview location:

1. Why did you choose to major in computer science?
2. Do you want to work in computer science in the future?
3. What events or competitions have you participated in that are related to computer science?
4. Do you think that the knowledge learned in the "Web Production and Practical Training" course is unlikely to be applied in life in the future?

**Continued**

5. What kind of teaching method and praise method do you like when learning the course “Web Page Production and Practical Training”?
6. How do you think you can improve your web page production skills?

**Supplementary III: Learning Effectiveness Evaluation Questionnaire**

Gamification teaching based on the ARCS motivation model (taking “Web Page Production and Practical Training” as an example) implementation effect and satisfaction questionnaire.

Dear students, in this semester’s “Web Production and Practical Training” study, we have carried out gamification teaching based on ARCS motivation mode with the help of the ARCS motivation mode and CSSBattle platform, and now we are investigating the effectiveness and Satisfaction of course implementation, and ask students to actively participate and cooperate so that teachers can improve teaching methods and teaching quality in the future.

1. Do you think it is challenging to master the knowledge content of the “Web Page Production and Practical Training” course? ( )  
A Yes      B No      C No perception
2. Do you think gamified teaching based on the ARCS motivational model can help you better understand and master the knowledge points of “Web Production and Practical Training”? ( )  
A Yes      B No      C No perception
3. Do you think that gamified teaching based on the ARCS motivation model—taking “Middle-level Web Page Production and Practical Training” as an example, whether the learning content is smooth and reasonable with the textbook? ( )  
A Yes      B No      C No perception
4. Compared with traditional classroom teaching, gamified teaching mode teaching based on ARCS motivational mode is more conducive to your integration and refinement of the knowledge points of “Web Page Production and Practical Training”, and the understanding and mastery of key content ( )  
A Very much agreed    B Somewhat agreed    C General    D Disagrees    E Strongly disagrees
5. Compared with traditional classroom teaching, gamified teaching based on ARCS motivational mode is more conducive to stimulating interest in learning “Web Production and Practical Training” ( )  
A Very much agreed    B Somewhat agreed    C General    D Disagrees    E Strongly disagrees
6. Gamified teaching based on the ARCS motivational model helps you improve your ability to analyze and solve problems and expand your scientific thinking skills ( )  
A Very much agreed    B Somewhat agreed    C General    D Disagrees    E Strongly disagrees
7. Which learning activity is you more interested in gamification based on the ARCS motivational model with Middle-level Web Creation and Training? ( )  
A Classroom import video      B Introduction to the CSSBattle platform  
C Teacher presentation      D Autonomous operation