

## DEVELOPMENT OF THE UNO CHEMICAL CARD GAME AS A LEARNING MEDIA ON THE CHEMICAL BONDING MATERIAL FOR HIGH SCHOOL STUDENT

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Received: February 14, 2023. Accepted: March 20, 2023. Published: March 30, 2023

**Abstract:** This study aims to develop chemical uno cards as learning media in class X senior high school in chemical bonding materials that are valid and practical. This type of research is development research using the Plomp model. This research has three stages, namely (1) preliminary research, (2) prototyping stage, and (3) assessment phase. The subjects of this research consist of 5 chemistry lecturers at the Faculty of Mathematics and Science, Padang State University, two chemistry teachers, and 12 students at SMA N 13 Padang for the 2021/2022 academic year. The research instruments used were self-evaluation sheets, one-to-one evaluation interview sheets, content validity questionnaires, construct media, and practicality questionnaires. Data analysis for validity uses Aiken's V formula, and practicality uses the percentage formula. The research results obtained a V value for material validation of 0.92 and media validation of 0.92, which are included in the valid category. The media practicality was obtained from the teacher's response of 96.8% and 94.4% of the students included in the very practical category.

**Keywords:** *Chemistry Uno Cards, Learning Media, Chemical Bonds.*

### INTRODUCTION

Learning is a self-development activity that produces experiences based on self-ability through teacher guidance. Teaching is a directing activity, making it easy to find something based on the abilities possessed by the teacher [1]. In the teaching and learning process, the teacher has an important role in the smooth running of the learning process. The teacher is a source of information for students and guides students to find certain concepts in the learning process. Teachers must also have creativity in applying learning models and strategies and using learning media. All of these aspects can motivate students to participate actively in learning activities and make it easier for them to understand the concepts of the material being taught.

Chemical bonding is one of the materials studied in the 2013 curriculum in class X SMA/MA in odd semesters [2]. In this material, the basic competence (BC) achieved is BC 3.5, which reads comparing ionic bonds, covalent bonds, coordinate covalent bonds, and metallic bonds and their relation to the properties of substances. Chemical bond material contains a lot of knowledge of facts and concepts. One example of fact knowledge from this material is that NaCl is an ionic compound that can conduct electric current in solution form. Meanwhile, an example of conceptual understanding from chemical bonding material is ionic bonding, a bond that occurs due to the attractive force of attraction between negative ions and positive ions. The dominance of chemical bond material, which contains more factual knowledge and concepts, requires students to hold discussions to exchange ideas with their friends and read and do exercises to strengthen students understanding of the material.

Based on the results of a questionnaire given to chemistry teachers at SMAN 10 Padang, SMAN 13 Padang, and SMA Pembangunan Laboratory Faculty of Mathematics and Science, Padang State University, it was found that at the end of the material, the teacher always gives practice with practice questions provided from modules, textbooks, student worksheet and self-made questions. The practice questions given by the teacher to students in the process are still individual. The variety of exercise models used in the learning process has yet to maximally motivate students to be active in doing the exercises. It is also supported by the author's experience when conducting educational field practice at Pertiwi 1 Padang High School, seen when using media such as PPT, textbooks, and student worksheet. Most students still need to be more active in doing the exercises. In contrast, students' activeness in carrying out exercises is very important because success in learning activities can be seen from students' activeness in participating in learning, including in doing these exercises [3]. The results of the questionnaire given to 60 class X SMA/MA students it was obtained: (a) the exercises provided by the teacher came from textbooks, student worksheet, modules, and questions made by the teacher, (b) 71.66% of the students still less active in doing the exercises given.

A strategy is needed to increase students' interest and activeness in doing the exercise. One way is to use game media as a variation of the training model. To increase the activity of students, learning media as an alternative to the training model used must follow the students' character [4]. Children aged 7-18 years have characteristics that tend to prefer the application of game-based training models in doing exercises [5]. Games can be

developed as learning media that can make these games educative and attract students' interest in doing learning activities [6]. Games can connect actions and thoughts. If games can be developed as learning media properly, they can provide authentic training in thinking [7]. The uno card game is a card game that 2-7 people can play. The focus of this game is to match the color, symbol, or number on the card issued by the previous player. The winner of this game is the person who spends the fastest card that the judge or coordinator in the game previously distributed. This uno card game can be modified into a chemical uno card game which can be used as an alternative learning medium for fun exercise models. This game can make students participate actively in learning activities [7]. The principle of the chemical uno game developed is still the same as the usual uno game, namely matching numbers, symbols, and colors. The modification of this game so that it becomes an educational game is that the card design is modified by adding questions based on competency achievement indicators and accompanied by pictures and symbols related to the questions.

From the description above, adjusting the characteristics of students who prefer applying game-based training models in doing exercises, the uno chemistry card game is very suitable if used as a learning medium for alternative training models. The uno chemical game is an educational and fun game that can increase students' interest and activeness in learning activities in doing exercises. This game can create a learning atmosphere that was initially boring and tense to more enjoyable. Therefore, a study focuses on developing the Uno Chemistry Card Game as Learning Media in Class X SMA/MA Chemical Bonds.

## RESEARCH METHODS

This type of research is research development (Research & Development) which produces a product in the form of learning media for the chemical uno card game on chemical bonding material. The model used in this study is the Plomp model, which has three stages: preliminary research, prototyping stage, and assessment phase. However, this research is only limited to the prototyping stage, which produces valid and practical products.

The subjects of this study were five chemistry lecturers at the Faculty of Mathematics and Science, Padang State University, as material and media expert validators, two chemistry teachers as material expert validators and practitioners, and twelve students of class XI MIPA SMAN 13 Padang as practitioners. The object of this research is the chemical uno card as a learning medium in the chemical bonding material for class X SMA/MA. The data analysis technique uses Aiken's V formula to obtain the validity value and the percentage to obtain the practicality level.

## RESULTS AND DISCUSSION

### Preliminary Research

#### 1) Needs Analysis

Based on the results of the questionnaire analysis distributed to teachers and students, it can be concluded that: 1) the teacher provides exercises at the end of each lesson to strengthen students' concepts. 2) There is no game media used as learning media for practice. 3) The practice questions used come from modules, textbooks, student worksheet, and questions made by the teacher. 4) The exercises the teacher gives still need to make students active. While the activeness of students in doing exercises is one of the things that we can assess that students understand the material we teach [3]. Therefore, we need a strategy that can arouse students' activeness in learning activities, especially in doing exercises. The strategy that can be done is to apply a game-based training model in doing the exercise. According to [5] children aged 7-18 years have characteristics that tend to prefer the application of game-based training models in learning activities. The game developed is a chemical uno card.

#### 2) Context Analysis

Based on the analysis of the syllabus in the 2013 curriculum that has been carried out, basic competence (BC) and formulation of competency achievement indicators on chemical bonding material.

Based on the description of the indicator formulation above, the learning objectives to be achieved by students in chemical bonding material are through teaching materials and uno chemical games as an alternative learning medium for the training models used, so students are expected to be able to compare ionic bonds, covalent bonds, covalent bonds coordination and metallic bonding and its relation to the nature of substances.

#### 3) Study of Literature

The results obtained from a review of some of the literature are based on research conducted by [7] entitled Development of the UNO Card Game to Improve Understanding of Concepts and Characteristics of Class VIII Students with Optical Themes. This research produces products that have been developed, which are stated to be very valid and effective in increasing student understanding of the concept of optical theme material and can increase the curiosity character of students. [8] entitled Development of UNO Card Learning Media on Bank Material for Class X IIS MAN 2 Lamongan, produced a valid UNO card learning media. [9] entitled Development of Learning Media for UNO Card Games in Mathematics Learning for Unit Length Material, the results of this study are that UNO card learning media is very suitable for use as learning media. [10] entitled Making UNO Spin Chemistry Learning Media on Elemental Periodic System Material, from this study, it was found that

the developed media was very suitable for use as a learning medium. Student learning outcomes were better by using Uno game media than without using media or learning directly [11]. The Development of the Uno Card Game as an Evaluation Tool for Learning Accounting on the Subject of Long-Term Debt produced the Uno card game as an evaluation tool for learning accounting which is included in the very feasible category [12]. The Role of the Uno Card Game in Improving Students' Critical Thinking Skills: This study showed that students' critical thinking skills increased after using the Uno card learning media [13]. Learning Media in the Form of Cards Using the Uno Card Game Method on Protista Material shows that students need additional learning media on Protista material. The criteria for learning media students need the material delivered to be complete, concise, concise, accompanied by pictures, and using the game method [14]. The Effect of Using the Uno Card Game Media on Hydrocarbon Compound Material on Student Learning Outcomes it was found that students who studied using the Uno card media obtained higher scores than students who studied directly [15]. The Effect of Uno Game Card Media on Student Learning Outcomes in Material Comparing Simple Fractions it was found that student learning outcomes in material comparing simple fractions using Uno game card media were better than students who studied without using game card media uno [12].

#### 4) Conceptual Framework

The conceptual framework in this study can be seen in Figure 1.

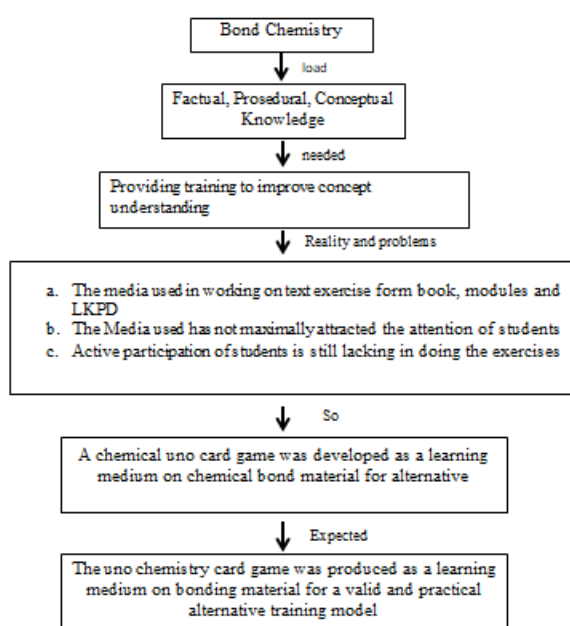


Figure 1. Conceptual Framework

#### Prototyping Stage

##### 1) Prototype 1

At this stage, it produces a chemical uno card game as a learning medium on chemical

bonding material which consists of several components, namely: card boxes, game rule sheets, answer key sheets, number/question cards, action cards (skip cards, reverse cards, +1 cards, +2 cards, and wild cards ) and cover cards.

##### a) Card Box

Card boxes are printed using cardboard and then laminated, so they are not easily damaged. The card box design was created using the Canva app. The display of the chemical uno card box can be seen in Figure 2.



Figure 2. Chemistry Uno Card Box

##### b) Game rule sheet

The game rule sheet was created using Microsoft word with Times New Roman font size 12 and printed using paper.

##### c) Answer Key Sheet

The answer key sheet contains the questions as well as the answers. This answer key sheet was created using Microsoft word with Times New Roman font size ten and printed using paper.

##### d) Question Card

This question card was designed using the Canva application using the Alice font type. This card is made to resemble a rectangle of 7cm x 10 cm, and the paper used to print this card is Art paper Cardboard Glossy Lamination. The display of several question cards can be seen in Figure 3.

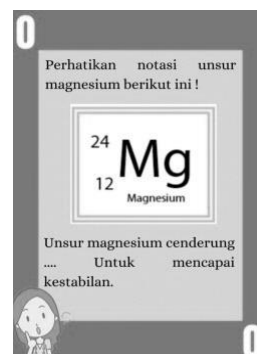


Figure 3. Question Cards

##### e) Action Card

There are four types of action cards, namely skip cards, reverse cards, +1 cards, +2 cards, and wild cards. This action card was designed using the

Canva application with the Alice font type. This card is made to resemble a rectangle of 7 cm x 10 cm, and the paper used to print this card is Art paper Cardboard Glossy Lamination.

f) Card Covers

A cover made using the Canva application is on the back of the card. The font type used is Open Sans Extra Bold.

After producing prototype I, the next step to produce prototype II is to do a self-evaluation. The self-evaluation stage focuses on ensuring the completeness of the components contained in the product with a checklist system. At this stage, it was concluded that all the components of the chemical uno card were complete.

2) Prototype II

a) Expert Reviews

In validating this material, there are several indicators, namely the content/content component and the construct or connectivity between all media components and the content of the media being developed (language, presentation, and graphics). Indicators must exist in this material's validation assessment [17]. Namely, a content/content component exists and constructs or connectivity between all media components and the content being developed (language, presentation, and graphics). The material validation value on the chemical uno card learning media as a whole is shown in Table 2.

Table 1. Validation of Chemical Uno Card Material

| No. | Category             | V    | Validity Category |
|-----|----------------------|------|-------------------|
| 1.  | Content Validation   | 0.91 | Valid             |
| 2.  | Construct Validation | 0.93 | Valid             |

From Table 1 above, it can be concluded that the chemical uno card as a learning medium in chemical bonding material for class X SMA/MA in terms of material validity obtained a value of V of 0.92, which is included in the valid category. From the aspect of content validation, the media developed in terms of content components follows core competencies, basic competencies, competency achievement indicators, and learning objectives. From the constructed aspect, the media developed based on the presentation of the questions has directed students to achieve learning objectives. All the components contained in the uno chemistry card game are card boxes, covers, question cards, action cards, game rules, and answer keys, complete and systematically arranged. In this chemical uno card game, the language is clear and does not confuse. As well as in terms of graphics, it is appropriate, interesting, and can be observed clearly.

b) Media Expert Validation

Media validation data analysis can be seen in Table 2.

Table 2. Conclusion of Media Validation Data Analysis

| No. | component              | V    | Validity Category |
|-----|------------------------|------|-------------------|
| 1.  | Display Aspect         | 0.90 | Valid             |
| 2.  | Engineering Components | 0.93 | Valid             |

From Table 2 for the display aspect, the V value is obtained, which is 0.90 with a valid category. This value indicates that using symbols, images, and writing in the media is attractive and clear. [18] states that media design using appropriate colors and images will make students more interested and foster a realistic impression for students.

The technical aspect of use obtained a V value of 0.93 with a valid category. It shows that the uno chemistry card game developed is simple and easy to operate. Media with good technical quality is a criteria to consider when choosing learning media [19].

The V value for media validation obtained a value of 0.92 with a valid category. These results indicate that the chemistry Uno cards, from a visual and technical point of view, are suitable for use as learning media.

c) One To One Evaluation

The results of this stage can be concluded that the display of the chemical uno card game in terms of appearance can attract students' interest in doing the exercises because the aesthetics of the appearance of the chemical uno card are made as good as possible. The questions on the card follow basic competencies and learning objectives and are very helpful to students in strengthening the concept of chemical bonding material. This chemistry uno card also uses good and correct Indonesian spelling to ensure everything is clear.

3) Prototype III

After producing prototype III, a small group evaluation test will be carried out to obtain the practical value of the product being developed. The average value of the data analysis of the practicality of teachers and students can be seen in table 3 and table 4.

The evaluation aspect of the first practicality questionnaire, namely the product's ease of use for the teacher's response questionnaire, obtained a practicality value of 96.7% in the very practical category. In comparison, the students obtained a value of 94.8% in the very practical category. This value indicates that the uno chemical card game, in its use as a learning medium, is very easy to use because the language is easy to understand. The

card's components are medium and can still be carried and used anywhere and anytime. Media can be considered practical if the media is easy to use [20].

Table 3. The value of teacher practicality

| No.                    | Rated aspect    | Percentage (%) | Category       |
|------------------------|-----------------|----------------|----------------|
| 1.                     | Ease of use     | 96.7           | Very Practical |
| 2.                     | Time efficiency | 96.7           | Very Practical |
| 3.                     | Benefit         | 97.2           | Very Practical |
| Percentage (%) overall |                 | 96.8           | Very Practical |

Table 4. Students' practical value

| No.                    | Rated aspect    | Percentage (%) | Category       |
|------------------------|-----------------|----------------|----------------|
| 1.                     | Ease of use     | 94.8           | Very Practical |
| 2.                     | Time efficiency | 93.6           | Very Practical |
| 3.                     | Benefit         | 94             | Very Practical |
| Percentage (%) overall |                 | 94.4           | Very Practical |

Furthermore, time efficiency for teacher responses obtained an average practicality value of 96.7% and students of 93.6 % with a very practical category. This value proves that chemistry uno cards as learning media can make learning time efficient.

The usefulness aspect obtained an average practicality score of 97.2% for teachers and 94% for students in the very practical category. So, the chemical uno card can be used as a learning medium to strengthen students' concepts in chemical bonding material because the questions on the chemical uno card follow basic competencies and direct students to learning goals. The game method can increase motivation and strengthen students' understanding of concepts in learning [21].

The average practicality value of all aspects for the teacher's response is 96.8 % in the very practical category, and the student's response is 94.4 % very practical category. Based on the practicality category, it was concluded that the chemical uno card as a learning medium for class X SMA/MA chemical bond material that had been developed was practically used as a learning medium.

#### 4) Prototype IV

At the small group evaluation stage, prototype IV, a valid and practical chemical uno card, was produced.

## CONCLUSION

The results of the research that has been done concluded that the chemical uno card game as a learning medium in chemical bonding material for class X SMA/MA can be developed as a learning medium using the Plomp model. The chemical uno card game as a learning medium in chemical bonding material for class X SMA/MA obtained a V value for material validation of 0.92 and media validation of 0.92, which is included in the valid category. The practicality of the media was obtained from the teacher's response of 96.8 % and 94.4% of the students included in the very practical category.

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