CHAPTER I
INTRODUCTION

1.1 Background of the Problem

Education is not only based on intellectual development, but also the process of forming individuals who excel in spiritual, moral and social aspects (Aisy et al., 2024). In the challenging era of globalization, education is not enough to only emphasize science and technology, but also to strengthen spiritual and moral values (Halimah et al., 2024). Holistic strategy is an educational approach that emphasizes not only intellectual intelligence, but also emotional, spiritual, and social development (Asrofi et al., 2025). In Indonesia, education is based on the 1945 Law and also Pancasila which emphasizes the balance between faith, noble morals, devotion, and personality with mastery of knowledge, attitudes, and skills (Sapitri & Maryati, 2022). Spiritual development theory emphasizes that individual experiences in a given context can drive transcendence by moving beyond old ways of thinking toward new mindsets (Eren & Dökme, 2022). This is in line with the goals of national education which not only emphasizes the mastery of knowledge and technology, but also on the development of the spiritual, social and moral potential of students (Iskandar, 2022).

Chemistry is often seen as less interesting by students because of abstract concepts and reactions. One of the topics in class X chemistry material that tends to be difficult to understand and not easy to visualize or experiment with is chemical bonds (Sinaga and Darmana, 2020). The topic of chemical bonding underlies the understanding of reactions and structure-property relationships, but is often difficult for students to understand (Tsaparlis et al., 2021). Various studies show that students still have difficulty visualizing the shape and structure of molecules in chemical bonds because they require high visual-spatial skills (Kuit & Osman, 2021). This abstraction is what causes students to have difficulty understanding the material, so learning media that is able to visualize the concept of chemical bonds clearly, interestingly and easily understands is needed.

PISA (Programme for International Student Assessment) states that science literacy is the ability to apply scientific concepts in real life to make the right decisions (Amelia et al., 2025). The results of the 2018 PISA international survey

show that the science literacy of Indonesian students is still below the OECD average (OECD, 2019). This indicates that students are not fully able to relate science concepts to real-life contexts.

UNESCO through *Education for Sustainable Development (ESD)* also emphasizing the importance of integrating aspects of values, spirituality, and sustainability in science education (UNESCO, 2020). This aims for students not only to become academically intelligent individuals, but also to be able to behave ethically, respect nature, and be responsible in social life (S. A. F. Putri & Wiranata, 2025) .

The insertion of spiritual values in the learning of chemistry does not mean diminishing the scientific nature of chemistry itself. On the contrary, this step can be seen as the right approach, because it helps students realize that the various natural phenomena and scientific discoveries that have existed are in essence part of God's provision and greatness (Harahap et al., 2022). By integrating spiritual values, chemistry learning not only focuses on the cognitive aspect, but also builds self-awareness, fosters gratitude, and strengthens an understanding of the orderliness of God's creation (Harahap & Darmana, 2020). This approach is in line with the goal of holistic education, which is to develop intellectual potential while shaping the character and morals of students to be able to face life's challenges with a strong foundation of values.

On the other hand, the development of digital technology opens up new opportunities in learning media innovation. Learning media is a means that carries information from the source to the recipient, or as a means of transferring messages in the learning process (Abthal et al., 2024). Learning media is understood as an intermediate component in conveying messages, both in the form of tools, techniques, and approaches, so that the interaction between teachers and students in the learning process becomes more optimal (Lubis et al., 2023). Innovative learning media not only serves as a means of delivering information, but also as a stimulus that can arouse students' interest and active participation in the classroom. In the context of chemistry learning, especially in chemical bonding materials that are abstract and difficult to visualize, the use of digital media is very relevant.

Based on the result of the questionnaire administered to teachers at SMAN 2 Medan (2025), teachers still use conventional methods that have not been supported by varied learning media. The learning process generally relies only on textbooks or power point text as the main material to explain chemical bonding material. The results of students questionnaire showed that students were less interested in taking chemistry lessons in the classroom. This condition makes the classroom atmosphere feel monotonous, less interesting, and results in low student interest in participating in learning. In addition, the integration of spiritual values in learning has also not been optimized, even though spiritual values are an important competency that must be instilled through the educational process to form students who are not only intellectually intelligent, but also characterful.

One alternative that can be used to overcome this problem is digital comics. This media has the advantage because it is presented simply, using images and everyday language that is easy to understand, so that it is able to attract the attention of readers from various circles (Arief et al., 2022). Comics as a learning medium are also effective in presenting material in visual form that is attractive, light, and fun for students. In addition to serving as entertainment, comics can also contain character values, including spiritual values, so that not only add to students' understanding of abstract chemical concepts, but also foster awareness of the importance of life values in the learning process (Darmayanti et al., 2022). Thus, the development of digital comics with spiritual values is one of the right learning media innovations to improve the quality and meaning of chemistry learning, especially in chemical bonding materials in class X of high school.

A number of previous studies have shown that the integration of spiritual values and the use of visual media has great potential in improving the quality of chemistry learning. Andriyani et al. (2021) proved that chemistry modules combined with spiritual values can help students' understanding of abstract concepts such as atomic structures, thus showing that the integration of values can be in harmony with scientific content. Furthermore, Okmarisa et al. (2016) found that chemistry teaching materials integrated with spiritual values through the Problem-Based Learning (PBL) model are able to improve student learning outcomes. In addition, research on comic media in chemistry learning provides a strong foundation for the

development of digital comics. Fawaidah and Sukarmin (2016) succeeded in developing comic-based learning media on chemical bonding materials, providing procedural references and proof of feasibility related to the visualization of ionic and covalent bond concepts. Nisa et al. (2022) also developed a PBL-based chemistry comic on chemical bonding materials that have been proven to increase student engagement and concept understanding through storylines and problem-based challenges.

Based on the description of the problem above, the author feels the need to present learning media innovations that are able to visualize the concept of chemical bonds while integrating spiritual values. Therefore, the author is interested in conducting a research with the title "Development of Digital Comics with Spiritual Values as a Learning Media for Chemical Bonds in Class X of High School".

1.2 Problem Identification

Based on the background description above, several problems can be identified as follows:

1. Chemistry learning, especially chemical bonding material, is often considered abstract and difficult for students to understand
2. Teachers still dominate using conventional methods centered on textbooks, so learning tends to be monotonous and less interesting
3. Low interest and difficult understanding of students in learning chemistry materials, especially those that require visualization skills
4. The learning media used has not varied
5. Spiritual values have not been optimally integrated into the learning process

1.3 Scope

The scope of this study includes:

1. The subjects of the study are chemistry teachers who teach at the high school/equivalent level spread across 25 districts and 8 cities in North Sumatra Province, as an assessment of the practicality of the media. In addition, grade XI students at a high school in Medan were also the subject of research as responders to the use of media.

2. The Learning Material that is the focus of media development is Chemical Bonding for class X of high school.
3. The product developed is a digital comic learning media that integrates spiritual values (such as love, respect, compassion, truthfulness, responsibility and sharing).
4. The focus of the development of this research is limited to the Define, Design, and Develop stages of the Thiagarajan 4D model, with an emphasis on Needs Analysis (Define), Product Design (Design), and Expert Validation, Practitioner Appraisal, also Student's Responses (Develop).
5. Assessed aspects of media include, validity, practicality, and user response.

1.4 Problem Limitations

1. The chemical material developed in digital comics is only on the subject of chemical bonds.
2. Integrated spiritual values are focused on relevant spiritual values and can support students' understanding and awareness of the orderliness of God's creation.
3. The development model used is 4D (Define, Design, Develop, Disseminate), but only up to the development stage.
4. The Define stage conducts need, learner, task and concept analysis of the learning process.
5. The Design stage is carried out by making digital comic media with spiritual values include the media and format selction.
6. The Development stage is validated by material expert validators, spiritual expert validators and media expert validators, as well as appraisal by teachers.

1.5 Problem Formulation

Based on the background, identification, scope, and limitations of the problem that has been presented, the problem formulation of this research is:

1. What are the need analysis of teacher and student for the development of digital comic media with spiritual values into chemical bonding materials based on the perception of teachers and students?
2. How is the level of validity of digital comic media with spiritual values into chemical bonding materials based on the assessment of material experts, media experts, and spiritual value experts?
3. How is the practicality of digital comic media with spiritual values into chemical bonding materials based on the appraisal of chemistry teachers?
4. How do student's responses to digital comic learning media with spiritual values into chemical bonding materials?

1.6 Research Objectives

The objectives of this research are:

1. To know the need analysis of teachers and students for the development of digital comic media integrating spiritual values into chemical bonding materials.
2. To measure the level of validity of digital comic media with spiritual values into chemical bonding materials based on the assessment of material experts, media experts, and spiritual value experts.
3. To find out the level of practicality of digital comic media with spiritual values into chemical bonding materials based on the appraisal of chemistry teachers.
4. To describe students' responses to digital comic media with spiritual values into chemical bonding materials.

1.7 Research Benefits

In accordance with the objectives that have been formulated, this research is expected to provide a number of benefits as follows:

1. For teachers, this research is expected to provide an innovative, practical, and easily accessible alternative learning media in the form of digital comics to explain the abstract concept of chemical bonds. In addition, the resulting

product can be a concrete example of how to integrate spiritual values into chemistry learning without reducing the depth of the material, while enriching the reference of learning media to improve the quality of learning in the classroom.

2. For students, the media developed can increase students' understanding of abstract chemical bonding concepts, as well as foster awareness of the importance of spiritual values in life.
3. For Education Students, the results of research can be a reference in the development of creative media that combines cognitive aspects with character values.
4. For Media Developers Furthermore, this research can be the basis or foothold for the development of other learning media that integrate different character values according to needs.
5. In general, this research supports the realization of chemistry learning that is more meaningful, interesting, and in line with the goals of national education, namely developing academic and spiritual competencies.