

## What are the Characteristics of Learners and the Variations of Non-Electronic Learning Media?

Ira Mahartika<sup>1\*</sup>, Syukriyati Na'imatul Aisyah<sup>2</sup>, Langen Nidhana Meisyalla<sup>3</sup>, Aldeva Ilhami<sup>4</sup> 

<sup>1,2</sup> Chemistry Education Departement, Faculty of Education and Teacher Training, Universitas Islam Negeri Sultan Syarif Kasim Riau, Indonesia

<sup>3</sup> Developmental and Educational Psychology Departement, Faculty of Education, Hubei University, Wuhan, P.R of China

<sup>4</sup> Science Education Departement, Faculty of Education and Teacher Training, Universitas Islam Negeri Sultan Syarif Kasim Riau, Indonesia

### ARTICLE INFO

#### Article history:

Received August 11, 2022

Revised August 15, 2022

Accepted May 22, 2023

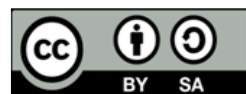
Available online June 25, 2023

#### Kata Kunci:

Analisis Kebutuhan, Media Pembelajaran, Media Non Elektronik

#### Keywords:

Need Analysis, Learning Media, Non-Electronic Media



This is an open access article under the [CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.

Copyright ©2023 by Author. Published by Universitas Pendidikan Ganesha.

### ABSTRAK

Analisis kebutuhan media sangat penting sebelum mengembangkan produk media pembelajaran. Analisis ini harus segera melihat kebutuhan di lapangan dan mempertimbangkan media sesuai dengan kriteria dan karakteristik yang dibutuhkan, namun hal ini tetap dikesampingkan dan dianggap tidak perlu. Penelitian ini bertujuan untuk menganalisis informasi tentang analisis kebutuhan khusus pada media non elektronik. Penelitian ini merupakan penelitian deskriptif kuantitatif dengan menggunakan metode survei berbantuan NVIVO Plus. Pemilihan sampel diperoleh sebanyak 23 sekolah yang terdiri dari 23 guru dan 230 siswa. Pengumpulan data dilakukan melalui wawancara dan kuesioner. Hasil penelitian menunjukkan bahwa variasi media pembelajaran masih belum terlihat karena berbagai kendala yang dihadapi guru. Siswa menginginkan berbagai media pembelajaran non elektronik yang menarik, praktis, menyenangkan, dan mudah dipahami. Beberapa sekolah masih membutuhkan media pembelajaran non-elektronik untuk mendukung proses pembelajaran kimia, salah satunya adalah media permainan edukasi, modul, dan LKS berbasis pendekatan model pembelajaran, serta gabungan pemanfaatan media non-elektronik dan elektronik.

### ABSTRACT

Analysis of media needs is crucial before developing a learning media product. This analysis should immediately look at a need in the field and consider the media according to the criteria and characteristics needed, but this is still ruled out and deemed unnecessary. This study aimed to analyze information about special needs analysis on non-electronic media. This research is a quantitative descriptive study using the NVIVO Plus assisted survey method. The sampling selection is a total of 23 schools were obtained consisting of 23 teachers and 230 students. Data collection were carried out through interviews and questionnaires. The results of the study showed that variations in learning media are still not visible due to the various obstacles encountered by teachers. Students want a variety of non-electronic learning media that is interesting, practical, fun, and easy to understand. Some schools still need non-electronic learning media to support the chemistry learning process, one of which is educational game media, modules, and worksheets based on learning model approaches, as well as a combination of the utility of non-electronic and electronic media.

### 1. INTRODUCTION

Needs analysis is part of the development research stage and is the first thing that must be completed as an initial basis for determining the learning media to be developed. By the opinion of Morisson stated that the use of needs analysis is a tool to identify a problem and then sort out interventions according to needs (Hamilton et al., 2016; Ndiung & Jediut, 2021). These needs analysis studies can be in the form of literature and field studies. In the field analysis study, direct observations were made at the research location. Hence, the real results would be obtained and follow the desired level of need. These needs analysis can be related to curriculum studies, student characteristics, initial abilities, learning environment, availability of facilities and infrastructure, and learning objectives (Sihombing & Marheni, 2012; Yusop et

\*Corresponding author

E-mail addresses: [ira.mahartika@uin-suska.ac.id](mailto:ira.mahartika@uin-suska.ac.id) (Ira Mahartika)

al., 2015). However, this analysis is often neglected and considered unnecessary because it requires a relatively long time. Therefore, this needs analysis study is crucial to do so that it can help other researchers design products that are useful and follow what is required (Asrizal et al., 2017; Hidayat et al., 2019; Suardana & Juniartina, 2020; Sumarni et al., 2020).

Another reason for choosing this research study is to contribute to saving the time of other researchers working on a development research project. The period of the development project required is quite long if it starts from the initial step to the final stage. A percentage number as much as 33% of needs analysis activities, 10% of the design stage, 23% of the development stage, and 33% of the implementation, evaluation, and maintenance stages. Therefore, this needs analysis research can save a third of the time of other researchers working on a project related to learning media.

The urgency of other research is also supported based on field observations, resulting that results showing teachers develop media only in an "impromptu" nature without the need for analysis due to the limitations of teachers who do not comprehend the technical aspects of developing instructional media (N. L. P. A. Saraswati & Mertayasa, 2020; Sri Saraswati et al., 2019). The selection of learning media is only adjusted to the material to be taught but has not considered the needs of students. Students think that learning still needs innovations in the use of learning media. It is interesting and not boring. Then, this needs analysis takes a long time. Therefore, research ideas are expected to be able to serve as teacher literature or other researchers in developing learning media and can save a third of the teacher's time in developing media, especially non-electronic media so that more varied learning media are created (Nugroho & Surjono, 2019; Widiyanti & Nisa, 2021).

Variations of needs analysis research were also carried out by other researchers in different fields of study. Previous study examined the analysis of teacher needs in science learning, especially chemistry lessons by obtaining data from teacher and student response questionnaires (Sihombing & Marheni, 2012). Other study carried out a needs analysis and looked at the teacher's role in improving science and environmental learning media (Ichsan et al., 2018). There is research related to the analysis of the needs of teaching materials (Rahmadani et al., 2018). Research related to information regarding the need for educational games, perceptions of educational games, and the format of educational game presentations for teachers and students (Adita et al., 2018). Study analyzed the need in developing self-concept modules (Yusop et al., 2015). Study analyzed the need in developing a blended learning model (Widyasari et al., 2019). Other study analysis of student needs in developing online learning media with a STEM contextual approach (Pathoni et al., 2021). There is also study conducted a study related to social skills-based learning models for mentally retarded children in inclusive schools (Husadani et al., 2021).

Based on the various studies above, in general, the researchers examined the dominant needs analysis on one particular topic of learning media development in the field of social studies and dominant sampling techniques using purposive sampling. Therefore, there is an opportunity for researchers to focus on needs analysis studies that are tailored to the field of chemistry education. The novelty improvisation of this study leads to a cluster sampling technique which consists of grouping schools with high, medium, and low criteria spread across all sub-districts in the city of Pekanbaru, so that the data obtained is more comprehensive. Furthermore, discussions were held with the best experts from within and outside the country in the field of education as well as providing convenience and saving one-third of the total time for implementing development project research for teachers or other researchers who will develop non-electronic learning media. The aims of this study analyze information about special needs analysis on non-electronic media.

## 2. METHOD

This research is a type of quantitative descriptive research with a survey method assisted by the NVIVO application (Braun et al., 2021). Related research samples are teachers and students. The selection of the research sample was carried out using a cluster sampling technique taking into account the criteria for high, medium, and low school levels spread across each sub-district so that 23 public and private SMA/MA schools in Pekanbaru were obtained with 23 teachers and 230 students. Data collection techniques used non-test techniques: questionnaires with a Likert scale and interview guidelines (Joshi et al., 2015; Nemoto & Beglar, 2014). The questionnaire instruments and interview guidelines were validated by content validation through expert judgment by five experts in chemistry education. There are five indicators of needs analysis, namely: 1) Identification of users. 2) Identification of population and environment. 3) Identification of needs. 4) Evaluation of needs. 5) Decision-making based on needs evaluation results.

Data analysis used descriptive statistics (Dietmaier, 2017; Quintela-del-Río & Francisco-Fernández, 2017). The stages of research implementation consist of 3 stages; 1) Planning stage, which consists of

identifying and describing related to the target population and respondents involved in the research, clarifying the objectives of the needs analysis, defining the problem, identifying the source of the problem and determining the solution to the problem. 2) The data collection stage, collecting sources of information relevant to the research, collecting literature studies related to the analysis of learning media needs, carrying out the research process with data collection techniques through interviews and questionnaires, making a recapitulation of information obtained during the research. 3) Data analysis and interpretation stage, reviewing the information that has been collected, data from interviews and questionnaires which are grouped according to the research school, and then the data is processed quantitatively then the data is recapitulated and described in detail with the additional NVIVO Plus application.

### 3. RESULT AND DISCUSSION

#### Result

##### *Curriculum Analysis*

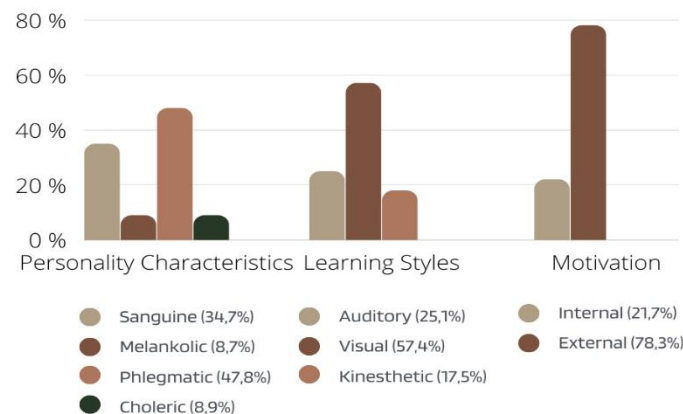
Based on the research at 23 schools, there are 100% of the schools implemented the K-13 curriculum, then 4.3% implemented a curriculum other than K-13. The student characteristics background discussed in this study are includes the economic status of the family. Based on the results of the research, it was found that 23.48% belonged to the very high-income group, 42.17% to the high-income group, 28.70% to the medium-income group, and 5.65% to the low-income group. Based on the data above, the dominant economic status of the students' families is the second class (high-income group). The classification of family economic status according to the Central Statistics Agency (BPS) in 2016 is divided into 4 groups namely: 1) The highest income group is if the average income is more than Rp. 3,500,000 per month. 2) The high-income group is if the average income is between Rp. 2,500,000 to Rp. 3,500,000 per month. 3) Medium income group is if the average income is between Rp. 1,500,000 to 2,500,000 per month. 4) The low-income group is if the average income is below IDR 1,500,000 per month.

This shows that the average economic status of the families of students at the school in the research location in Pekanbaru has the sufficient financial capacity to support the learning process. Family economic status plays a role as a support for student learning at school. Students with various economic and social statuses come together to interact with each other and carry out the learning process. This difference should not be an obstacle in carrying out the learning process. The implication of the existence of various socio-economic statuses of these students, educators are required to be able to act fairly and not be discriminatory. There are several things that need to be considered in selecting media related to the background of the family's economic status, namely the selected media should be aligned and support the educational goals and conditions of students, its cost-effectiveness in the long term, factors related to flexibility, practicality, and durability of media, media The chosen one must be able to facilitate and bring understanding closer to students.

Based on the results of the research shows the dominant learning style of students is 26.08% of a visual learning style. Students with a visual learning style have a high interest in learning that presents pictures that they can see directly. This learning style emphasizes the senses of the eye to capture the information presented. For children with a visual learning style, the teacher will use more media or pictures on the whiteboard. It is crucial to allow students to see what they are learning. Furthermore, the teacher's expressions and body language are also important to make it easier for them to understand their intentions and goals. This visual learning style is one of the student learning styles in the millennial era. This increasingly sophisticated technological development has made the millennial generation do things quickly. It's like when we exchange information, we don't need to write on paper, but use today's digital technology which can be quickly and easily conveyed. Smartphones are the result of digital technology which is very important for the millennial generation. On average they use smartphones to carry out all their activities. Reading and listening techniques may not necessarily be able to understand the thoughts of the millennial generation, they need a way of learning that is very easy to understand everything and that is presented in the form of pictures. For example by watching material/tutorials on a platform, namely Youtube. By giving the viewing technique they will find learning more fun and can increase their interest in learning, so they will also tend to enjoy and feel satisfied with learning. Therefore, non-electronic learning media in this study can still be developed according to needs, but taking into account the conversion from non-electronic to electronic.

Learning motivation is a characteristic of students that needs to be known further by an educator who will develop learning media. Interest is a significant factor in learning process activities. Interest is an element that drives a person's motivation so that the person can concentrate on an object or a particular activity that has been practiced. Learning motivation is an impetus that exists within a person to try to make changes in behavior that are better in meeting their needs in learning. The results show that 78.3% of the

dominant learning motivation of students comes from outside (external). The factors that influence learning motivation consist of internal and external factors. Internal factors come from within the student, namely physical, intelligence, attitudes, interests, talents, and emotions. External factors come from outside the student's self, namely family, school, and community. One of the factors in the school environment that influences motivation is the teaching method used by the teacher (for example, teacher-centered or student-centered), the type of curriculum used, the relationship between teacher and student (for example, very intimate, open, or very closed), the relationship between students (for example competition or cooperation), school discipline models developed, types of subjects and student learning load, school time (for example entering the morning or entering the afternoon), the condition of the school building, the number of homework assignments and the use of learning media. The description of the results of the personality, learning style, and motivation of students described above is shown in Figure 1.



**Figure 1.** Percentage of Student Personality Characteristics Results, Learning Styles, and Student Motivation

Base on Figure 1, this level of intelligence is related to the ability of students to receive subject matter and to be able to measure the level of depth and breadth of the material. This research has found that 17.4% were rated as having a high intelligence level, there are 60.7% rated as a moderate intelligence level and 21.74% had a low intelligence level rate. The dominant level of student intelligence from the 23 sample schools is in the medium category. The data in this study were obtained from guidance and counseling teachers of each school. The relationship between the use of media and the level of intelligence of students is considered by the teacher in compiling material, methods, media, and the level of difficulty in evaluating the level of intelligence of students. Therefore, the use of media for students is expected to be carried out with different techniques and types according to the development of students' intelligence.

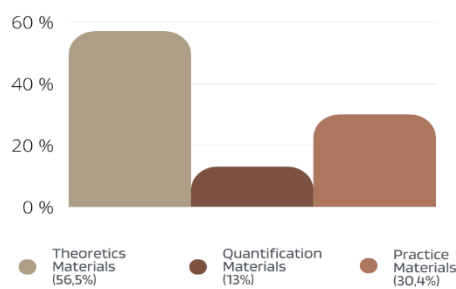
Based on the characteristics described above, a close connection was obtained from this study, namely, the dominant phlegmatic personality of the students and their learning style tended to be visual, requiring strong external motivation. This phlegmatic personality is very relaxed, humble, non-offensive, patient, calm, and realistic, can be a mediator, and can be a good listener. In addition, the disadvantages are that they tend to be unenthusiastic, and quiet, lack discipline, like to procrastinate work, can appear lazy, indecisive, or emotionally closed, and tend to avoid conflict. Students with phlegmatic personalities also tend to respond quickly, show a high level of tolerance, and have low emotional responses, meaning that they experience limited emotional changes and focus on how information is processed by their thoughts. So the solution that can be given to students who have a phlegmatic personality is that the teacher must always show enthusiasm, try something new, learn to communicate feelings, and practice making decisions. Other businesses that need to be understood are realizing that they need direct motivation from the environment and teachers, setting goals, and making awards.

**Material Analysis**

Material analysis is carried out by collecting and selecting relevant material and rearranging it systematically. In the analysis process, the researcher made an observation related to the use of non-electronic media on chemical material and asked students for responses on which chemical materials students were interested in. The goal is to see appropriate teaching materials to develop non-electronic chemistry learning media based on the needs of teachers and students. Based on the student's responses in general, they liked the theory/memorization material because they more easily understand rote and

practical material than calculating material which seems difficult for students. These student difficulties should be an additional input for the teacher in being creative in creating new learning media so that students are facilitated in understanding the content of the calculation material. However, based on the study results, found that teachers used non-electronic media more on memorizing and practical material than calculating material with a percentage of 56.5%.

After conducting interviews with teachers, it turned out that the cause was that teachers were still experiencing problems in making media, namely related to time-sharing, administrative work, ideas, creativity, and limitations in operating technological devices. Thus, teachers only use textbooks, worksheets, and modules that have been directly provided by the school, book publishers, and the MGMP group. Based on the problems above, teachers still need innovations in the development of learning media for theoretical, computational, or practical material. As for chemical materials that can be developed for non-electronic mediums following the 2013 curriculum, namely chemistry and its role, the nature of chemistry, scientific method, laboratory safety, and security, material and its classification, atomic structure and periodic system of elements, chemical bonds, electrolyte, and non-electrolyte solutions. electrolyte, reduction and oxidation reactions, chemical formulas, the nomenclature of chemical compounds, reaction equations, stoichiometry, fundamental laws of chemistry, hydrocarbons, petroleum, reaction rates, thermochemistry, chemical equilibrium, colloids, acids and bases, buffer solutions, stoichiometry, acid titrations bases, hydrolysis of salts, the solubility of salts, colligative properties of solutions, electrochemistry, electrolytic cells, voltaic cells, Faraday's law, addition reactions, substitution reactions, elimination reactions, corrosion, biomolecules, elemental chemistry, alkali, and alkaline earth metals, noble gases, benzene, isomers, and polymers. An overview of the results of the explanation above shows in [Figure 2](#).



**Figure 2.** Percentage of Chemicals using Non-Electronic Media

### **Analysis of Non-Electronic Media Needs**

Non-electronic media is a tool or means of delivering material that is very important to utilize in the learning process. This utilization should be made according to the analysis of user needs. The needs analysis is used as a guide and consideration for educational media developers to come up with ideas related to making appropriate media design and development so that it is beneficial to users. Based on the results, found that the teacher as a whole had developed a lot of LKPD/LKS, modules, evaluation question flashcards, and handouts. This is because the media has been facilitated by schools, publishing partners, subject teacher council groups (MGMP), as well as research students and PPL who are in their respective schools.

Making media in practice is not easy. This is due to several obstacles faced by the teacher. The most dominant constraints are time and ideas/creativity. Teachers are currently faced with a lot of administrative work, self-development training, and additional task activities assigned by each school. Thus, there tends to be no time for preparing and making learning media and ultimately utilizing existing media. Furthermore, teachers also have problems operating technological devices along with additional software in creating and designing learning media. Therefore, teachers still need the help of learning media developers to be able to help with the deficiencies and obstacles they experience, especially in making non-electronic learning media.

An overview of non-electronic media that is needed by teachers and students and can be developed and taken into consideration in developing media that is appropriate and has benefits for its users as needed is a pocketbook, chemistry module based on project-based learning, LKPD chemistry based on concept understanding skills, educational chemistry game media (monopoly, snake and ladders, puzzles, guessing words, playing cards, UNO cards, etc.), POE-based chemistry module, Inquiry-based chemistry comics, chemical comics based on webtoon, chemistry posters, chemistry modules based on critical thinking skills, chemistry worksheets based on chemo-edutainment, chemical comics integrated with Qur'an values, SSCS-

based chemistry worksheets, flashcards based on augmented reality (AR), STEM-based chemistry worksheets, problem-based learning chemistry worksheets, SETS-based chemistry modules, handouts, and Android-based chemistry modules. Thus, overall teachers and students want print media that is more interesting, not boring, easy to understand, has supporting images that are closely related to everyday life, easy to implement and is able to make them understand the concept of the material provided. Another interesting thing is that teachers and students also really want a guide between print and electronic media that is relevant to current technological developments.

### **Curriculum Analysis**

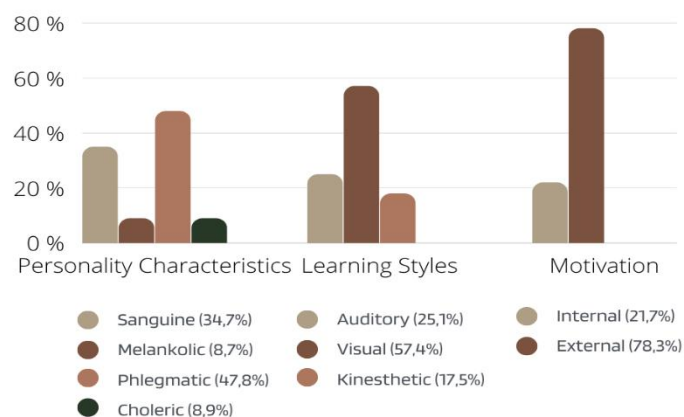
Based on the research at 23 schools, there are 100% of the schools implemented the K-13 curriculum, then 4.3% implemented a curriculum other than K-13. The student characteristics background discussed in this study are includes the economic status of the family. Based on the results of the research, it was found that 23.48% belonged to the very high-income group, 42.17% to the high-income group, 28.70% to the medium-income group, and 5.65% to the low-income group. Based on the data above, the dominant economic status of the students' families is the second class (high-income group). The classification of family economic status according to the Central Statistics Agency (BPS) in 2016 is divided into 4 groups namely: 1) The highest income group is if the average income is more than Rp. 3,500,000 per month. 2) The high-income group is if the average income is between Rp. 2,500,000 to Rp. 3,500,000 per month. 3) Medium income group is if the average income is between Rp. 1,500,000 to 2,500,000 per month. 4) The low-income group is if the average income is below IDR 1,500,000 per month.

This shows that the average economic status of the families of students at the school in the research location in Pekanbaru has the sufficient financial capacity to support the learning process. Family economic status plays a role as a support for student learning at school. Students with various economic and social statuses come together to interact with each other and carry out the learning process. This difference should not be an obstacle in carrying out the learning process. The implication of the existence of various socio-economic statuses of these students, educators are required to be able to act fairly and not be discriminatory. There are several things that need to be considered in selecting media related to the background of the family's economic status, namely the selected media should be aligned and support the educational goals and conditions of students, its cost-effectiveness in the long term, factors related to flexibility, practicality, and durability of media, media The chosen one must be able to facilitate and bring understanding closer to students.

Based on the results of the research shows the dominant learning style of students is 26.08% of a visual learning style. Students with a visual learning style have a high interest in learning that presents pictures that they can see directly. This learning style emphasizes the senses of the eye to capture the information presented. For children with a visual learning style, the teacher will use more media or pictures on the whiteboard. It is crucial to allow students to see what they are learning. Furthermore, the teacher's expressions and body language are also important to make it easier for them to understand their intentions and goals. This visual learning style is one of the student learning styles in the millennial era. This increasingly sophisticated technological development has made the millennial generation do things quickly. It's like when we exchange information, we don't need to write on paper, but use today's digital technology which can be quickly and easily conveyed. Smartphones are the result of digital technology which is very important for the millennial generation. On average they use smartphones to carry out all their activities. Reading and listening techniques may not necessarily be able to understand the thoughts of the millennial generation, they need a way of learning that is very easy to understand everything and that is presented in the form of pictures. For example by watching material/tutorials on a platform, namely Youtube. By giving the viewing technique they will find learning more fun and can increase their interest in learning, so they will also tend to enjoy and feel satisfied with learning. Therefore, non-electronic learning media in this study can still be developed according to needs, but taking into account the conversion from non-electronic to electronic.

Learning motivation is a characteristic of students that needs to be known further by an educator who will develop learning media. Interest is a significant factor in learning process activities. Interest is an element that drives a person's motivation so that the person can concentrate on an object or a particular activity that has been practiced. Learning motivation is an impetus that exists within a person to try to make changes in behavior that are better in meeting their needs in learning. The results show that 78.3% of the dominant learning motivation of students comes from outside (external). The factors that influence learning motivation consist of internal and external factors. Internal factors come from within the student, namely physical, intelligence, attitudes, interests, talents, and emotions. External factors come from outside the student's self, namely family, school, and community. One of the factors in the school environment that influences motivation is the teaching method used by the teacher (for example, teacher-centered or student-

centered), the type of curriculum used, the relationship between teacher and student (for example, very intimate, open, or very closed), the relationship between students (for example competition or cooperation), school discipline models developed, types of subjects and student learning load, school time (for example entering the morning or entering the afternoon), the condition of the school building, the number of homework assignments and the use of learning media. The description of the results of the personality, learning style, and motivation of students described above is shown in Figure 3.



**Figure 3.** Percentage of Student Personality Characteristics Results, Learning Styles, and Student Motivation

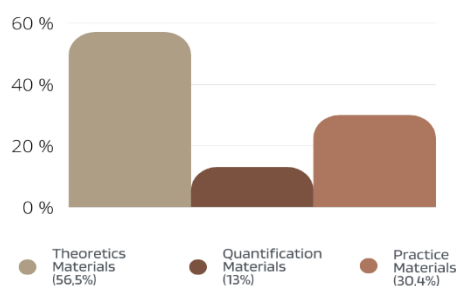
Base on Figure 3, this level of intelligence is related to the ability of students to receive subject matter and to be able to measure the level of depth and breadth of the material. This research has found that 17.4% were rated as having a high intelligence level, there are 60.7% rated as a moderate intelligence level and 21.74% had a low intelligence level rate. The dominant level of student intelligence from the 23 sample schools is in the medium category. The data in this study were obtained from guidance and counseling teachers of each school. The relationship between the use of media and the level of intelligence of students is considered by the teacher in compiling material, methods, media, and the level of difficulty in evaluating the level of intelligence of students. Therefore, the use of media for students is expected to be carried out with different techniques and types according to the development of students' intelligence.

Based on the characteristics described above, a close connection was obtained from this study, namely, the dominant phlegmatic personality of the students and their learning style tended to be visual, requiring strong external motivation. This phlegmatic personality is very relaxed, humble, non-offensive, patient, calm, and realistic, can be a mediator, and can be a good listener. In addition, the disadvantages are that they tend to be unenthusiastic, and quiet, lack discipline, like to procrastinate work, can appear lazy, indecisive, or emotionally closed, and tend to avoid conflict. Students with phlegmatic personalities also tend to respond quickly, show a high level of tolerance, and have low emotional responses, meaning that they experience limited emotional changes and focus on how information is processed by their thoughts. So the solution that can be given to students who have a phlegmatic personality is that the teacher must always show enthusiasm, try something new, learn to communicate feelings, and practice making decisions. Other businesses that need to be understood are realizing that they need direct motivation from the environment and teachers, setting goals, and making awards.

### Material Analysis

Material analysis is carried out by collecting and selecting relevant material and rearranging it systematically. In the analysis process, the researcher made an observation related to the use of non-electronic media on chemical material and asked students for responses on which chemical materials students were interested in. The goal is to see appropriate teaching materials to develop non-electronic chemistry learning media based on the needs of teachers and students. Based on the student's responses in general, they liked the theory/memorization material because they more easily understand rote and practical material than calculating material which seems difficult for students. These student difficulties should be an additional input for the teacher in being creative in creating new learning media so that students are facilitated in understanding the content of the calculation material. However, based on the study results, found that teachers used non-electronic media more on memorizing and practical material than calculating material with a percentage of 56.5%.

After conducting interviews with teachers, it turned out that the cause was that teachers were still experiencing problems in making media, namely related to time-sharing, administrative work, ideas, creativity, and limitations in operating technological devices. Thus, teachers only use textbooks, worksheets, and modules that have been directly provided by the school, book publishers, and the MGMP group. Based on the problems above, teachers still need innovations in the development of learning media for theoretical, computational, or practical material. As for chemical materials that can be developed for non-electronic mediums following the 2013 curriculum, namely chemistry and its role, the nature of chemistry, scientific method, laboratory safety, and security, material and its classification, atomic structure and periodic system of elements, chemical bonds, electrolyte, and non-electrolyte solutions. electrolyte, reduction and oxidation reactions, chemical formulas, the nomenclature of chemical compounds, reaction equations, stoichiometry, fundamental laws of chemistry, hydrocarbons, petroleum, reaction rates, thermochemistry, chemical equilibrium, colloids, acids and bases, buffer solutions, stoichiometry, acid titrations bases, hydrolysis of salts, the solubility of salts, colligative properties of solutions, electrochemistry, electrolytic cells, voltaic cells, Faraday's law, addition reactions, substitution reactions, elimination reactions, corrosion, biomolecules, elemental chemistry, alkali, and alkaline earth metals, noble gases, benzene, isomers, and polymers. An overview of the results of the explanation above shows in [Figure 4](#).



**Figure 4.** Percentage of Chemicals using Non-Electronic Media

#### **Analysis of Non-Electronic Media Needs**

Non-electronic media is a tool or means of delivering material that is very important to utilize in the learning process. This utilization should be made according to the analysis of user needs. The needs analysis is used as a guide and consideration for educational media developers to come up with ideas related to making appropriate media design and development so that it is beneficial to users. Based on the results, found that the teacher as a whole had developed a lot of LKPD/LKS, modules, evaluation question flashcards, and handouts. This is because the media has been facilitated by schools, publishing partners, subject teacher council groups (MGMP), as well as research students and PPL who are in their respective schools.

Making media in practice is not easy. This is due to several obstacles faced by the teacher. The most dominant constraints are time and ideas/creativity. Teachers are currently faced with a lot of administrative work, self-development training, and additional task activities assigned by each school. Thus, there tends to be no time for preparing and making learning media and ultimately utilizing existing media. Furthermore, teachers also have problems operating technological devices along with additional software in creating and designing learning media. Therefore, teachers still need the help of learning media developers to be able to help with the deficiencies and obstacles they experience, especially in making non-electronic learning media.

An overview of non-electronic media that is needed by teachers and students and can be developed and taken into consideration in developing media that is appropriate and has benefits for its users as needed is a pocketbook, chemistry module based on project-based learning, LKPD chemistry based on concept understanding skills, educational chemistry game media (monopoly, snake and ladders, puzzles, guessing words, playing cards, UNO cards, etc.), POE-based chemistry module, Inquiry-based chemistry comics, chemical comics based on webtoon, chemistry posters, chemistry modules based on critical thinking skills, chemistry worksheets based on chemo-edutainment, chemical comics integrated with Qur'an values, SSCS-based chemistry worksheets, flashcards based on augmented reality (AR), STEM-based chemistry worksheets, problem-based learning chemistry worksheets, SETS-based chemistry modules, handouts, and Android-based chemistry modules. Thus, overall teachers and students want print media that is more interesting, not boring, easy to understand, has supporting images that are closely related to everyday life, easy to implement and is able to make them understand the concept of the material provided. Another



interesting thing is that teachers and students also really want a guide between print and electronic media that is relevant to current technological developments.

## Discussion

The curriculum is a set of plans and arrangements regarding the objectives, content, and learning materials as well as the methods used as guidelines for the implementation of learning activities to achieve certain educational goals. The definition of the 2013 curriculum itself is a character and competency-based curriculum which is a further step in developing a competency-based curriculum that was pioneered in 2004 and the 2006 KTSP which includes integrated attitudes, knowledge, and skills competencies (Amrizul, 2018; Saraswati Saraswati et al., 2022). Indonesian educational units currently implemented the K-13 curriculum as the basis for carrying out the teaching and learning process. During the COVID-19 pandemic, the Ministry of Education and Culture simplified the K-13 curriculum into an emergency curriculum (Chan et al., 2017; Sukitman & Ridwan, 2016). Overall, schools in Pekanbaru use the K-13 curriculum which has been simplified into an emergency curriculum, while the Madrasah Aliyah Teacher curriculum uses an additional MAK (Madrasah Aliyah Skills) curriculum (Emilzoli et al., 2021; Ishartono et al., 2015).

The role of learning media is very important in the implementation of the K-13 curriculum, as mentioned in the curriculum components. According to previous study there are 4 main components in this curriculum are objectives, teaching materials, learning methods, media, and assessment (Sukmadinata, 2017). This learning media is any medium that can be used to convey messages from the sender to the recipient so that it can stimulate thoughts, attention, feelings, and interests and attention lead the learning process to become meaningful (Abdullah, 2017; Qekaj-Thaqi & Thaqi, 2021). The distribution of types of learning media is generally divided into electronic and non-electronic media. The ability of teachers to design and implement learning media is the key to successful and meaningful learning (Fatimah & Santiana, 2017; Rahmatullah, 2020). Therefore, the development of learning media innovations is needed to support the successful implementation of curriculum and learning.

The selection of learning media for phlegmatic personalities can be visually done one way or another, this is because students with phlegmatic personalities tend to be quiet and don't want to ask other people, so with the help of this video students can repeat the material until they understand. Other research also suggests that phlegmatic students need a variety of learning methods so the use of learning media must also be varied (Bojanowska & Zalewska, 2017; Mo et al., 2022). Learning style is a combination of a person's way of concentrating, absorbing, organizing, and processing the information or knowledge obtained. In general, learning styles are divided into three, namely visual learning styles, auditory learning styles, and kinesthetic learning styles (Leasa et al., 2020; Sulistyowati et al., 2022). The selection of learning media should be adapted to student learning styles so that the student learning process is facilitated according to their learning style and their understanding of the concepts of teaching materials becomes faster and better (Abidin, 2016; Dewantara et al., 2020; Mustafida, 2016; Purwanti, 2015; Sari, 2019).

Personality is a character of every person that is characteristic of that person and becomes a human differentiator from one another. The instrument used in this study was personality test (Azizan et al., 2018; Christopoulou et al., 2018). Based on the research, the dominant personality of the students is 34.8% of sanguine, and 47.8% of phlegmatic. The relationship between the selection of learning media and personality types is important. Several things need to be considered in selecting learning media, namely starting from understanding each personality (sanguines, melancholy, phlegmatic and choleric) then focusing on the learning styles possessed by each personality, and then paying attention to the direction of students' learning motivation in each personality type (Daud, 2020; Dewantara et al., 2020). So that only then can determine what learning media are suitable for the personality/character of each student (Asrawati & Mulyati, 2018; Lee & Wu, 2022; Musa & Ziatdinov, 2015).

Analysis of student characteristics projected at aspects of students' academic abilities, physical characteristics, group work ability, learning motivation, economic and social background, previous learning experience, etc (Ghofur et al., 2018; Nurseto, 2012). In relation to the development of learning media, the characteristics of students need to be acknowledged in order to develop learning media that are in accordance with their academic abilities. The description of the characteristics of students is limited only to background, personality, learning style, level of intelligence, and interest and motivation to learn (T. Nurrita, 2018; Teni Nurrita, 2019). This research provides contributions and information to other researchers who focus on the field of study of learning media development to formulate ideas in creating media needed by users specifically in high school chemistry subjects. This research also facilitates schools to be able to improve quality in the field of education, especially in the innovation of developing non-electronic learning media.

#### 4. CONCLUSION

The need for non-electronic media (print media) in each school generally varies. Teachers need media that helps them teach chemistry material better and can make students understand a concept of chemical material. Teachers also want to learn media developers to pay attention to schools that still lack learning media facilities with various constraints and limitations that these schools have. Furthermore, students want non-electronic learning media (print media) that are interesting, practical, fun, and easy for them to understand in the chemistry learning process.

#### 5. REFERENCES

- Abdullah, R. (2017). Pembelajaran Dalam Perspektif Kreativitas Guru Dalam Pemanfaatan Media Pembelajaran. *Lantanida Journal*, 4(1), 35. <https://doi.org/10.22373/lj.v4i1.1866>.
- Abidin, Z. (2016). Penerapan Pemilihan Media Pembelajaran. *Edcomtech*, 1(1), 9–20. <http://journal2.um.ac.id/index.php/edcomtech/article/view/1784>.
- Adita, A., Kusuma, A. B., & Risnani, L. Y. (2018). Analisis Kebutuhan Game Edukasi MIPA. *Jurnal Bioedukatika*, 5(2), 86–91. <https://doi.org/10.26555/bioedukatika.v5i2.7374>.
- Amrizul. (2018). Upaya Meningkatkan Kompetensi Guru Dalam Menyusun Rencana Pelaksanaan Pembelajaran (RPP) Melalui Work Shop dan Bimbingan Berkelanjutan di SDN 01 Lunang Kecamatan Lunang. *Jurnal Penelitian Guru Indonesia*, 3(1), 34–41. <https://doi.org/10.29210/02159jppi0005>.
- Asrawati, N., & Mulyati, M. (2018). Pengembangan Media Pembelajaran Matematika Berbasis Macromedia Flash untuk Meningkatkan Motivasi Belajar Siswa. *Pedamath : Journal on Pedagogical Mathematics*, 1(1), 26–34. <https://ojs.unsulbar.ac.id/index.php/pedamath/article/view/217>.
- Asrizal, A., Festiyed, F., & Sumarmin, R. (2017). Analisis Kebutuhan Pengembangan Bahan Ajar Ipa Terpadu Bermuatan Literasi Era Digital Untuk Pembelajaran Siswa Smp Kelas Viii. *Jurnal Eksakta Pendidikan (Jep)*, 1(1), 1. <https://doi.org/10.24036/jep/vol1-iss1/27>.
- Azizan, M. T., Mellon, N., Ramli, R. M., & Yusup, S. (2018). Improving Teamwork Skills and Enhancing Deep Learning Via Development of Board Game Using Cooperative Learning Method in Reaction Engineering Course. *Education for Chemical Engineers*, 22(October), 1–13. <https://doi.org/10.1016/j.ece.2017.10.002>.
- Bojanowska, A., & Zalewska, A. M. (2017). Happy Temperament? Four Types of Stimulation Control Linked to Four Types of Subjective Well-Being. *Journal of Happiness Studies*, 18(5), 1403–1423. <https://doi.org/10.1007/s10902-016-9777-2>.
- Braun, V., Clarke, V., Boulton, E., Davey, L., & McEvoy, C. (2021). The online survey as a qualitative research tool. *International Journal of Social Research Methodology*, 24(6), 641–654. <https://doi.org/10.1080/13645579.2020.1805550>.
- Chan, B. S. K., Churchill, D., & Chiu, T. K. F. (2017). Digital Literacy Learning In Higher Education Through Digital Storytelling Approach. *Journal of International Education Research (JIER)*, 13(1), 1–16. <https://doi.org/10.19030/jier.v13i1.9907>.
- Christopoulou, M., Lakioti, A., Pezirkianidis, C., Karakasidou, E., & Stalikas, A. (2018). The Role of Grit in Education: A Systematic Review. *Psychology*, 09(15), 2951–2971. <https://doi.org/10.4236/psych.2018.915171>.
- Daud, A. (2020). Strategi Guru Mengajar Di Era Milenial. *Al-Mutharahah: Jurnal Penelitian Dan Kajian Sosial Keagamaan*, 17(1), 29–42. <https://doi.org/10.46781/al-mutharahah.v17i1.72>.
- Dewantara, A. harpeni, Amir, A., & Harnida, H. (2020). Kreativitas Guru Dalam Memanfaatkan Media Berbasis It Ditinjau Dari Gaya Belajar Siswa. *Al- Gurfah : Journal of Primary Education*, 1(1), 15–28. <https://www.jurnal.iain-bone.ac.id/index.php/algurfah/article/view/1039>.
- Dietmaier, C. (2017). Deskriptive Statistik. In *Mathematik für Wirtschaftsingenieure*. <https://doi.org/10.3139/9783446454477.014>.
- Emilzoli, M., Ali, M., & Rusman. (2021). Perceptions, attitudes and lifestyles of students of Madrasah Ibtidaiyah Teacher Education Study Program about education for sustainable development. *IOP Conference Series: Earth and Environmental Science*, 739(1). <https://doi.org/10.1088/1755-1315/739/1/012058>.
- Fatimah, A. S., & Santiana, S. (2017). Teaching in 21st Century: Students-Teachers' Perceptions of Technology Use in the Classroom. *Script Journal: Journal of Linguistic and English Teaching*, 2(2), 125. <https://doi.org/10.24903/sj.v2i2.132>.
- Ghofur, A., Kuswanto, K., & Youhanita, E. (2018). Pemanfaatan Media Untuk Pembelajaran Ekonomi di Sekolah Menengah Atas. *EQUILIBRIUM : Jurnal Ilmiah Ekonomi Dan Pembelajarannya*, 6(2), 102–111. <https://doi.org/10.25273/equilibrium.v6i2.2929>.

- Hamilton, E. R., Rosenberg, J. M., & Akcaoglu, M. (2016). The Substitution Augmentation Modification Redefinition (SAMR) Model: a Critical Review and Suggestions for its Use. *TechTrends*, 60(5), 433–441. <https://doi.org/10.1007/s11528-016-0091-y>.
- Hidayat, H., Ardi, Z., Yuliana, N. A., & Herawati, S. (2019). Exploration of the need analysis for technopreneurship scientific learning models in higher vocational education. *International Journal of Economics and Business Research*, 18(3), 356–368. <https://doi.org/10.1504/IJEBR.2019.102733>.
- Husadani, R., Suryani, N., & Yusuf, M. (2021). Needs Analysis: Social Skills-Based Learning Model For Children With Learning Disabilities at an Inclusive School. *JPI (Jurnal Pendidikan Indonesia)*, 10(1), 90–96. <https://doi.org/10.23887/jpi-undiksha.v10i1.28845>.
- Ichsan, I. Z., Dewi, A. K., Hermawati, F. M., & Iriani, E. (2018). Pembelajaran IPA dan Lingkungan: Analisis Kebutuhan Media Pembelajaran pada SD, SMP, SMA di Tambun Selatan, Bekasi. *Jurnal Pendidikan IPA Veteran*, 2(2), 131–140. <https://doi.org/10.31331/jipva.v2i2.682>.
- Ishartono, B., Ashadi, & Susilowati, E. (2015). Implementasi Model Pembelajaran Problem Solving Berbantuan Peer Tutoring dilengkapi Hierarki Konsep Untuk Meningkatkan Kualitas Proses dan Hasil Belajar Materi Stoikiometri Pada Siswa Kelas X IPA 6 SMAN 1 Sukoharjo Tahun Pelajaran 2013/2014. *Jurnal Pendidikan Kimia*, 4(1), 10–19. <https://jurnal.fkip.uns.ac.id/index.php/kimia/article/view/4710>.
- Joshi, A., Kale, S., Chandel, S., & Pal, D. (2015). Likert Scale: Explored and Explained. *British Journal of Applied Science & Technology*, 7(4), 396–403. <https://doi.org/10.9734/bjast/2015/14975>.
- Leasa, M., Corebima, A. D., & Batlolona, J. R. (2020). The effect of learning styles on the critical thinking skills in natural science learning of elementary school students. *Elementary Education Online*, 19(4), 2086–2097. <https://doi.org/10.17051/ilkonline.2020.763449>.
- Lee, P.-J., & Wu, T.-Y. (2022). Mining relations between personality traits and learning styles. *Information Processing & Management*, 59(5), 103045. <https://doi.org/10.1016/j.ipm.2022.103045>.
- Mo, C. Y., Jin, J., & Jin, P. (2022). Relationship Between Teachers' Teaching Modes and Students' Temperament and Learning Motivation in Confucian Culture During the COVID-19 Pandemic. *Frontiers in Psychology*, 13(May), 1–12. <https://doi.org/10.3389/fpsyg.2022.865445>.
- Musa, S., & Ziatdinov, R. (2015). Developing Educational Computer Animation Based on Human Personality Types. *European Journal of Contemporary Education*, 11(1), 52–71. <https://doi.org/10.13187/ejced.2015.11.52>.
- Mustafida, F. (2016). Kajian Media Pembelajaran Berdasarkan Kecenderungan Gaya Belajar Peserta Didik Sd/Mi. *Madrasah: Jurnal Pendidikan Dan Pembelajaran Dasar*, 6(1), 77–95. <https://doi.org/10.18860/jt.v6i1.3291>.
- Ndiung, S., & Jediut, M. (2021). Analisis Kebutuhan Bahan Ajar Berbasis Etnomatematika Yang Berorientasi Keterampilan Berpikir Kreatif. *Jurnal Cakrawala Pendas*, 7(2), 224–232. <https://doi.org/10.31949/jcp.v7i2.3162>.
- Nemoto, T., & Beglar, D. (2014). Likert-scale questionnaires. In *JALT 2013 Conference Proceedings*, 1–8. [https://jalt-publications.org/sites/default/files/pdf-article/jalt2013\\_001.pdf](https://jalt-publications.org/sites/default/files/pdf-article/jalt2013_001.pdf).
- Nugroho, I. A., & Surjono, H. D. (2019). Pengembangan multimedia pembelajaran interaktif berbasis video materi sikap cinta tanah air dan peduli lingkungan. *Jurnal Inovasi Teknologi Pendidikan*. <https://doi.org/10.21831/jitp.v6i1.15911>.
- Nurrita, T. (2018). Pengembangan Media Pembelajaran Untuk Meningkatkan Hasil Belajar Siswa. *Journal of Physics: Conference Series*, 03(2), 171–187. <https://doi.org/10.1088/1742-6596/1321/2/022099>.
- Nurrita, Teni. (2019). Development of circle learning media to improve student learning outcomes. *Journal of Physics: Conference Series*, 1321(2), 171–187. <https://doi.org/10.1088/1742-6596/1321/2/022099>.
- Nurseto, T. (2012). Membuat Media Pembelajaran yang Menarik. *Jurnal Ekonomi Dan Pendidikan*, 8(1), 19–35. <https://doi.org/10.21831/jep.v8i1.706>.
- Pathoni, H., Ashar, R., -, M., & Huda, N. (2021). Analysis Student Needs for the Development of Contextual-Based STEM Approach Learning Media in Online Learning: An Evidence from Universities in Jambi, Indonesia. *International Journal on Research in STEM Education*, 3(1), 17–26. <https://doi.org/10.31098/ijrse.v3i1.495>.
- Purwanti, B. (2015). Pengembangan Media Video Pembelajaran Matematika dengan Model Assure. *Jurnal Kebijakan Dan Pengembangan Pendidikan*, 3(1), 42–47. <https://doi.org/10.22219/jkpp.v3i1.2194>.
- Qekaj-Thaqi, A., & Thaqi, L. (2021). The Importance of Information and Communication Technologies (ICT) during the COVID-19—Pandemic in Case of Kosovo (Analytical Approach of Students Perspective). *OALib*, 08(07), 1–15. <https://doi.org/10.4236/oalib.1106996>.
- Quintela-del-Río, A., & Francisco-Fernández, M. (2017). Excel Templates: A Helpful Tool for Teaching Statistics. *The American Statistician*, 1–23.

- <https://doi.org/http://dx.doi.org/10.1080/00031305.2016.1186115>.
- Rahmadani, H., Roza, Y., & Murni, A. (2018). Analisis Kebutuhan Bahan Ajar Matematika Berbasis Teknologi Informasi di SMA IT Albayyinah Pekanbaru. *JURING (Journal for Research in Mathematics Learning)*, 1(1), 91. <https://doi.org/10.24014/juring.v1i1.5230>.
- Rahmatullah, I. (2020). Media Pembelajaran Audio Visual Berbasis Aplikasi Canva. *Jurnal Pendidikan Ekonomi Undiksha*, 319. <https://doi.org/10.23887/jjpe.v12i2.30179>.
- Saraswati, N. L. P. A., & Mertayasa, I. N. E. (2020). Pembelajaran praktikum kimia pada masa pandemi covid-19: qualitative content analysis kecenderungan pemanfaatan teknologi daring. *Wahana Matematika Dan Sains: Jurnal Matematika, Sains, Dan Pembelajarannya*, 14(2), 144–161. <https://doi.org/https://doi.org/10.23887/wms.v14i2.28297>.
- Saraswati, Saraswati, Safitri, A., & Kabiba, K. (2022). Peran Guru dalam Implementasi Kurikulum 2013. *Jurnal Pendidikan Dan Pengajaran (JPP)*, 1(3). <https://doi.org/10.51454/jpp.v1i3.56>.
- Saraswati, Sri, Linda, R., & Herdini, H. (2019). Development of Interactive E-Module Chemistry Magazine Based on Kvisoft Flipbook Maker for Thermochemistry Materials at Second Grade Senior High School. *Journal of Science Learning*, 3(1), 1–6. <https://doi.org/10.17509/jsl.v3i1.18166>.
- Sari, P. (2019). Analisis Terhadap Kerucut Pengalaman Edgar Dale Dan Keragaman Dalam Memilih Media. *Jurnal Manajemen Pendidikan*, 1(1), 42–57. <https://doi.org/10.55352/mudir.v1i1.27>.
- Sihombing, S. N., & Marheni, M. (2012). Analisis Kebutuhan dalam Pembelajaran IPA Kimia untuk Pengembangan Bahan Ajar Kimia SMP di DKI Jakarta. *JRPK: Jurnal Riset Pendidikan Kimia*, 2(1), 119–126. <https://doi.org/10.21009/jrpk.021.04>.
- Suardana, I. N., & Juniartina, P. P. (2020). Analisis Kebutuhan Guru SMP Mengenai Metode Pembelajaran Flipped Classroom. *Jurnal Pendidikan Matematika Dan IPA*, 11(1), 62–73. <https://doi.org/10.26418/jpmipa.v11i1.32556>.
- Sukitman, T., & Ridwan, M. (2016). Implementasi Pendidikan Nilai (Living Values Education) Dalam Pembelajaran Ips (Studi Terhadap Pembentukan Karakter Anak Di Tingkat Sekolah Dasar). *Profesi Pendidikan Dasar*, 3(1), 30–41. <https://doi.org/10.23917/ppd.v3i1.2717>.
- Sukmadinata, N. S. (2017). *Pengembangan Kurikulum : Teori dan Praktek*. Remaja Rosdakarya.
- Sulistyowati, F., Hartanti, S., Widodo, S. A., & Putrianti, F. G. (2022). Critical Thinking Skills in Phlegmatic Students Using Learning Videos. *Jurnal Math Educator Nusantara: Wahana Publikasi Karya Tulis Ilmiah Di Bidang Pendidikan Matematika*, 8(2), 119–133. <https://doi.org/10.29407/jmen.v8i2.18874>.
- Sumarni, R. A., Bhakti, Y. B., Astuti, I. A. D., Sulisworo, D., & Toifur, M. (2020). Analisis Kebutuhan Guru Smp Mengenai Metode Pembelajaran Flipped Classroom. *ORBITA: Jurnal Kajian, Inovasi Dan Aplikasi Pendidikan Fisika*, 6(2), 236–242. <https://doi.org/10.31764/orbita.v6i2.3168>.
- Widiyanti, T., & Nisa, A. F. (2021). Pengembangan E-LKPD Berbasis Pendekatan Sainifik Untuk Meningkatkan Hasil Belajar Peserta Didik Pada Pembelajaran IPA Kelas V Sekolah Dasar. *TRIHAYU: Jurnal Pendidikan Ke-SD-An*, 8(1), 1269–1283. <https://doi.org/10.30738/trihayu.v8i1.11136>.
- Widyasari, Rasmitadila, Asri Humaira, M., Rusmiati Aliyyah, R., Abdul Gaffar, A., & Rachmadtullah, R. (2019). Preliminary study on the development of blended learning (BLM) model: Based on needs analysis and learning independence. *Journal of Physics: Conference Series*, 1175(1). <https://doi.org/10.1088/1742-6596/1175/1/012207>.
- Yusop, Y. M., Sumari, M., Mohamed, F., Said, S., Azeez, M. I. K., & Jamil, M. R. M. (2015). The Needs Analysis in Self-Concept Module Development. *The Malaysian Online Journal of Educational Science*, 3(1), 44–55. <http://ajba.um.edu.my/index.php/MOJES/article/view/12680>.