

# Needs Analysis: Development of an LMS-Assisted DELPHI-STEAM Model to Improve Students' Computational Thinking and Character

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## Abstrak

Kemajuan teknologi menuntut siswa memiliki keterampilan berpikir komputasional sekaligus karakter yang kuat. Namun, belum tersedia model pembelajaran yang mengintegrasikan kedua aspek tersebut secara simultan. Penelitian ini bertujuan melakukan analisis kebutuhan untuk mengembangkan model pembelajaran DELPHI-STEAM (*Deep Learning Project Hypnoteaching-STEAM*) berbasis Learning Management System (LMS). Menggunakan model pengembangan ADDIE, penelitian saat ini berada pada fase analisis. Data dikumpulkan melalui instrumen penilaian berpikir komputasional, survei karakter, protokol observasi, dan wawancara terhadap guru serta siswa di 15 sekolah negeri dan swasta di Kabupaten Sumedang. Hasil penelitian menunjukkan bahwa pengembangan model DELPHI-STEAM berbasis LMS beserta perangkat pendukungnya sangat esensial dan layak diimplementasikan. Model ini terbukti dapat meningkatkan kemampuan berpikir komputasional dan pengembangan karakter secara bersamaan. Selain itu, model ini mampu mentransformasi matematika dalam proyek STEAM menjadi pengalaman belajar yang lebih bermakna dan menyenangkan bagi siswa.

**Kata Kunci:** analisis kebutuhan; Berpikir Komputasional; DELPHI-STEAM; Karakter; LMS.

## Abstract

Technological advancements demand that students possess both computational thinking skills and strong character development. Currently, pedagogical models that simultaneously integrate these two aspects remain scarce. This study aims to conduct a needs analysis for developing the LMS-supported DELPHI-STEAM (*Deep Learning Project Hypnoteaching-STEAM*) model. Adopting the ADDIE development framework, the research is currently in the analysis phase. Data were collected through computational thinking assessments, character surveys, observation protocols, and interviews involving teachers and students across 15 public and private schools in Sumedang Regency. The findings indicate that the development of the LMS-based DELPHI-STEAM model and its supporting tools is both essential and feasible. This model is designed to concurrently enhance computational thinking and character growth. Furthermore, it transforms mathematics, traditionally utilized as a mere computational tool in STEAM projects, into a more meaningful and engaging learning experience for students.

**Keywords:** needs analysis; Computational Thinking; DELPHI-STEAM; Character; LMS.

## I. INTRODUCTION

Computational Thinking (CT) has become a vital skill (Maharani et al., 2019; Salwadila & Hapizah, 2024; Ye et al., 2023), because it can support the development of technology and information (IT) (Aminah et al., 2021) and guide students to solve problems (Nurlaelah et al., 2025). Critical thinking is a vital cognitive trait that students must embrace and apply proficiently to tackle the challenges of the digital realm (Isoda & Araya, 2021). Consequently, there is a prevalent and growing consensus among scholars and educators that computational thinking should be taught to all individuals, as it is an essential element of scientific literacy (Chytas et al., 2024). Computational Thinking (CT) is characterized as a cognitive approach for devising and resolving issues through concepts and tactics predominantly associated with computer science (Aminah, Sukestiyarno, et al., 2023). This CT can assist pupils in resolving mathematical issues (Nabila & Yahfizham, 2024). Critical thinking encompasses not only the resolution of problems but also the articulation of both problems and answers (Aminah et al., 2022). Numerous research have recognized that CT can facilitate efficient mathematics learning for children (Kynigos & Grizioti, 2018). The stages of computational thinking include decomposition, pattern identification, abstraction, and algorithm building (Fajri et al., 2019).

However, in reality, students' CT scores are still low (Supiarmo et al., 2021; Syahputra & Sinaga, 2024). There are several factors other than learning that influence CT, including prior knowledge, feelings about group work, enjoyment,

motivation to learn, and problem solving (Stewart et al., 2021).

The development of IT in education has also led to moral degradation (Rahmadani et al., 2024). Various news reports on television often show events that indicate that the noble values and character of school-age children are declining (Sarah et al., 2024). Character is a distinctive human trait that reflects moral qualities, ethnic values, and responsibilities based on prevailing norms (Arifin et al., 2022). The cultivation and enhancement of students' moral character can be achieved by incorporating and actualizing character and moral education into emotionally resonant teaching materials and content (Suciati et al., 2023). The national character values fostered by mathematics education encompass discipline, integrity, diligence, inventiveness, inquisitiveness, autonomy, communication proficiency, and accountability (Juwita et al., 2020).

Research on CT and its learning models has been conducted extensively. Models commonly used to improve computational thinking include project-based learning (Azmi & Ummah, 2021; Habibi et al., 2025; Syahputra & Sinaga, 2024; Wang et al., 2024), problem-based learning (Manullang & Simanjuntak, 2023), and discovery learning (Hariyani et al., 2024; Sa'adah et al., 2023). This aligns with findings from the 2019 Trends in International Mathematics and Science Study (TIMSS) and the 2022 Programme for International Student Assessment (PISA), which indicate that nations that consistently apply these models have enhanced mathematics performance (Lethulur et al., 2025). However, existing research has focused

solely on developing computational thinking, not on student character. Research that develops character in mathematics learning, however, focuses on cognitive abilities other than computational thinking (Azqia et al., 2019; Cahyaningsih & Ghufro, 2016; Sari & Prihatnani, 2018; Supianti et al., 2025). However, no one has researched both simultaneously using a single learning model. Computational thinking and character must be developed simultaneously because both are equally important in facing IT developments.

Responding to the urgency of dealing with developments in information technology, the government has directed educators to innovate and utilize digital technology. Therefore, it is necessary to develop appropriate learning models. The one most widely used to improve computational thinking skills is the project-based learning model. Zhang, et al (Zhang et al., 2024) conducted an analysis of project-based learning's role in enhancing computational thinking reveals that it is consistently beneficial in cultivating these skills. Moreover, numerous studies indicate that the incorporation of STEM (Science, Technology, Engineering, and Mathematics) fosters the development of computational thinking skills (Salam, 2022). However, several studies have stated that in Project – STEAM learning, the mathematics material is minimal, not challenging enough, and does not have a big impact on improving mathematics achievement even though attitudes towards mathematics improve. (Diego-Mantecon et al., 2021; Martín-Cudero et al., 2024). Mathematics in this learning only appears as a simple calculation

or "tool", not as a core idea that is deepened. Therefore, there needs to be an approach that can make mathematics in STEAM Project learning more meaningful.

Deep learning is one approach that can be used. This approach differs from deep learning in artificial intelligence (AI) and places more emphasis on an educational philosophy that is educational, inspiring, and enjoyable. Consequently, deep learning transcends a mere learning technique, embodying a more holistic and forward-thinking educational philosophy (Nofamataro Zebua, 2025). Deep learning encourages deep understanding for students, integration of knowledge, and application in real-life situations (Diputera et al., 2024). Deep learning elements can address various problems in the Indonesian education system, such as low motivation to learn, limited relevance of material to students' real lives, and stress and pressure experienced by students in the learning process (Putri et al., 2022).

Mathematics is a scary subject for students (Anjariyah et al., 2024; Ekeh & Onuike, 2025; Mantey et al., 2022). Making students aware of learning and working on STEAM projects in mathematics learning certainly requires a certain approach. Many studies show that hypnoteaching can reduce anxiety and fear of learning (Arta Wiguna, 2020; Arta wiguna, 2020; Bali & Masulah, 2019; Suryaman, 2023). Besides reducing anxiety and fear of learning, hypnoteaching can also develop good character in students and improve their mathematics learning outcomes (Amalia & Zumrotun, 2024; Nissa' & Sutopo, 2023;

Nursiami & Suryaman, 2024) with enjoyable learning conditions.

Technology-enhanced project-based learning fosters a dynamic and participatory educational atmosphere, augmenting academic competencies while equipping students to confront real-world difficulties through effective utilization of digital resources (Fitrah et al., 2025). LMS is the one of the interactive platforms, which plays an important role in the context of modern learning (Dewi et al., 2025). The LMS enables interaction between students and instructors via diverse features, including discussion boards and chat functionalities (Mpungose & Khoza, 2022). This makes it easier for students to ask questions when they encounter concepts they do not understand.

The project entails employing STEAM and interactive platforms to enable students to implement mathematical principles in practical contexts (Cunha et al., 2024). In Project-Based Learning – STEAM, students engage in inquiry-driven education, collaboration, and hands-on activities, thereby augmenting the relevance and involvement of their learning experience (Supianti et al., 2025). The execution of Project-STEAM can markedly enhance CT by offering a project-based learning methodology that amalgamates several disciplines. This education also motivates students to participate in activities that necessitate problem analysis, pattern recognition, abstraction utilization, and algorithm development (Gracia et al., 2024; Mariana & Kristanto, 2023; Supianti et al., 2025; Wang et al., 2024), which are all core components of CT. PjBL-STEAM not

only develops technical skills, but also soft skills (Maulina et al., 2024).

Based on these conditions, researchers will integrate deep learning and hypnoteaching approaches into the Project-STEAM learning model, assisted by an LMS. The model will be named DELPHI-STEAM assisted LMS (Deep learning Project STEAM with a Hypnoteaching approach assisted by an LMS). This model is expected to simultaneously enhance computational thinking and character development. The Delphi referred to in this research is not the Delphi programming language, but rather the learning model. The Delphi-STEAM program, facilitated by a Learning Management System (LMS), features the availability of positive suggestion films and educational resources that students can watch prior to in-class learning. Classroom instruction is utilized to apply the concepts acquired through the completion of assigned STEAM projects.

This research is crucial for offering effective solutions for managing relevant learning in kids, thereby enhancing their computational thinking and character development. A requirements analysis of the learning model must be conducted to develop a model that aligns with the characteristics of students and the contextual conditions. The needs analysis needs to be carried out as soon as possible so that the development of an appropriate learning model can be carried out immediately, enabling students to quickly acquire computational thinking and character, which are competencies needed to deal with developments in technology and information. The objectives of this study are to analyze student characteristics,

analyze computational thinking and student character, analyze the curriculum used in schools, and analyze the learning and assessment processes currently carried out in schools so that an appropriate LMS-assisted Delphi-STEAM learning model can be developed.

## II. METHOD

This study methodology is developmental. Developmental research seeks to create a new product or enhance an existing one, the efficacy of which may subsequently be evaluated (Sugiyono, 2007). This study employs the ADDIE development model. ADDIE (Analysis – Design – Develop – Implement – Evaluate) is a classroom-focused development strategy that mirrors the creation of learning systems (Hamzah, 2019). This research is now in the analytical phase to assess the requirements for establishing a Delphi-STEAM learning model supported by a Learning Management System (LMS). The needs analysis was grounded in the characteristics of junior high school students, the necessity for computational thinking skills, the curriculum implemented in schools, the learning process and assessment, students' computational thinking abilities, and student attributes.

The methods employed to examine the attributes of junior high school pupils and their requirement for computational thinking skills were observation and document analysis. Meanwhile, the curriculum, learning process, and learning assessment were analyzed using interviews and observation. Students' computational thinking skills were assessed using tests and

document study, while student characteristics were assessed using questionnaires, observation, and interviews.

The interview guidelines for teachers included questions on the curriculum, learning activities, learning reality, learning levels, learning relevance, interactivity, rediscovery, and assessment. The computational thinking instrument was developed using indicators consisting of decomposition, pattern recognition, abstraction, and algorithms (Fajri et al., 2019). The indicators were chosen based on a specific set of skills required to simplify complex everyday problems into manageable solutions (Aminah, Maat, et al., 2023). Computational thinking indicators and competency indicators can be seen in Table 1.

Table 1.  
Computational Thinking Indicators and Competency Indicators

No	Computational Thinking Indicators	Competency Indicators
1	Decomposition	Students can identify and explain information related to the given problem.
2	Pattern Recognition	Students can find similar or different patterns used in solving problems.
3	Abstract	Students can eliminate irrelevant elements in their problem-solving plans to reach conclusions.
4	Algorithm	Students can explain logical and systematic steps to find solutions to given problems.

Sumber: Afifah & Apriyono (Afifah et al., 2023)

Simultaneously, the Pancasila student profile serves as a framework for character development. The Pancasila student profile is utilized as the curriculum implemented in all secondary schools in Sumedang Regency is the independent curriculum. The Pancasila student profile emphasizes six components: (1) faith and devotion to God Almighty, along with noble character; (2) global variety; (3) independence; (4) mutual cooperation; (5) critical thinking; and (6) creativity.

All instruments used in the research were first validated by three experts in their respective fields. The computational thinking questions and questionnaire were piloted in a school in Subang Regency to determine their validity and reliability. The list of validators and their qualifications can be seen in Table 2.

Table 2.  
Validator and their qualifications

No	Instrument	Qualifications
1	Computational Thinking Test	Doctoral degree who has conducted research on computational thinking
2	Character observation questionnaire and guidelines	Professor with character expertise
3	Interview guide for implementing learning and assessment	Doctoral degree in mathematics education who has conducted research on the development of learning models.

The study encompassed 15 public and private junior high schools located in Sumedang Regency. The interviewed educators possessed a minimum of five years of expertise in mathematics

instruction. The observed pupils who were administered tests were ninth graders. Of the 15 schools identified by the researcher for the trial, only 12 provided complete data on computational thinking skills and character assessments.

The test data were subjected to descriptive statistical analysis, subsequently followed by qualitative analysis for several students. The data acquired from the Likert scale questionnaire were examined by initially coding the data, subsequently computing the mean, and interpreting the results. Interview data is typically narrative and necessitates transcription for subsequent analysis. Interview data analysis typically employs coding and thematic grouping approaches, whereby the researcher discerns patterns that arise from the dialogue and classifies them into distinct themes. The data is further studied thematically to attain a more profound comprehension of specific facets of decision-making. Concurrently, data acquired from observation is descriptive and mostly concentrated on behaviors, events, or interactions that transpire during the investigation. Upon collecting the observational data, researchers will employ thematic analysis or categorization methods to discern patterns pertinent to the research aims.

When data obtained from tests, questionnaires, interviews, and observations are combined in a single study, researchers can use a triangulation approach to validate the findings. Triangulation refers to the use of various data collection techniques to ensure that the analysis results reflect a more accurate reality. This is very important in ensuring the

validity of research findings and increasing the reliability of the analysis. The use of triangulation in research makes it possible to verify the results of interviews and observations with data obtained through questionnaires, thus providing a clearer and more comprehensive picture of the issues being studied.

### III. RESULT AND DISCUSSION

#### 1. Importance of Students having computational thinking skill and character

The analysis was conducted through a literature review. The subjects of this study were junior high school students. Therefore, the researcher limited the analysis of student characteristics to those aged 12–16 years. In general, junior high school students are classified as adolescents, although there may be cases of certain junior high school students who are still in puberty or have already entered early adulthood (Sugiman et al., 2016). Teenagers think in a more abstract, logical, and idealistic way (Marinda, 2020). Thus, junior high school students are able to think logically about abstract problems and test hypotheses systematically (Mauliya, 2019). However, (Saefudin et al., 2023) states that most students consider studying mathematics to be monotonous, meaning that they only practice continuously, and that each student's success in learning mathematics varies and can be influenced by luck.

Outcomes of a literature review regarding the significance of pupils possessing computational thinking skills and character attributes. Global Education

Monitoring Report Team - SEAMEO Regional Open Learning Center (Prahmana et al., 2024), the education system in Indonesia is progressively emphasizing computational thinking skills to prepare students with essential problem-solving capabilities for the digital era. This is achieved through a curriculum that prioritizes problem-solving, mathematics, and creativity, alongside initiatives that integrate education with coding technology, fostering an environment conducive to skill development and innovation. Computational thinking is an essential talent that students must cultivate to effectively engage with 21st-century globalization (Sudadi et al., 2023). Computational thinking is a fundamental skill that spans multiple fields (Nabila & Yahfizham, 2024). The analysis shows that, in the 21st century, computational thinking skills are very important for students to have, because computational thinking skills do not only focus on problem solving, but are more focused on how to solve a problem (Abidi et al., 2023). Alongside computational thinking, character education is crucial for tackling the issues of 21st-century education, particularly for junior high school pupils (Lutfityani, 2023). Students with good grades and character will contribute to the academic success of other students (Manaf et al., 2020).

#### 2. Learning process and Assessment

The next analysis is to analyze the learning process and assessment related to computational thinking and student character, as shown in Table 3.

Table 3.  
Analysis of the learning process and assessment

No	Questions	Yes (%)	No (%)
1	Use of the Merdeka Curriculum	100	0
2	Using conventional learning models	100	0
3	Using applications during learning	86,7	13,3
4	Provision of diverse teaching materials	100	0
5	Understanding deep learning	100	0
6	Have you ever used the Project-STEAM learning model in mathematics education.	20	80
7	Do you know about the hypnoteaching approach.	13,3	86,7
8	Should I take a diagnostic test	100	0
9	Using student experiences as learning materials	80	20
10	Implementing a three-way interaction pattern (teacher-student, student-student, student-teacher)	73,3	26,7
11	Conducting cognitive assessments during the learning process	80	20
12	Conducting cognitive assessments with tests	100	0
13	Assessing computational thinking skills	0	100
14	Conducting formal character assessments (observation guidelines/questionnaires)	0	100

Based on Table 3, regarding the curriculum, all schools in Sumedang Regency have implemented the Merdeka Curriculum. The implementation of the Merdeka Curriculum in every school in Sumedang Regency is considered to have supported the development of computational thinking. This aligns with the research undertaken by Monalisa (Monalisa, 2023), which indicates that

children can master the stages of computational thinking within the Merdeka Curriculum. The incorporation of computational thinking in the execution of the Merdeka Curriculum has significant promise (Salsabila & Yahfizham, 2024) and is an important step to improve the quality of learning or education in Indonesia in order to prepare or produce a creative, innovative, problem-solving, and competitive future generation in the digital era (Gusteti & Neviyarni, 2022). Thus, computational thinking has been integrated into the independent curriculum. This condition differs from the opinion of Maharini et al. (Maharani et al., 2019) indicates that the curriculum in Indonesia has not yet integrated computational thinking. In 2019, Indonesia continued to implement the 2013 curriculum. Consequently, the government's decision to adopt the Merdeka Curriculum was a prudent step in anticipation of 21st-century globalization.

Interviews related to mathematics learning activities revealed that, in general, teachers still use direct learning, where learning is student-centered. The hope is that the learning that takes place is contextual so that students find it easier to understand and apply the material being studied. (Haryanto & Arty, 2019; Kristidhika et al., 2020; Meutiawati, 2023; Tamur et al., 2020).

Regarding the use of applications in learning, several teachers have used learning media applications. These applications include Geogebra, Quizizz, Wordwall, Google Forms, and Canva. The Quizizz application is usually used for evaluation (Handoko et al., 2021; Noviasmy

et al., 2023; Romadhon et al., 2023). Meanwhile, Wordwall is used not only for evaluation but also to make learning more interactive (Amahoroe, 2025; Lestari & Rohmani, 2024; Nisa et al., 2024; Rahmawati & Wijayanti, 2022). The Geogebra application is commonly used to simulate materials (Ardina et al., 2025; Dahal et al., 2022; Pylypenko, 2025). The incorporation of media in mathematics education has demonstrated enhancements in learning outcomes and motivation, while also rendering the learning experience more entertaining (Kusnandar & Yusuf, 2023; Yusuf et al., 2021; Yusuf & Nugraha, 2020). However, some schools have limited facilities and infrastructure, one of which is a school located in a blankspot area.

The teaching materials they provide are also diverse. The teachers interviewed stated that they provide teaching materials in various forms, such as videos and reading materials. Moreover, they have been provided with the Canva Pro application by the government. The provision of diverse teaching materials is a form of differentiated learning (Campbell et al., 2016; Goyibova et al., 2025; Nehe et al., 2024; Stavrou, 2024). Based on observations and interviews, students generally prefer teaching materials provided in video format, especially short videos. The use of short video learning media in teaching allows students to learn independently, flexibly, and personally, according to their needs (Sukmawati et al., 2024). The supply of instructional resources, whether as presentations or designated YouTube links, serves as an alternative for

educators about the information required by students during the learning process.

Interview and observation data indicate that educators recognize the concept of deep learning. Nevertheless, they remain uncertain about how to construct learning experiences that encompass the three components of deep learning, particularly in fostering mindful mathematical education. Currently, pupils continue to perceive mathematics as an intimidating subject (Anjariyah et al., 2024; Ekeh & Onuike, 2025; Mantey et al., 2022). This poses a challenge in making students aware of the importance of learning mathematics.

Respondents agreed that integrating STEAM into mathematics learning can make mathematics learning more contextual, thereby attracting students' attention (Supianti et al., 2025; Violy, 2025; Yulaikha & Rusnilawati, 2025). Teachers encounter difficulties in incorporating STEAM into education due to their insufficient expertise and the absence of adequate equipment and infrastructure in certain schools. This aligns with other research indicating that educators struggle to determine the appropriate discipline, combine the five elements, and fairly assess all dimensions (results, processes, and mathematical concepts) (Belbase et al., 2022; Siregar et al., 2020; Sukmawati et al., 2023). Likewise, related to structural constraints and inadequate facilities, such as limited time, schedules, facilities, and the absence of a specific STEAM curriculum framework/guidelines, implementation is not optimal and mathematics is easily marginalized (Belbase et al., 2022; Herro et al., 2019; Nonik Safitri & Ari Suriani, 2025;

Sukmawati et al., 2023). In fact, Project-STEAM itself is a learning model recommended by the government for implementing in-deep learning (Kementerian Pendidikan Dasar dan Menengah Republik Indonesia, 2025). When asked about hypnoteaching, respondents were confused about what kind of teaching constitutes hypnoteaching. After further exploration, it turned out that they were unknowingly doing it in their teaching.

Before teaching, respondents conducted diagnostic tests. The methods used in these diagnostic tests varied, ranging from written tests to informal oral tests. These diagnostic tests served as a benchmark for teachers in their teaching activities so that each student's learning could be facilitated (Alfarisi, 2024; Sujinah et al., 2024). In general, differentiated learning is applied in mathematics lessons to facilitate the learning development of each student according to the results of the diagnostic test.

During the learning process, respondents often use students' experiences as learning materials. They try to relate these experiences to the mathematics material being studied. For example, they might use the experience of flying kites when studying flat shapes. The classroom engagement is dynamic, involving exchanges between teacher and student, as well as amongst students themselves. By utilizing contexts from daily life and offering scaffolding, students are indirectly supported in locating the knowledge necessary for their learning (Broman et al., 2018; Eticha et al., 2024; Tampubolon et al., 2024a).

Respondents conducted assessments through tests and during the learning process for cognitive abilities. However, they did not conduct specific assessments on computational thinking. Students often complete test questions by simply writing down the final answer. This leads respondents to assume that students are copying their peers' answers. Respondents assess character through observation, but this is unstructured and not done for all students. Respondents believe that students' character has declined due to the influence of the internet. The current development of information technology has had a negative impact on students' character (Syafitri et al., 2024; Tampubolon et al., 2024b).

### 3. Computational Thinking Skill Students'

Of the 15 schools selected by the researcher for the trial, only 12 schools had complete data on computational thinking skills and character questionnaires. The average score of students on the computational thinking test was still below the minimum passing grade. The test results for each school can be seen in Figure 1.

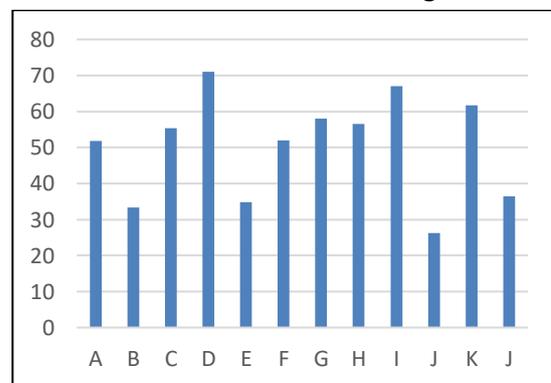


Figure 1. Average Computational Thinking Test Scores from 12 schools.

Figure 1 indicates that the average score for computational thinking skills beyond 70

is merely 1, while those surpassing 60 is only 2, with the remainder falling below 60. If the minimum passing grade for mathematics ranges from 60 to 75, then, according to Figure 1, it may be inferred that the majority of students' computational thinking scores fall below this threshold. This aligns with the findings of preliminary research undertaken by (Syahputra & Sinaga, 2024) which shows that students' computational thinking is still very low. Furthermore, (Jamna et al., 2022) also stated that most students were unable to demonstrate a level of algorithmic thinking and abstraction.

Further analysis was conducted on the students' work. There were still students who only recorded the final results, as can be seen in Figure 2.

Jawaban	
1	Luas daerah yang diwarnai pada batu adalah $(12-9\pi) \text{ cm}^2$
2	Luas daerah dan potongan kue yang di taburi hazelnut adalah $75 \text{ cm}^2$
3	Luas sawang yang di taburi adalah $75 \text{ cm}^2$ atau sekitar $235,5 \text{ cm}^2$
4	Luas daerah yang di arsir adalah $240 \text{ cm}^2$
5	Panjang tali yang di perisut adalah $(0,92 + 1,26)$ atau sekitar $2,18 \text{ m}$ .

Figure 2. Results of Students Who Only Recorded Final Results.

The results shown in Figure 2 indicate that the student did not read the instructions for the question. Additional information from the teacher indicated that these students had low mathematical abilities. This led the researchers and teachers to conclude that these students had copied the answers from their friends. The researchers could not conduct additional analysis of the computational thought process of the students who supplied the responses depicted in Figure 2. Alongside those who merely recorded the

final answer, numerous students advanced directly to the logarithmic stage, as illustrated in Figure 3.

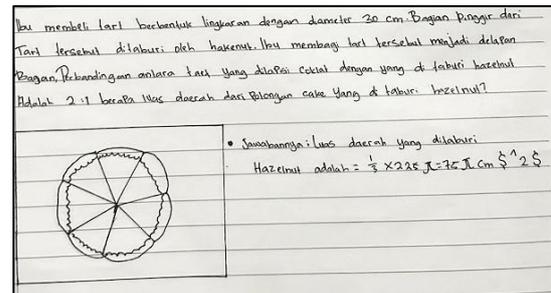


Figure 3. Results of students who proceeded directly to the logarithm stage.

There were several student answers as shown in Figure 3. Students only copied the questions back, did not master the stages of decomposition, pattern recognition, and abstraction. At the algorithm stage, the students' answers were also inaccurate. This is in line with the opinions of Aulia and Kartini (Aulia & Kartini, 2021) If there is an error in one of the steps of the solution, it will cause an error in the next step. If we look at this student's mistake, it can be classified as a fundamental error. Fundamental errors can occur due to incorrect use of formulas and incorrect interpretation of questions (Afriandani et al., 2022; Fitriatien, 2019). Both examples of student answers indicate that students' computational thinking skills are problematic.

#### 4. Students' Character

The examination of the character questionnaire indicates that pupils' characteristics in each indication fall within the good group. The analysis findings are presented in Table 4.

Table 4.  
Results of Student Character Questionnaire Analysis.

Dimension	Value	Interpretation
Belief in One God	3,3	Very good
Global Diversity	3,35	Very good
Mutual Cooperation	3,32	Very good
Independence	3,08	Very good
Critical Thinking	3,15	Very good
Creativity	3,1	Very good

The findings from the questionnaire analysis in Table 4 contrast with the outcomes of observations and interviews conducted with teachers. Teachers and the researcher's observations indicate that not all students exhibit exemplary character. For instance, regarding the belief in God Almighty and the moral obligation towards nature, some students continue to litter. In the context of global diversity and social justice, some kids continue to harass their peers. Furthermore, the findings from the researcher's observations and those of the educators indicate that contemporary pupils exhibit selfishness, engage in academic dishonesty, demonstrate a lack of respect for teachers, and display a reluctance to study. This is in line with Abi's (2017) which states that the current younger generation shows a pronounced tendency toward selfishness, characterized by a decline in communal values (tending toward individualism, selfishness, and indifference), a decline in patience (tending toward anarchy, malice, and the pursuit of instant gratification), a decline in religious and social norms (tending to justify all means), a decline in nationalism (tending to be primitive), a lack of self-respect, an inability to maximize one's potential (tending to be lazy), a lack of self-confidence (vulnerable to manipulation), and a prevalence of inconsistency and hypocrisy. These diverse

detrimental traits have arisen due to the influence of swift advancements in technology and information (Khairunisa et al., 2025; Mutmainnah et al., 2024; Nurhabibah et al., 2025; Srihadi et al., 2024).

The invention of the DELPHI-STEAM learning paradigm, which integrates deep learning inside the STEAM framework using the hypnoteaching approach, supported by a comprehensive LMS with educational resources, is both significant and viable. The assertion is corroborated by the feedback from educators and administrators of junior high schools in Sumedang Regency, who ardently endorse the initiative to create a learning model and resources grounded in STEAM principles, utilizing hypnoteaching as the pedagogical approach. Interview results with teachers indicated that, with their support, they also conveyed their willingness to build these goods.

#### IV. CONCLUSION

Based on the results of research and discussion, the results of needs analysis from various aspects show that the development of the DELPHI-STEAM learning model (deep learning project STEAM with the hypnoteaching method) assisted by LMS to improve computational thinking and character of students is very important and worth doing considering that there is no learning model that develops computational thinking and character simultaneously by applying deep learning principles. In addition, the curriculum and policies also support the development of the DELPHI-STEAM learning model (deep learning project STEAM with the hypnoteaching method) assisted by LMS. The availability of facilities and

infrastructure also makes it possible to implement LMS-assisted learning.

For further research, it is recommended that the needs analysis be conducted on a broader scale, such as at the provincial level. This will ensure that the conditions in the field regarding the development of learning models are more in line with the needs of students and teachers in the field. Furthermore, the development of learning models needs to facilitate mathematics, not just as a calculation tool in STEAM project learning, but also to make mathematics more meaningful. Furthermore, the development of learning models must make mathematics a desirable subject so that students are aware of it when they are learning. LMS interactive media must be able to be a means of learning interaction that facilitates students in a variety of ways according to their needs.

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