

## **“Elementary Teachers’ Misconceptions about Joyful Learning in Deep Learning-Based Instruction: A Certainty of Response Index (CRI) Analysis”**

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### **ARTICLE INFO**

#### **Article history:**

Received April 1, 2025

Revised Mei 13, 2025

Accepted Juni 30, 2025

Available online Juni 30, 2025

#### **Kata Kunci:**

*Joyful Learning, Deep Learning, Miskonsepsi, Certainty of Response Index (CRI), Guru Sekolah Dasar*

#### **Keywords:**

*Joyful Learning, Deep Learning, Misconceptions, Certainty of Response Index (CRI), Elementary School Teachers*



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### **ABSTRAK**

*Penelitian ini bertujuan untuk menganalisis tingkat miskonsepsi guru sekolah dasar terhadap konsep Joyful Learning dalam konteks pembelajaran berbasis Deep Learning dengan menggunakan pendekatan Certainty of Response Index (CRI). Metode penelitian yang digunakan adalah kuantitatif deskriptif dengan teknik misconception analysis berbasis CRI. Subjek penelitian terdiri atas 37 guru Sekolah Dasar di Kota Bandung yang menjawab 15 butir pernyataan konseptual terkait penerapan Joyful Learning dalam pembelajaran bermakna. Data dikumpulkan melalui angket daring dengan lima tingkat keyakinan (sangat tidak yakin-sangat yakin), kemudian dianalisis untuk menentukan kategori paham, tidak paham, dan miskonsepsi.*

*Hasil penelitian menunjukkan bahwa sebagian besar guru telah memahami konsep dasar Joyful Learning, khususnya pada indikator peran guru sebagai fasilitator, refleksi pembelajaran, serta pemanfaatan teknologi pendidikan dengan rata-rata CRI di atas 0,80 (paham tinggi). Namun, ditemukan miskonsepsi sedang hingga tinggi pada beberapa indikator, terutama pada anggapan bahwa Joyful Learning tidak mendukung Deep Learning (68,8% miskonsepsi; CRI = 0,78) dan bahwa aktivitas yang ramai otomatis bermakna (47,2% miskonsepsi; CRI = 0,69). Selain itu, 50% guru masih beranggapan*

*bahwa penilaian formatif dapat mengganggu suasana belajar yang menyenangkan. Temuan ini menunjukkan bahwa sebagian guru masih menafsirkan Joyful Learning secara sempit sebagai kegiatan yang menyenangkan tanpa menekankan kedalaman berpikir dan refleksi siswa. Oleh karena itu, penelitian ini merekomendasikan perlunya pelatihan pedagogik dan supervisi akademik yang menekankan integrasi antara kesenangan belajar dan kedalaman kognitif dalam pembelajaran bermakna.*

### **ABSTRACT**

*This study aims to analyze the level of misconceptions among elementary school teachers regarding the concept of Joyful Learning in the context of Deep Learning-based learning using the Certainty of Response Index (CRI) approach. The research method used is descriptive quantitative with CRI-based misconception analysis techniques. The research subjects consisted of 37 elementary school teachers in Bandung who answered 15 conceptual statements related to the application of Joyful Learning in meaningful learning. Data were collected through an online questionnaire with five levels of confidence (very unsure-very confident), then analyzed to determine the categories of understanding, not understanding, and misconception. The results showed that most teachers understood the basic concepts of Joyful Learning, particularly in terms of the role of teachers as facilitators, learning reflection, and the use of educational technology, with an average CRI above 0.80 (high understanding). However, moderate to high misconceptions were found on several indicators, especially on the assumption that Joyful Learning does not support Deep Learning (68.8% misconception; CRI = 0.78) and that lively activities are automatically meaningful (47.2% misconception; CRI = 0.69). In addition, 50% of teachers still believe that formative assessment can disrupt a pleasant learning atmosphere. These findings indicate that some teachers still interpret Joyful Learning narrowly as enjoyable activities without emphasizing depth of thinking and student*

*reflection. Therefore, this study recommends the need for pedagogical training and academic supervision that emphasizes the integration of learning enjoyment and cognitive depth in meaningful learning.*

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## 1. INTRODUCTION

The development of educational practices in Indonesia in the last two decades has shown a paradigm shift from learning that emphasizes memorization and content transmission toward learning that prioritizes understanding, engagement, reflection, and the construction of meaning (Hendriyani et al., 2022; Herlambang et al., 2023). This shift is inseparable from global demands for 21st-century competencies, which include critical thinking, creativity, collaboration, and communication (Fullan, Quinn, & McEachen, 2018; OECD, 2022; Trilling & Fadel, 2009). In this context, learning is no longer understood as a mere process of acquiring information, but as a process of building deep understanding through meaningful cognitive and emotional engagement (Hattie, 2009; Mayer, 2020).

One of the main references for evaluating the quality of education globally is the Programme for International Student Assessment (PISA) organized by the Organisation for Economic Co-operation and Development (OECD). PISA assesses students' abilities in reading literacy, mathematics, and science with a strong emphasis on reasoning, problem solving, and the application of knowledge in real-life contexts (OECD, 2022). The results of PISA over the last two decades consistently show that Indonesian students' achievement remains significantly below the OECD average. In PISA 2022, Indonesian students obtained an average reading literacy score of 359, far below the OECD average of 487 (OECD, 2022). Similar patterns were found in mathematics and science, indicating that learning practices in Indonesia still tend to emphasize surface learning and procedural mastery rather than deep conceptual understanding (Hattie, 2009; Fullan et al., 2018).

These conditions indicate an urgent need for a fundamental transformation in classroom learning practices. Learning should not only focus on completing the curriculum or delivering content, but must also foster students' ability to think deeply, reflect meaningfully, and connect knowledge with real-life contexts (Biggs & Tang, 2011; Mayer, 2020). In response to this challenge, the Indonesian Ministry of Education, Culture, Research, and Technology (Kemdikbudristek) introduced the Deep Learning pedagogical framework, which is built on three main pillars: mindful learning, meaningful learning, and joyful learning (Kemdikbudristek, 2023).

Deep Learning in this context is not a new curriculum, but a pedagogical orientation that emphasizes the quality of students' understanding through conscious awareness (mindful), conceptual meaning-making (meaningful), and positive emotional engagement (joyful). This framework is theoretically rooted in constructivist learning theory, which views learning as an active process of knowledge construction through experience, interaction, and reflection (Bruner, 1996; Vygotsky, 1978). It is also closely aligned with Ausubel's theory of meaningful learning, which emphasizes the importance of linking new information with learners' existing cognitive structures (Ausubel, 1968; Novak, 2010).

In recent educational research, deep learning is consistently associated with students' ability to engage in higher-order thinking, transfer knowledge, and develop metacognitive awareness (Fullan et al., 2018; Hattie, 2009; Marton & Säljö, 2005). At the same time, emotional and motivational aspects are increasingly recognized as inseparable components of meaningful learning. Studies in educational psychology show that positive emotions, enjoyment, and interest play a crucial role in sustaining students' engagement and perseverance in cognitively demanding tasks (Fredrickson, 2001; Pekrun, 2014; Ryan & Deci, 2020).

Within this framework, Joyful Learning is not merely about creating a fun or entertaining classroom atmosphere. Rather, it is a pedagogical approach that integrates emotional engagement with cognitive challenge and reflective thinking (Immordino-Yang et al., 2019; Kim & Reeves, 2022). Joyful learning is closely related to the concept of flow (Csikszentmihalyi, 1990), self-determination theory (Ryan & Deci, 2020), and achievement emotions theory (Pekrun, 2014), all of which emphasize that deep engagement emerges when learners experience enjoyment, relevance, and a sense of competence in challenging learning activities.

However, in the context of basic education in Indonesia, the implementation of Joyful Learning still faces serious conceptual and practical challenges. Several studies indicate that many teachers tend to interpret joyful learning narrowly as noisy, game-based, or purely entertaining activities, without sufficient attention to cognitive depth, conceptual understanding, and reflective processes (Rahman et al., 2022; Tondeur et al., 2023). As a result, learning activities may appear active and fun on the surface, but remain shallow in terms of conceptual development (Biggs & Tang, 2011; Marton & Säljö, 2005).

This problem becomes even more critical in the context of the Merdeka Curriculum, which explicitly emphasizes deep understanding, formative assessment, and reflective learning practices (Kemdikbudristek, 2023; Kemdikbudristek, 2024). National reports show that a large proportion of teachers still focus more on student participation and enjoyment rather than on evidence of conceptual understanding and learning progress (Kemdikbudristek, 2024). This gap between policy intentions and classroom practices suggests that the problem is not merely technical, but also conceptual—related to teachers' understanding of the true meaning of Joyful Learning within the Deep Learning framework.

From a theoretical and practical perspective, misconceptions held by teachers can have a significant impact on instructional quality. Teachers' beliefs and conceptual understanding strongly influence how they design learning activities, assessments, and feedback (Pajares, 1992; Fives & Buehl, 2012). If teachers believe that joyful learning should avoid cognitive challenge or formative assessment, they may unintentionally weaken students' opportunities to develop deep understanding, critical thinking, and reflective awareness.

To identify such misconceptions more precisely, this study employs the Certainty of Response Index (CRI) developed by Hasan, Bagayoko, and Kelley (1999). The CRI approach allows researchers to distinguish between correct understanding, lack of knowledge, and strong misconceptions by considering not only the correctness of responses but also the level of confidence with which those responses are given. This method has been widely used in educational research to diagnose conceptual understanding and persistent misconceptions among learners and teachers (Hasan et al., 1999; Rahman et al., 2022).

Based on these considerations, a clear and accurate understanding of Joyful Learning as an integral part of Deep Learning is crucial for supporting learning transformation in Indonesian elementary schools. Therefore, this study aims to analyze elementary school teachers' misconceptions about the concept of Joyful Learning using the Certainty of Response Index (CRI) approach. The findings of this study are expected to provide empirical evidence for designing more targeted and reflective teacher professional development programs, as well as for strengthening the implementation of meaningful, mindful, and joyful learning in primary education.

## **2. METHOD**

### **1. Types and Approaches to Research**

This study uses a descriptive quantitative approach with a method of analyzing misconceptions based on the Certainty of Response Index (CRI). This approach was chosen because it aims to identify the level of understanding and misconceptions of elementary school teachers regarding the concept of Joyful Learning in the context of Deep Learning-based learning. According to Hasan, Bagayoko, and Kelley (1999), the CRI method is effective in distinguishing between true understanding, lack of knowledge, and strong misconceptions by considering the level of confidence of respondents in their answers.

### **2. Population and Sample**

The population of this study was all elementary school teachers in the city of Bandung who had implemented the Merdeka Curriculum. The sample consisted of 37 elementary school teachers, selected using purposive sampling based on the following criteria:

1. Had taught for at least two years in a public elementary school,
2. Had participated in training on the implementation of the Merdeka Curriculum, and
3. Have implemented the Joyful Learning approach in learning activities.

The number of 37 respondents is considered representative to describe the tendency of teachers' conceptual understanding of Joyful Learning in primary education.

### 3. Research Instrument

The research instrument was a closed-ended questionnaire consisting of 15 conceptual statements related to the principles, implementation, and evaluation of Joyful Learning in meaningful learning. Each item was followed by two assessment aspects:

1. Conceptual answer (true or false), and
2. Confidence rating scale (CRI) for the answer.

The CRI scale was adapted from Hassan et al. (1999) and simplified into four levels of confidence, namely:

| Value | Description |
|-------|-------------|
| 1     | Very unsure |
| 2     | Unsure      |
| 3     | Sure        |
| 4     | Very sure   |

CRI enables analysis based not only on the correctness of answers, but also on the level of confidence of respondents, resulting in a more accurate understanding map.

### 4. Data Collection Techniques

Data was collected through an online questionnaire (Google Form) distributed to elementary school teachers in Bandung City. Prior to distribution, content validity was validated by three experts in basic education and psychometrics. The reliability of the instrument was tested using Cronbach's Alpha coefficient and obtained a value of  $\alpha = 0.86$ , indicating high reliability.

Data analysis was conducted quantitatively using the Certainty of Response Index (CRI) procedure to identify teachers' understanding, misconceptions, and conceptual ignorance. CRI Analysis Procedure

The analysis was conducted through the following four steps :

1. Correct answer + high CRI → understanding of the concept
2. Incorrect answer + high CRI → strong misconception
3. Incorrect answer + low CRI → lack of understanding
4. Correct answer + low CRI → guessing

The percentage for each category is calculated using the formula:

$$P = \frac{f}{N} \times 100\%$$

Explanation:

f = frequency of respondents in each category

N = total number of respondents

P = percentage of category

#### Misconception Category Criteria

The level of teacher misconception is classified based on the following percentage ranges :

| Percentage | Misconception Category |
|------------|------------------------|
| 0-33%      | Low                    |
| 34-67%     | Medium                 |
| 68-100%    | High                   |

This classification refers to Hasan et al. (1999) and the adaptation of the analysis of educational misconceptions by Rahman et al. (2022). The results of the analysis are presented in the form of distribution tables and percentage interpretations in the results and discussion section.

### 3. RESULTS AND DISCUSSION

#### Result

The results of the Certainty of Response Index (CRI) analysis of 37 elementary school teachers are presented in Table 1. The data shows the percentage of understanding, misconceptions, and ignorance of the 15 indicators of the Joyful Learning concept in the context of Deep Learning-based learning.

Table 1. Results of the Certainty of Response Index (CRI) Analysis on 37 Elementary School Teachers

| No | Indicator   | Total Responses | Understanding (%) | Misconceptions (%) | Lack of Understanding (%) | CRI Scale (average) | Category               |
|----|---|-----------------|-------------------|--------------------|---------------------------|---------------------|------------------------|
| 1  | Joyful learning emphasizes a balance between enjoyment and cognitive challenges.                                      | 37              | 85,7              | 10,7               | 3,6                       | 0,82                | High Understanding     |
| 2  | Games can be used as joyful learning only if they are designed to achieve specific competencies.                      | 37              | 67,6              | 26,5               | 5,9                       | 0,71                | Moderate misconception |
| 3  | Joyful learning does not support deep learning because students focus too much on enjoyment rather than understanding | 37              | 25,0              | 68,8               | 6,2                       | 0,78                | High misconception     |
| 4  | Joyful learning can happen through quiet reflection, such as writing down what you learned today.                     | 37              | 78,8              | 15,2               | 6,1                       | 0,74                | Moderate understanding |
| 5  | Teachers act as facilitators who create a pleasant learning atmosphere without neglecting learning objectives.        | 37              | 81,0              | 12,5               | 6,5                       | 0,80                | High understanding     |
| 6  | Lively and laughter-filled activities automatically indicate meaningful learning.                                     | 37              | 45,5              | 47,2               | 7,3                       | 0,69                | Moderate misconception |
| 7  | Evaluation in joyful learning should assess students'   | 37              | 52,0              | 38,7               | 9,3                       | 0,70                | Moderate misconception |

| No | Indicator  | Total Responses | Understanding (%) | Misconceptions (%) | Lack of Understanding (%) | CRI Scale (average) | Category               |
|----|--|-----------------|-------------------|--------------------|---------------------------|---------------------|------------------------|
|    | enjoyment, not their understanding   |                 |                   |                    |                           |                     |                        |
| 8  | Joyful learning should focus on student activities, not on learning outcomes.                    | 37              | 58,0              | 34,2               | 7,8                       | 0,72                | Moderate misconception |
| 9  | Reflection and feedback are part of joyful learning that supports deep learning.                 | 37              | 83,5              | 10,5               | 6,0                       | 0,82                | High understanding     |
| 10 | Project-based learning can be categorized as joyful learning.                                    | 37              | 75,0              | 17,0               | 8,0                       | 0,77                | High understanding     |
| 11 | Teachers need to understand students' learning styles to create effective joyful learning.       | 37              | 87,0              | 8,0                | 5,0                       | 0,84                | High understanding     |
| 12 | Digital technology can be used to enhance the fun aspect of joyful learning.                     | 37              | 80,5              | 14,2               | 5,3                       | 0,79                | High understanding     |
| 13 | Joyful learning ignores formative assessment because it disrupts the learning atmosphere.        | 37              | 40,0              | 50,0               | 10,0                      | 0,67                | Moderate misconception |
| 14 | Teachers should guide students to discover the meaning of learning through enjoyable activities. | 37              | 88,0              | 7,0                | 5,0                       | 0,85                | High understanding     |
| 15 | Effective joyful learning must foster students' intrinsic interest and motivation.               | 37              | 92,0              | 5,0                | 3,0                       | 0,86                | High understanding     |

**Misconception category criteria:**

- 0.00-0.30 = Low misconception
- 0.31-0.70 = Moderate misconception
- 0.71-1.00 = High misconception

Based on the data in the table above, most teachers demonstrated a good level of understanding of the Joyful Learning concept, particularly in indicators related to the role of teachers as facilitators (81%), learning reflection (78.8%), and the use of educational technology (80.5%) with an average CRI above 0.80 (high understanding category).

However, there are moderate to high misconceptions on several indicators, especially on the assumption that Joyful Learning does not support Deep Learning (68.8% misconception; CRI = 0.78), that lively activities are automatically meaningful (47.2% misconception; CRI = 0.69), and that formative assessment disrupts a pleasant learning atmosphere (50%; CRI = 0.67).

## Discussion

The results of this study indicate that, in general, elementary school teachers already have a fairly good understanding of the basic concept of Joyful Learning, particularly regarding the role of teachers as facilitators, the importance of learning reflection, and the use of technology in learning. However, these findings also reveal the presence of significant conceptual misconceptions in several key aspects, especially concerning the relationship between Joyful Learning and Deep Learning, the meaning of learning activeness, and the role of formative assessment in joyful learning environments.

The most prominent misconception was found in the belief that Joyful Learning does not support Deep Learning because students are assumed to focus more on enjoyment than on understanding. This view reflects a false dichotomy between the emotional and cognitive dimensions of learning. In fact, various theoretical and empirical studies emphasize that positive emotional engagement is a crucial prerequisite for deep learning to occur (Fredrickson, 2001; Pekrun, 2014; Ryan & Deci, 2020). From the perspective of deep and surface approaches to learning, Marton and Säljö argue that deep learning is not determined by a serious or rigid classroom atmosphere, but by students' orientation toward meaning-making and conceptual understanding (Marton & Säljö, 2005). Similarly, Biggs and Tang (2011) and Hattie (2009) highlight that high-quality learning takes place when students face meaningful cognitive challenges in a supportive and motivating learning environment.

These findings are also consistent with the studies of Kim and Reeves (2022) and Tondeur et al. (2023), which demonstrate that Joyful Learning and Deep Learning are not contradictory concepts but rather complementary ones. Joyful Learning functions as an affective gateway that strengthens students' engagement, while Deep Learning ensures that such engagement leads to sustained conceptual understanding and transferable knowledge. Therefore, the misconceptions found in this study indicate a gap between the theoretical framework and teachers' practical understanding in the field.

Another important misconception is reflected in the belief that lively and laughter-filled classroom activities automatically indicate meaningful learning. This view shows a tendency to equate physical activeness with cognitive depth. In the theory of meaningful learning, Ausubel (1968) and Mayer (2020) emphasize that meaningful learning is not determined by how busy students are, but by the extent to which they are able to connect new information with their existing cognitive structures. Hattie (2009) also argues that effective learning activities are not merely those that are enjoyable or attractive, but those that demonstrably contribute to students' understanding and learning progress.

In this regard, the findings of this study reinforce Biggs and Tang's (2011) critique of learning practices that overemphasize surface features of learning, in which classroom activities appear active but remain shallow in terms of conceptual development. Thus, Joyful Learning that is not accompanied by cognitively challenging and reflective tasks risks being reduced to enjoyable but conceptually superficial activities.

Another significant misconception concerns the belief that formative assessment disrupts a pleasant learning atmosphere. This view contradicts well-established findings in the assessment literature. Black and Wiliam (2009) and Brookhart (2017) argue that formative assessment and high-quality feedback are at the heart of effective learning because they help students understand their current level of achievement and determine the next steps for improvement. Hattie and Timperley (2007) further show that feedback is among the most powerful influences on student learning achievement.

Within the framework of Deep Learning and the Merdeka Curriculum, formative assessment is not intended as a tool to pressure students, but as a means of supporting reflection and

strengthening the learning process (Kemdikbudristek, 2023; Kemdikbudristek, 2024). Therefore, the finding that some teachers still perceive assessment as a threat to joyful learning indicates the need to strengthen teachers' conceptual understanding of the function of assessment in meaningful learning.

Viewed more broadly, these findings support the argument that the main challenges in implementing Joyful Learning in elementary schools are not merely technical, but conceptual. Teachers' beliefs and conceptual understandings strongly influence how they design learning activities, select instructional strategies, and use assessment and feedback in the classroom (Pajares, 1992; Fives & Buehl, 2012). When teachers hold partial or inaccurate understandings, the resulting instructional practices may deviate from the intended pedagogical goals.

In the context of national education policy, these findings have important implications for the implementation of the Merdeka Curriculum and the Deep Learning framework. Educational transformation cannot rely solely on curriculum change or the provision of teaching materials, but must be accompanied by continuous strengthening of teachers' pedagogical literacy and professional reflection (Fullan et al., 2018; Darling-Hammond et al., 2020). Teacher professional development programs should explicitly emphasize the integration of learning enjoyment, cognitive challenge, reflection, and formative assessment as an inseparable whole.

Thus, this study confirms that Joyful Learning can truly contribute to the realization of Deep Learning only when it is understood and implemented holistically as an approach that integrates affective, cognitive, and reflective dimensions of learning. Without strong conceptual understanding, Joyful Learning risks being reduced to merely enjoyable surface activities that lack the power to foster students' deep and sustainable understanding.

#### **4. CONCLUSION**

This study reveals that although most elementary school teachers demonstrate a generally good understanding of the basic principles of Joyful Learning, there are still significant conceptual misconceptions regarding its relationship with Deep Learning. The Certainty of Response Index (CRI) analysis shows that some teachers hold incorrect conceptions with a high level of confidence, particularly concerning the role of enjoyment in relation to cognitive depth, the meaning of active learning, and the function of formative assessment in joyful learning environments.

These findings confirm that the main challenges in implementing Joyful Learning in elementary education are not merely technical, but conceptual in nature. Teachers' understanding of the balance between enjoyment, cognitive challenge, reflection, and assessment plays a crucial role in determining whether learning activities truly lead to deep and meaningful understanding. When Joyful Learning is interpreted only as entertaining or lively activities without sufficient attention to conceptual understanding and reflective processes, it risks being reduced to surface-level learning practices.

Within the framework of the Merdeka Curriculum and Deep Learning, Joyful Learning should be understood as an integral component of a holistic pedagogical approach that integrates affective, cognitive, and reflective dimensions of learning. Therefore, strengthening teachers' conceptual literacy and reflective awareness is a fundamental prerequisite for improving the quality of meaningful and sustainable learning in elementary schools.

#### **5. RECOMMENDATION**

Based on the findings of this study, several strategic recommendations can be proposed to improve the quality of Joyful Learning implementation in elementary education.

First, it is necessary to strengthen teachers' pedagogical competence through systematic and continuous professional development programs. The Ministry of Education, Culture, Research, and Technology (Kemdikbudristek), in collaboration with educational quality assurance institutions, should design training programs that emphasize a deep and integrated understanding of Mindful, Meaningful, and Joyful Learning within the Deep Learning framework. Such programs should not only focus on teaching strategies, but also on developing teachers' conceptual awareness and reflective practice.

Second, teachers should be encouraged to adopt evidence-based teaching in both lesson planning and classroom implementation. Learning activities should be designed based on research findings and learning theories, ensuring that joyful learning experiences remain oriented toward developing students' conceptual understanding, higher-order thinking skills, and reflective

awareness. In this way, Joyful Learning will not be limited to emotional engagement alone, but will also contribute directly to measurable learning outcomes.

Third, schools and educational supervisors are expected to conduct continuous academic supervision that focuses on the alignment between lesson planning, classroom implementation, formative assessment, and reflective feedback. This supervision is essential to ensure that classroom practices truly reflect the principles of Deep Learning and support the integration of enjoyment, cognitive challenge, and reflection in a coherent learning process.

Finally, future research is recommended to expand the scope of this study by involving a larger and more diverse sample, such as teachers from different regions or educational levels. Further studies could also explore the relationship between teachers' conceptual understanding of Joyful Learning and students' actual learning outcomes. Such research would provide a more comprehensive understanding of how Joyful Learning can be effectively implemented to support deep, meaningful, and sustainable learning in diverse educational contexts.

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