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Deconstructing Learners' Creative Potentials: An Assessment of Students' Divergent Thinking Skills

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ABSTRACT

This study examines the divergent thinking skills of young learners, specifically focusing on fluency, flexibility, originality, and elaboration. Using a descriptive research design, a sample of 234 STEM students was selected to assess these critical creative capacities through standardized tests and qualitative discussions. The results show that while a majority of students are proficient in fluency (58.55%) and flexibility (90.60%), fewer demonstrate proficiency in originality (24.79%) and elaboration (29.06%). The findings highlight that most students excel in generating ideas and adapting their thinking but struggle with developing unique and well-elaborated concepts. To address these gaps, the study recommends targeted instructional strategies such as creative writing, project-based learning, and interdisciplinary activities to foster deeper creative skills. These interventions can support the development of well-rounded divergent thinking abilities essential for both academic success and real-world problem-solving.

Keywords: Divergent thinking, fluency, flexibility, originality, elaboration, creativity, young learners, educational interventions

INTRODUCTION

Creativity is recognized as one of the essential skills for the 21st century, where individuals are expected to generate novel ideas and solutions in various contexts. Divergent thinking, a key component of creativity, encompasses fluency, flexibility, originality, and elaboration—skills critical to adapting in a fast-paced and innovative world. Thus, the ability to foster creativity is crucial, especially in educational environments that are rapidly evolving due to technological advancements and shifting societal demands. Educators, therefore, need to assess how well students can engage in creative thinking across various domains. By identifying the specific strengths and weaknesses in students' divergent thinking skills, this study aims to provide educators with concrete data that could inform more effective instructional strategies. The ultimate goal is to cultivate students who are not only knowledgeable but also capable of using their creative faculties to solve complex, real-world problems. Hence, this study focuses on assessing these skills in young learners, offering insights into their creative potential and how these skills are developed in the educational system.

Particularly, this research sought to answer the following research question:

What are the levels of students' divergent thinking skills in terms of:

1. Fluency;

2. Flexibility;

3. Originality, and

4. Elaboration?

REVIEW OF RELATED LITERATURE

Fluency

Fluency, defined as the ability to generate numerous relevant ideas in response to a stimulus, is an essential skill in creativity. Learners with high fluency can produce multiple solutions, which may lead to more effective problem-solving. Research stresses that individuals exposed to various educational stimuli develop fluency as a reflection of their cognitive processing capabilities [8]. Studies have demonstrated that fluency increases when learners engage in tasks challenging them to think beyond conventional solutions, such as brainstorming sessions or creative writing exercises [3].

Furthermore, fluency is often closely linked to cognitive flexibility, as learners who are able to shift between different categories of thought and perspectives tend to generate more diverse ideas. According to research, educational approaches that encourage open-ended questioning, inquiry-based learning, and problem-solving environments tend to promote fluency by offering students the freedom to explore multiple potential solutions without the fear of making mistakes [12, 13]. This flexibility allows students to synthesize new solutions quickly and adapt their ideas to changing circumstances, reflecting the fluid nature of creative thinking [8].

However, there remains a notable gap in the literature concerning how fluency development may differ across disciplines, particularly in STEM education compared to the arts and humanities. While the majority of fluency-related research focuses on creativity within fields like literature and the visual arts, less attention has been given to the ways in which problem-based learning and inquiry-driven approaches in STEM foster or hinder fluency in idea generation [10, 12]. STEM disciplines, which often emphasize accuracy, structure, and convergent thinking, may present different challenges and opportunities for fluency development. For example, while STEM education encourages solutions-based thinking, it may not always prioritize the kind of divergent thinking necessary for high fluency. This gap in understanding highlights the need for further investigation into how fluency is nurtured in various educational contexts.

On another note, while fluency is a valuable component of divergent thinking, it should not be viewed in isolation. Some studies have raised concerns that fluency alone may not be a reliable indicator of creative potential. Jankowska and Karwowski (2015) suggest that while fluency promotes the generation of multiple ideas, it can sometimes lead to a focus on quantity over quality, where learners generate a large number of ideas that may lack depth or originality [6]. In this regard, fluency must be complemented by other divergent thinking skills, such as originality and elaboration, to provide a more holistic measure of creativity. Research further indicates that fluency should be balanced with the ability to refine and develop ideas in depth, ensuring that the ideas generated are both numerous and meaningful.

Additionally, fluency can be influenced by a range of factors, including individual differences in cognitive style, prior knowledge, and even psychological traits such as creative self-efficacy. Learners who are more confident in their creative abilities tend to generate more ideas, while those who struggle with confidence or fear failure may produce fewer ideas due to self-censorship. As Kaufman and Baer (2008) note, students' creative confidence plays a significant role in their willingness to engage in free-flowing idea generation, and this can directly impact fluency. Consequently, fluency development can vary not only by discipline but

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also by individual differences, highlighting the complex nature of this divergent thinking skill [1].

Flexibility

Flexibility, or the ability to produce ideas across different categories, demonstrates the capacity to shift perspectives. Learners who engage in activities requiring different viewpoints tend to develop more adaptive thinking, enabling them to navigate complex situations with ease [12, 13]. Research highlights that flexibility is closely tied to students' exposure to interdisciplinary learning environments where they can draw connections between diverse fields [10]. In these settings, students are encouraged to explore concepts from multiple angles, which promotes cognitive flexibility by encouraging them to consider alternative solutions and approaches to problem-solving. This skill helps learners move beyond fixed patterns of thinking, allowing them to find novel solutions to problems. For example, students exposed to interdisciplinary tasks, such as integrating arts and sciences, tend to demonstrate higher flexibility, as they are challenged to synthesize knowledge across domains [13].

Yet despite the recognized importance of flexibility in creative thinking, existing research rarely addresses the impact of curriculum integration on flexibility in divergent thinking, particularly in educational contexts that emphasize specialization. In disciplines where students focus on narrow sets of skills, such as STEM fields, flexibility may be constrained by the emphasis on convergent, structured thinking, where learners are often guided to a single correct answer. This gap in the literature underlines a need to explore how students from specialized fields, like STEM, develop flexibility when compared to those in more interdisciplinary programs [11]. The arts and humanities typically promote open-ended thinking, which naturally fosters flexibility, whereas STEM fields may emphasize precision and methodical problem-solving, potentially limiting the development of this skill. Exploring how different educational contexts nurture or hinder flexibility can provide a more comprehensive understanding of how divergent thinking is shaped by curriculum design.

Moreover, flexibility is not always associated with higher creativity or problem-solving efficiency. Some researchers argue that flexibility may have its limitations, particularly when overemphasized. For instance, Siswono (2009) found that while learners demonstrated flexibility in mathematics problem-solving, those who frequently shifted perspectives sometimes struggled to form cohesive solutions. In these cases, their ideas were not always logically connected, which could detract from the depth of understanding required to solve complex problems effectively. This indicates that shifting perspectives without maintaining focus on the problem at hand can result in disjointed or fragmented ideas [11].

This contrasting view underscores the importance of balancing flexibility with other divergent thinking skills such as fluency and originality. While flexibility allows learners to explore a wide range of ideas, fluency ensures they can generate numerous solutions, and originality ensures that the solutions are both novel and meaningful. Thus, while flexibility is essential for navigating complex tasks and generating diverse ideas, it must be tempered with an understanding of how to apply those ideas coherently and meaningfully. The relationship between flexibility and other creative capacities, such as elaboration and originality, remains an area ripe for further exploration, particularly in understanding how these skills can be developed in tandem within various educational contexts [11].

Another consideration is the role that flexibility plays in cognitive processes beyond creative problem-solving. Flexibility has also been linked to emotional regulation and adaptability in challenging situations, implying that students who develop this skill are not only better at generating creative solutions but are also more capable of adapting to changing circumstances and managing stress in academic environments [10]. This highlights the broader implications of flexibility beyond creativity, as it contributes to students' overall resilience and ability to succeed in dynamic learning contexts.

Originality

Originality refers to the statistical rarity and uniqueness of responses, often regarded as the pinnacle of creativity because it involves breaking away from conventional thought patterns to produce truly novel ideas [12]. Learners exposed to diverse stimuli, particularly in creative arts settings, are more likely to demonstrate higher originality scores. Studies like Gundogan (2013) show that environments encouraging open-ended tasks and creative exploration allow learners to generate unique solutions, highlighting the importance of engagement with diverse stimuli in fostering original thinking [4]. Open-ended projects, in particular, provide students with the freedom to explore multiple possibilities, take creative risks, and ultimately produce ideas that deviate from traditional responses.

Nevertheless, originality is a complex construct, and research presents some contrasting perspectives. While originality is celebrated in creative thinking, Baer and Kaufman (2008) argue that not all original ideas are necessarily useful or practical [1]. In some cases, learners may produce ideas that are statistically rare yet irrelevant or impractical for the problem at hand. Kaufman's earlier research (2006) further hints that originality should be assessed not only by its uniqueness but also by its relevance and applicability in real-world contexts. This tension between novelty and practicality is a critical issue in creative thinking research, as educators must strike a balance between fostering original ideas and ensuring that those ideas are valuable and feasible for problem-solving [7].

Originality does not develop uniformly across all disciplines. Research highlights a gap in understanding how specific educational interventions, particularly in STEM disciplines, can nurture originality without sacrificing the practicality required in technical fields. STEM education, which often underlines accuracy, precision, and problem-solving efficiency, may not prioritize the kind of divergent thinking necessary to foster originality. However, recent discussions in the literature point to the need for a more nuanced approach, where students in STEM fields are encouraged to innovate while also maintaining the applicability of their ideas [1, 4]. This presents an opportunity for further research to explore how STEM education can integrate originality into its curriculum without compromising on the practical demands of the discipline.

Additionally, the ability to produce original ideas is closely linked to learners' confidence in risk-taking and their willingness to explore unconventional solutions. Environments that support experimentation and tolerate failure tend to see higher levels of originality in students. However, as Baer and Kaufman (2008) caution, originality should not be seen in isolation. It must be supported by other divergent thinking skills such as elaboration and fluency to ensure that ideas are not only novel but also well-developed and relevant to the context. Without this balance, students may produce creative but impractical solutions, which could limit the overall impact of their originality in problem-solving tasks [1].

Despite the emphasis on originality in creative thinking research, there remains a deficiency in understanding how specific educational interventions, particularly in specialized disciplines like STEM, can effectively nurture originality without sacrificing practicality. The tension between fostering innovation and maintaining applicability in real-world problem-solving continues to be an underexplored area in the literature. Addressing this gap could provide valuable insights into how originality can be cultivated more effectively across various educational contexts, ensuring that students not only generate unique ideas but also contribute meaningful, applicable solutions [1, 4, 7].

Elaboration

Elaboration, the ability to add meaningful details to an idea to enhance its clarity and depth, plays a crucial role in transforming initial concepts into well-developed solutions. Research by Marzano (2001) and Caroli

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& Sagone (2009) suggests that learners capable of elaborate thinking exhibit higher levels of vivid visualizations and detailed conceptualizations, which contribute to a more comprehensive and innovative approach to problem-solving. Elaboration is not simply about adding information but about refining ideas to ensure coherence and depth. This process allows learners to move beyond surface-level thinking and engage more deeply with their creative output, ultimately producing more thoughtful and effective solutions [2, 9].

Furthermore, elaboration involves a delicate balance between enriching an idea and maintaining its clarity. While elaboration can enhance an idea's development, it can also lead to the risk of over-complication if learners do not focus on relevant details. Drapeau (2009) stresses that educators must guide learners to prioritize relevant details that improve the quality of the idea, rather than allowing them to add superfluous information that detracts from the idea's core [3]. Henderson's (2003) study found that some learners who excelled in elaboration often became overly fixated on adding excessive details, leading to over-complicated solutions for otherwise simple problems [5]. This finding accentuates the importance of teaching learners to strike a balance between depth and simplicity, ensuring that the added details enhance the core concept rather than detract from its effectiveness.

In contrast to creative fields such as the arts and literature, where elaboration is typically highly valued and encouraged, STEM disciplines often place less emphasis on elaboration due to the focus on precision, efficiency, and quick problem-solving. This creates a unique challenge for developing elaboration skills in environments that prioritize straightforward, efficient solutions over in-depth exploration. The tendency to focus on producing quick, correct answers in STEM contexts may limit students' opportunities to engage in the kind of detailed elaboration that is more commonly encouraged in creative disciplines [2, 9]. This gap in the literature points to a need for further exploration of how elaboration can be nurtured in fields that traditionally prioritize efficiency over creativity.

One of the major deficits in existing research is the limited exploration of how elaboration skills are cultivated across various educational contexts. While elaboration is commonly recognized as important in creative disciplines, such as the arts and humanities, there is a notable lack of research on how elaboration can be encouraged in fields that emphasize precision and practicality, such as STEM education. The challenge in STEM disciplines lies in encouraging students to not only solve problems efficiently but also to consider how additional details and layers of information could enhance their solutions without compromising efficiency. Marzano (2001) argues that this tension between elaboration and efficiency requires careful instructional strategies that guide learners in applying elaboration meaningfully within the constraints of structured disciplines [2].

Elaboration plays a critical role in enhancing the overall creativity of an idea by allowing students to explore and develop their thoughts more fully. Caroli & Sagone (2009) assert that learners with strong elaboration skills are more likely to visualize ideas clearly and develop them in greater detail, which leads to more innovative and robust solutions [9]. Yet, this important cognitive skill remains underexplored in contexts that do not traditionally prioritize creativity, leading to a missed opportunity for fostering more profound and thoughtful approaches to problem-solving in such environments. Addressing this gap could reveal how elaboration can be effectively integrated into various educational frameworks, particularly those that focus on efficiency and precision, ensuring that learners can still explore the depth and richness of their ideas without sacrificing clarity and coherence.

RESEARCH DESIGN AND METHODOLOGY

This study employed a descriptive research design to assess the divergent thinking skills of young learners. A total of 234 STEM students were selected from the population using Cochran's formula, which is often used in educational research to determine an appropriate sample size for large populations. The formula ensures that the sample accurately represents the larger population within a specified margin of error.

The population comprised young learners from a senior high school cohort. Using simple random sampling, the sample was drawn from a total population of 608 students, ensuring that each individual had an equal chance of being selected. The use of random sampling minimizes bias and increases the representativeness of the sample, allowing for more generalizable results.

After determining the sample size, the selected students were invited to participate in a series of standardized tests (verbal and figural tasks) designed to measure their levels of fluency, flexibility, originality, and elaboration. Statistical tools such as frequency distributions, means, and t-tests were employed to analyze the quantitative data.

RESULTS AND DISCUSSION

Fluency

Table 1 shows the distribution of respondents' levels of fluency.

Table 1. *Distribution of Respondents by Levels of Fluency*

Fluency Levels	n	%	M	SD
Proficient to Advance 2.52 – 4.00	137	58.55	3.46	0.43
Poor to Fair 1.00 – 2.51	97	41.45	2.83	0.01
Overall	*234*	*100*	*2.86*	*0.98*

Note. Description of overall rating is Proficient

The results reveal that a majority of the respondents (58.55%) demonstrate proficiency in fluency, with a mean score of 3.46, indicating a strong ability to generate multiple relevant ideas. The relatively high performance in this group hints that most students are capable of responding creatively to stimuli, which is an essential indicator of divergent thinking. However, 41.45% of students fall within the "Poor to Fair" range, with a lower mean score of 2.83, reflecting a more limited ability to generate ideas. The tightly clustered scores in this group, evidenced by a small standard deviation, reveal that these students face consistent challenges in fluency.

As fluency is defined as the ability to generate numerous relevant ideas, it is a key indicator of creativity and divergent thinking [10]. The high percentage (58.55%) of students demonstrating proficiency in fluency is likely due to their exposure to educational environments that emphasize open-ended questioning and inquiry-based learning. Moreover, the high mean score of 3.46 indicates that these students are comfortable generating ideas and shifting perspectives. However, the significant portion of students (41.45%) in the "Poor to Fair" category indicates challenges in generating a sufficient number of ideas. This may reflect the gap in fluency development across disciplines, particularly in STEM education, where students are often encouraged to focus on accuracy and convergent thinking rather than the divergent thinking necessary for fluency [6], but according to Silvia (2008) and Drapeau (2009), open-ended and inquiry-based tasks may just foster fluency by encouraging students to think beyond the structured frameworks, which therefore may develop their fluency skills [3, 10]. Also, research reinforces the importance of arts and humanities integration in STEM disciplines—by positioning the disciplines in realistic human conditions paired with artistic stimulants, the theoretical knowledge, becomes grounded in real-life situations, allowing students to draw connections efficiently [8, 10, 13].

Furthermore, while fluency is a valuable component of creativity, it should not be viewed in isolation. Research says that fluency alone may lead to the generation of a large number of ideas, but without sufficient depth or originality [6]. Balancing fluency with skills such as originality and elaboration is critical for fostering more holistic creative thinking.

Also, individual factors such as creative self-efficacy likely play a role in fluency development. Students who are more confident in their creative abilities tend to generate more ideas, while those who struggle with confidence may limit their idea generation due to self-censorship [1]. This could account for the lower fluency scores observed in the "Poor to Fair" category.

Overall, the combined mean score for fluency among all respondents is 2.86, which still reflects a proficient level of ability, although the larger standard deviation (0.98) indicates greater variability across the sample.

Flexibility

Table 2 shows the distribution of respondents by levels of flexibility.

Table 2. *Distribution of Respondents by Levels of Flexibility*

Flexibility Levels	n	%	M	SD
Proficient to Advance 2.52 – 4.00	212	90.60	3.37	0.48
Poor to Fair 1.00 – 2.51	22	9.40	2.51	0.17
Overall	*234*	*100*	*3.23*	*0.55*

Note. Description of overall rating is Proficient

The table illustrates that the majority of students (90.60%) demonstrate proficiency in flexibility, with a mean score of 3.37, indicating strong abilities in shifting perspectives and adapting to diverse problems. This shows that most respondents are comfortable generating ideas across different categories and making connections between them. The relatively low standard deviation (0.48) highlights consistent performance among students in this group. Conversely, 9.40% of students fall within the "Poor to Fair" range, with a mean score of 2.51 and a smaller standard deviation (0.17), indicating limited variation in performance and suggesting that these students face challenges in approaching problems from multiple perspectives. The overall mean score of 3.23 further reinforces flexibility as a core strength of the student population, though a subset still requires support.

It appears from the results that flexibility is a well-developed skill among the majority of respondents, consistent with research indicating that exposure to interdisciplinary learning environments fosters adaptability and perspective-shifting [10]. However, the 9.40% subset of learners who may not have developed the same capacity for flexibility may possibly be due to exposure to more structured, convergent thinking environments, such as those found in STEM disciplines. In these settings, students are often guided toward single correct answers, which may limit their ability to engage in divergent thinking and shift perspectives effectively [11]. This gap in flexibility development implies that educational approaches may need to be more tailored in disciplines that emphasize precision and methodical problem-solving [10, 11].

The ability to approach problems from multiple angles is a critical component of divergent thinking, allowing students to make connections between seemingly unrelated ideas. However, the smaller group of students in the "Poor to Fair" range underscores the need for more targeted instructional strategies. As noted by Siswono (2009) and Vidal (2008), while flexibility is essential for creative problem-solving, it can be underdeveloped in students who are not exposed to diverse problem contexts [11, 13].

Still, the overall mean score for flexibility across all respondents was 3.23, further reinforcing flexibility as a core strength of the students. However, the need for targeted interventions remains, particularly for those in the lower-performing group. Research indicates that flexibility can be nurtured through activities like group work, role-playing, and interdisciplinary tasks that encourage perspective-shifting [10].

Originality

Shown in Table 3 are the respondents' levels of originality.

Table 3. *Distribution of Respondents by Levels of Originality*

Originality Levels	n	%	M	SD
Proficient to Advance 2.52 – 4.00	58	24.79	2.97	0.63
Poor to Fair 1.00 – 2.51	176	75.21	2.22	0.22
Overall	*234*	*100*	*2.47*	*0.46*

Note. Description of overall rating is Developing

It is evident from the table that only 24.79% of the respondents scored in the "Proficient to Advance" range for originality, with a mean score of 2.97 and a standard deviation of 0.63. This means that less than a quarter of the students exhibit a strong capacity to generate unique, novel ideas, a key aspect of divergent thinking. The relatively high standard deviation within this group reflects variability in performance, with some students demonstrating significantly better originality than others. In contrast, 75.21% of the students fall into the "Poor to Fair" category, with a lower mean score of 2.22 and a smaller standard deviation of 0.22, indicating a more uniform struggle with generating original ideas. This large portion of students demonstrates a tendency to produce more conventional ideas, highlighting the need for targeted interventions to enhance originality.

With the data, it can be implied that most students are still developing their originality skills, which is likely due to the emphasis on structured and convergent thinking in many educational settings, but commonly in STEM. One possible explanation for the lower scores in originality could be tied to the inherent structure of STEM education, where students are often trained to arrive at specific, correct answers through convergent thinking, which limits their ability to generate unique ideas [1]. Specifically, it reveals that while some students excel at originality, the majority struggle to break away from traditional thought patterns [1, 4, 7].

As highlighted by Gundogan (2013), learners exposed to diverse stimuli tend to demonstrate higher levels of originality due to their engagement with open-ended tasks that foster creative exploration [4]. However, the small proportion of students scoring in the "Proficient to Advance" range suggests that many have not been exposed to such environments, or have not had sufficient opportunities to engage in tasks that encourage risk-taking and the generation of novel ideas, which aligns with the argument put forward by Baer and Kaufman (2008), who caution that originality, while highly prized, is not always practical or applicable to problem-solving situations [1]. The emphasis on precision and efficiency may have inadvertently suppressed creative risk-taking, which is necessary for the development of original thought [8]. In this context, students are more comfortable reproducing familiar ideas rather than exploring new, uncharted possibilities.

This tension between novelty and practicality is particularly relevant in educational settings that emphasize accuracy, precision, and problem-solving efficiency, such as STEM fields. The focus on correct answers and structured thinking in STEM may hampers the development of originality, as these environments do not typically prioritize the divergent thinking necessary for creative idea generation [1, 4, 7, 10]. Addressing such gap could involve adopting more interdisciplinary approaches that combine STEM with creative disciplines, offering students the opportunity to engage in tasks that balance both innovation and applicability [1, 4, 7].

Originality, which involves producing unique and rare responses, is often seen as the pinnacle of creative thinking [1, 4, 12]. Yet, the data shows that a significant majority of students are producing more conventional ideas, rather than novel ones.

Elaboration

In terms of elaboration, the distribution of respondents are shown in table 4.

Table 4. *Distribution of Respondents by Levels of Elaboration*

Elaboration Levels	n	%	M	SD
Proficient to Advance 2.52 – 4.00	68	29.06	3.17	0.10
Poor to Fair 1.00 – 2.51	166	70.94	1.81	0.06
Overall	*234*	*100*	*2.32*	*0.70*

Note. Description of overall rating is Developing

Results indicate that only 29.06% of students scored in the “Proficient to Advance” range for elaboration, with a mean score of 3.17. This demonstrates that less than one-third of respondents have a strong ability to add meaningful details and expand on their initial ideas. The low standard deviation in this group hints consistent performance among those proficient in elaboration. Meanwhile, 70.94% of the students fall within the “Poor to Fair” range, with a mean score of 1.81 and a small standard deviation of 0.06. This denotes that the majority of students struggle with elaboration, showing limited capacity to add depth or clarity to their ideas during problem-solving tasks.

As research postulate, learners who are capable of elaborate thinking exhibit higher levels of vivid visualizations and detailed conceptualizations, leading to more comprehensive and innovative problem-solving solutions [2, 9]. However, the high percentage (70.94%) of students falling into the “Poor to Fair” category indicates that many learners struggle to engage in the kind of deep, thoughtful elaboration necessary to transform initial concepts into well-developed solutions. This finding aligns more with Drapeau (2009), who warns that while elaboration is important, it can lead to over-complication if learners are not guided to focus on relevant details [3]. Nevertheless, Marzano (2001) also points out, elaboration can enhance problem-solving by encouraging students to consider additional details and layers of information, but this must be done without sacrificing the clarity and coherence of the solution [9].

The minimal variation in scores, as specified by the small standard deviation for this group (0.06), hints that these students face consistent challenges in elaborating on their ideas, possibly due to a lack of experience on activities that encourage deeper exploration of concepts. This could be stemming from the over-prioritization of precision, efficiency, and quick problem-solving over the detailed exploration [2, 9].

The data also aligns with previous research that emphasizes elaboration is often underdeveloped, particularly in educational settings that prioritize quick responses over in-depth exploration. More instructional focus on activities that promote detail-oriented thinking is needed to help students build stronger elaboration skills [2, 3].

SUMMARY OF THE FINDINGS

Overall Divergent Thinking Skills

Table 5 provides a comprehensive summary of students' overall divergent thinking skills.

Table 5. *Distribution of the Respondents' Overall Divergent Thinking Skills*

Levels of Divergence	n	%	M	SD
Proficient to Advance 2.52 – 4.00	195	83.33	3.44	0.10
Poor to Fair 1.00 – 2.51	39	16.67	1.66	0.06
Overall	*234*	*100*	*2.72*	*0.71*

Note. Description of overall rating is Proficient

Indicators for Divergent Thinking		Mean	Description
1	Fluency	2.86	Proficient
2	Flexibility	3.23	Proficient
3	Originality	2.47	Developing
4	Elaboration	2.32	Developing

It shows an 83.33% scoring in the "Proficient to Advance" range and an overall mean score of 3.44. This indicates that most students are proficient in generating diverse ideas and adapting their thinking across different contexts.

However, 16.67% of the students fell into the "Poor to Fair" category, implying that a smaller but notable portion of learners struggles with creative problem-solving. The overall mean for divergent thinking is 2.72, with proficiency observed particularly in fluency (M = 2.86) and flexibility (M = 3.23), while originality (M = 2.47) and elaboration (M = 2.32) are still developing.

Although students are generally proficient in divergent thinking, there is room for improvement, especially in originality and elaboration. These skills, which involve generating unique ideas and adding meaningful details, need further attention. To address these gaps, educators should focus on fostering creativity through risk-taking and experimental learning opportunities, such as open-ended projects or peer critiques. By promoting activities that encourage originality and elaboration, students can develop more depth and novelty in their creative outputs, contributing to a more balanced and robust approach to creative thinking.

CONCLUSION

The study reveals that while students demonstrate proficiency in key components of divergent thinking such as fluency and flexibility, there are notable gaps in originality and elaboration. A significant portion of the students (83.33%) are proficient overall, indicating that most are capable of generating ideas and adapting their thinking to different contexts. However, a smaller but meaningful group (16.67%) struggles with divergent thinking, particularly in producing unique ideas and expanding on initial concepts. The overall proficiency in fluency and flexibility highlights the students' ability to generate and adapt ideas, but the developing levels in originality and elaboration suggest a need for targeted educational interventions to further nurture these creative skills.

RECOMMENDATIONS

Based on the findings of this study, several recommendations can be made to improve the development of divergent thinking skills, particularly in the areas of **fluency**, **flexibility**, **originality**, and **elaboration**. These recommendations focus on educational interventions, particularly within STEM fields, to ensure that students not only develop practical problem-solving skills but also foster creativity and innovation.

i. **Integrate Open-Ended Tasks.** Encourage open-ended and inquiry-based learning in curricula to boost fluency by allowing students to explore multiple solutions, especially in STEM, where single-correct answers are often emphasized.
ii. **Adopt Interdisciplinary Learning.** Use interdisciplinary approaches that combine STEM with the arts and humanities to enhance flexibility and originality, enabling students to connect concepts across fields and solve problems creatively.
iii. **Encourage Risk-Taking.** Create environments that foster creative risk-taking by valuing innovation alongside accuracy, especially in STEM, where originality can be stifled by a focus on correct answers.
iv. **Focus on Elaboration.** Promote elaboration by designing tasks that require students to add depth and detail to their ideas, particularly in STEM fields, where quick problem-solving often limits this skill.
v. **Professional Development for Educators**. Provide training for teachers, especially in STEM, to integrate creativity and divergent thinking into their teaching, helping them balance precision with creativity.
vi. **Further Research in STEM.** Conduct research on how to adapt STEM curricula to support creativity and divergent thinking without compromising technical rigor, exploring best practices for fostering originality.
vii. **Promote Collaborative Learning.** Encourage group projects and reflective learning to expose students to different perspectives and improve their flexibility and elaboration skills through peer interaction and self-assessment.

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