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Role of Fantasy for Developing Divergent Thinking in Students: A Systematic Literature Review and Meta-Analysis

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Abstract

Recent pedagogical approaches increasingly emphasize meaningful learning and creativity over rote memorization. Fantasy literature is hypothesized to positively influence divergent thinking because it immerses readers in imaginative narratives that stimulate cognitive flexibility by encouraging the exploration of alternative possibilities and creative problem-solving. The review aimed to estimate the effectiveness of fantasy in the context of teaching-learning to promote the divergent thinking of learners. The study was reported under Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A systematic search was conducted across PubMed, ERIC, Google Scholar, and Scopus to identify documents. A total of 38 studies were initially identified, from which, after rigorous screening and eligibility checking, 8 studies were included in the analysis. The meta-analysis employed a random-effects model, with the Fisher r-to-z transformed correlation coefficients, yielding a significant positive effect size (μ^=0.742, 95% CI: 0.367 to 1.117, z=3.88, p<0.001) indicating the effectiveness of fantasy in enhancing divergent thinking. However, significant heterogeneity was observed (τ^2=0.2776, I^2=96.72%, Q (7) =381.543, p<0.001), with a 95% prediction interval ranging from −0.3570 to 1.8404. The synthesis of results shows a medium effect size for the impact of fantasy literature on divergent thinking, with the average effect being statistically significant. The findings suggest that integrating fantasy literature into education can effectively foster divergent thinking in students, enhancing their creativity and problem-solving abilities.

Keywords: Divergent Thinking, Fantasy, Fantasy Literature, Meta-Analysis, PRISMA, Systematic Literature Review

1. Introduction

In contemporary education, innovative pedagogies are increasingly being embraced to shift away from rote memorization and instead foster critical thinking, creativity, and lifelong learning among students. The role of fantasy in education has expanded over recent decades, influenced by pedagogical shifts that recognize the value of imagination and creativity in promoting deep, meaningful learning across various subject areas and educational contexts (Roppola & Whitington, 2014). Fostering imagination is particularly crucial in preparing learners for success in a rapidly changing, complex world. Fantasy, defined as the capacity to imagine the improbable or impossible, that stretches the imagination, opens up new possibilities, and helps individuals envision overcoming challenges or achieving otherwise unattainable goals (Schwartzman, 2016). As a literary and cognitive genre, fantasy encourages boundless creativity and engages students in the exploration of abstract themes such as morality, power, and identity, often through magical or supernatural elements (Lien, 2022; Dall'Olio et al., 2023). Fantasy involves the imaginative exploration of scenarios that defy real-world constraints, allowing individuals to envision challenges, triumphs, and creative possibilities that may not be attainable in everyday life. This process stretches cognitive boundaries and fosters novel idea generation (Smith & Mathur, 2009). Fantasy literature continues to be utilized in educational settings to promote literacy, critical thinking, and imagination among students. Additionally, fantasy fuels our imagination, allowing us to explore worlds beyond the constraints of reality (Dall'Olio et al., 2023). In a variety of entertainment media, fantasy continues to be a popular genre (Abdukhalikova & Akramovna, 2023). Popular series like "Harry Potter," "Game of Thrones," and "The Lord of the Rings" have captured the attention of viewers all around the world, proving the timeless value of magical narrative.

The significance of fantasy lies in its entertainment value and its multifaceted contribution to mental, emotional, and social development (Seja & Russ, 1999; Eliphase, 2019). It serves as a very effective tool for understanding ourselves, others, and the world around us, offering both entertainment and profound insights into the human experience (Liebers & Straub, 2020). The importance of fantasy in our lives lies in its multifaceted impact on our mental, emotional, and social well-being (Seja & Russ, 1999). Furthermore, the influence of fantasy extends to technological advancements, with innovations inspired by fictional concepts. For example, virtual reality and augmented reality technologies draw inspiration from depictions of immersive digital worlds in fantasy literature and media. The fantasy genre has spawned inventive storytelling techniques, ground-breaking visual effects, and immersive multimedia experiences that captivate audiences and redefine traditional narratives and genres. In an era characterized by rapid technological advancements, socio-political upheavals, and existential anxieties, fantasy provides a sanctuary where audiences can immerse themselves in alternate realities, mythical realms, and epic adventures.

The connection between fantasy and divergent thinking lies in their shared emphasis on imagination and creativity. Fantasy can stimulate divergent thinking by encouraging individuals to explore alternative realities, question assumptions, and generate new ideas. Similarly, divergent thinking can enhance fantasy by providing the mental flexibility to explore various imaginative possibilities and envision unconventional solutions. Fantasy can stimulate divergent thinking by fostering imaginative exploration that enables individuals to optimize their creative processes (Russ & Schafer, 2006). Fantasy, as a cognitive and imaginative construct, has a huge probability for promoting divergent thinking, an essential component of creativity that involves generating multiple and novel ideas in response to open-ended tasks (Eliphase, 2019). Vygotsky's socio-cultural theory emphasizes that imaginative activity lays the foundation for higher-order cognitive functions, including creative and divergent thinking (Kincheloe, 2006). Fantasy allows individuals to transcend the constraints of reality, creating space for novel idea generation and exploration of "what if" scenarios (Parker & Lepper, 1992).

This study is both timely and relevant as it seeks to illuminate the largely untapped potential of fantasy in enhancing divergent thinking. The existing limitations in the literature underscore the need for a systematic review and meta-analysis to consolidate existing findings and offer a clearer, more comprehensive understanding of the role fantasy plays in fostering divergent thinking. This rigorous approach will also identify gaps in existing research, propose future directions, and guide evidence-based educational practices. This study aims to bridge theory and practice by highlighting how fantasy can be meaningfully integrated into teaching strategies to foster divergent thinking. The study also contributes to a deeper, more nuanced understanding of fantasy's educational value and offers actionable insights for educators, policymakers, and researchers aiming to cultivate creative, flexible, and forward-thinking learners.

2. Objectives of the Study

The main purpose of the study was to identify, collect, and summarize available empirical evidence to provide a comprehensive understanding of the role of fantasy in developing students' divergent thinking. The meta-analysis intends to address the following four defined objectives:

1. To analyze the existing body of evidence on the role of fantasy in fostering divergent thinking in students.
2. To determine the individual effect sizes of studies examining the relationship between fantasy-based interventions and divergent thinking in students.
3. To determine the effect size of fantasy-based interventions on divergent thinking through meta-analysis.
4. To determine the effect of fantasy on the development of divergent thinking of students.

3. Methodology

Meta-analysis is a synthesis process that makes it possible to properly and efficiently collect the results of multiple studies and obtain the conclusions (Tsagris & Fragkos, 2018). The study was reported under the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses" (PRISMA) guidelines (Page et al., 2021). PRISMA guideline-2020 has been widely accepted and endorsed in the academic community to facilitate accurate reporting in systematic reviews (Page & Moher, 2017). It serves as a standardized method that provides transparency to the full process behind the study, making this review replicable.

3.1. Eligibility Criteria

The eligibility criteria were defined in relation to the objectives of the "systematic literature review and meta-analysis". In order to achieve the objectives of the study, a very systematic and clear selection criterion was determined to select the most relevant studies.

3.1.1. Inclusion Criteria

A comprehensive and well-defined set of inclusion and exclusion criteria was defined to include studies in the analysis.

1. The article must be in English or have an English version available. Only empirical studies (quantitative, qualitative, or mixed methods) with contain empirical data will be included.
2. The publications must have included sufficient empirical data to estimate the effect sizes.
3. Articles were only included if they addressed the role of fantasy on divergent thinking or creative thinking of students.
4. The article must be a published academic journal article (not a book chapter or review article). Grey literature (e.g., theses, reports, or unpublished dissertations) may be considered if they meet quality standards.
5. Due to the limited availability of studies on this variable, no limitations on publication years were applied to ensure a comprehensive inclusion of relevant articles in the present study.
6. Full-text availability was a mandatory criterion for including studies in the present review.

3.1.2. Exclusion Criteria

To identify relevant papers for the study, the researcher defined the following exclusion criteria. We excluded papers from the review that met any of the following:1. Study published other than English will be excluded.2. Publications without access to full text were excluded.3. Studies with incomplete data or unavailable outcomes will be excluded.4. Studies with a high risk of bias or significant methodological flaws will be excluded.5. Non-empirical research (e.g., theoretical articles, literature reviews, opinion pieces) excluded.6. Studies that did not address the role of fantasy or its impact on divergent thinking were excluded.7. Studies that were not peer-reviewed were excluded.

3.2. Information Sources

PubMed, ERIC, Google Scholar, and Scopus databases were searched using the keywords "Fantasy" AND "Divergent thinking" to find the research included in the meta-analysis. The first advance searches on Scopus were conducted by refining the inclusion and exclusion criteria mentioned on May 1st, 2024, and identified 16 articles. The Scopus database was last searched on 25th May 2024, and no more articles were found. The researcher simultaneously conducted an advanced search in Google Scholar by refining inclusion and exclusion criteria on 5th May 2024 and identified 6 articles. The studies used a comprehensive literature search of the PubMed, ERIC online databases using "Fantasy" AND "Divergent thinking" search terms on 29th April 2024 and identified 6, and 10 articles, respectively. We also conducted a snowball search or meta-search to identify additional studies by searching the reference lists of publications eligible for full-text review.

3.3. Search Strategy

The Scopus, ERIC, Google Scholar, and PubMed were searched systematically to identify relevant and eligible documents that best fit to achieve of this study's objectives. The Scopus database was searched by following advanced query: TITLE-ABS-KEY ("fantasy" AND "divergent thinking") AND (LIMIT-TO (SUBJAREA , "PSYC") OR LIMIT-TO (SUBJAREA , "ARTS") OR LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "MATH")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (LANGUAGE , "English")).In addition, Boolean operators ("AND," "OR") were used to combine the keywords. There is no sophisticated search engine in every database that allows users to access studies. So, a systematic search was conducted in ERIC, Google Scholar, and PubMed manually by the controlled keywords "Fantasy" AND "Divergent Thinking". The references for the studies included were also searched manually.

3.4. Selection Process

Study selection is the most critical step involved in a systematic literature review and meta-analysis (Farooq et al. 2018; Moher et al. 2009; Salam et al. 2017). The selection process of the primary study in the review, through four stages guided by Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA), namely: (1) identification, (2) screening, (3) eligibility, and (4) inclusion, is shown in Figure 1. Considering the guidelines of Moher et al. (2009) we developed a thorough selection process, which encompassed the following three steps: (1) screening of the titles of all retrieved articles based on aforementioned inclusion criteria; (2) abstracts review and screening of initially selected articles for eligibility; (3) Full-text review for final inclusion, by assessing their suitability and alignment with our research objectives.

Initially, a total of 38 articles were identified from the databases (i.e., Google Scholar, ERIC, PubMed, and Scopus). The three researchers critically checked the datasheet to remove 17 duplicate records. Twenty-one articles remained after duplicate studies were eliminated from the CSV Excel datasheet. Then, the researchers independently screened and reviewed the titles

and abstracts of all the remaining articles, and only 14 articles were retained for full-text review. After a thorough review and screening of the full text of all 14 articles, only 8 articles were qualified for final inclusion (Figure 1).

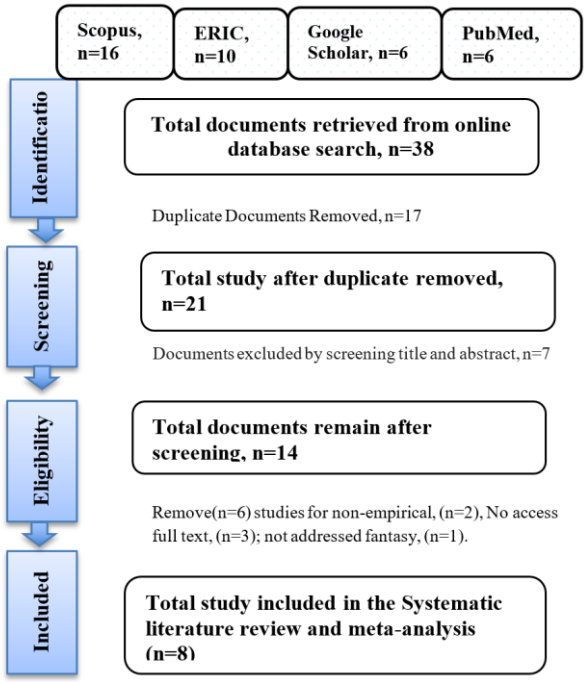

Figure 1: PRISMA[1] 2020 Flow Diagram

3.5. Data Collection Process

After an advanced literature search in Scopus, ERIC, PubMed, and Google Scholar, bibliometric metadata were exported into separate CSV files. After that, the researcher compiled all the data sheets into a single Excel file. The data were exported from all the studies that have passed the quality assessment criteria. Then, the researchers check the eligibility of each one of the documents by manual screening for final selection. The researcher accesses the full text of each of the selected articles to avail empirical data.

3.6. Publication Bias Analyses

When research with significant findings has a higher chance of being published than research with null findings, this is known as publication bias. This can lead to overestimated effects and suggest the existence of nonexistent effects. The review employed funnel plot analysis to identify publication bias or heterogeneity in standard errors of included studies in a meta-analysis through a visual examination of the funnel plot.

3.7. Study Risk of Bias Assessment

The assessment of 'risk of bias', known as quality assessment or critical appraisal, was a crucial step in our review process. To evaluate the internal validity of the included quasi-experimental and observational studies, we employed the ROBINS-I (Risk of Bias in Non-Randomized Studies – of Interventions) tool, which is designed specifically for assessing non-randomized studies. This tool evaluates the risk of bias across seven domains: bias in the selection of participants, classification of interventions, deviations from intended interventions, missing data, measurement of outcomes, selection of the reported result, and bias due to confounding. Each domain was rated as low risk, moderate risk, serious risk, critical risk of bias, or no information. Two reviewers independently assessed the risk of bias in each included study.

3.8. Estimation of Effect Sizes

The random effects model was selected to estimate the overall effect size of the primary studies due to the heterogeneous nature of the included studies.

4. Results

The Fisher r-to-z transformed correlation coefficient was employed as the outcome measure in the meta-analysis. A random effects model was best fitted in the study due to the heterogeneous nature of the data. The amount of heterogeneity (i.e., tau^2), was calculated using the restricted maximum likelihood estimator(Viechtbauer, 2005) as shown in Table 1. In addition to the estimate of tau^2, the Q-test for heterogeneity (Cochran, 1954) and the I^2 statistic is reported. In case any amount of heterogeneity is found (i.e., $tau^2 > 0$, irrespective of the results of the Q-test), a prediction interval for the true outcomes is also provided.

Table 1. Heterogeneity Statistics

Tau	Tau²	I²	H²	R²	df	Q	p
0.527	0.2776(SE= 0.1564)	96.72%	30.458	.	7.000	381.543	< .001

In the framework of the model, studies are examined for potential outliers and/or influence using Cook's distances and studentized residuals. Using a Bonferroni correction with two-sided alpha = 0.05 for the k studies in the 'meta-analysis', studies are deemed probable outliers if their studentized residual is greater than the 100 x (1 - 0.05/ (2 X k) th percentile of a typical normal distribution. Influential studies are those whose Cook's distance is more than the median plus six times the interquartile range of the Cook's distances. To assess for funnel plot asymmetry, two methods are used: the rank correlation test and the regression test, which uses the standard error of the observed results as predictors.

Table 2. Correlation Coefficients (r, N)[2]

Random-Effects Model (k = 8)

	Estimate	se	Z	p	CI Lower Bound	CI Upper Bound
Intercept	0.742	0.191	3.88	< .001	0.367	1.117

A total of k=8 studies were included in the meta-analysis based on the inclusion criteria. Observed Fisher r-to-z transformed correlation coefficients were positive (100%), with values ranging from 0.0902 to 1.5890. The random effect model calculated average Fisher r-to-z transformed correlation coefficient was \hat{\mu} = 0.7417 (95% CI: 0.3668 to 1.1166). Consequently, there was a significant difference between the average result and zero (z = 3.8774, p < 0.0001). The true outcome seems to be heterogeneous according to the Q-test (Q (7) = 381.5435, p < 0.0001, tau² = 0.2776, I² = 96.7168%) as shown in Table 1. The true results have a 95% prediction interval of -0.3570 to 1.8404. Therefore, even if the average result has been estimated to be positive, the actual result in certain studies may be negative. No proof was found of outliers in the context of this model, as an analysis of the studentized residuals showed that none of the studies had a value greater than ± 2.7344. As per Cook's distances, none of the research was determined to have a significant impact. There was no evidence of funnel plot asymmetry in either the regression test or the rank correlation (p = 0.4275 and p = 0.9008, respectively) outcome proved it.

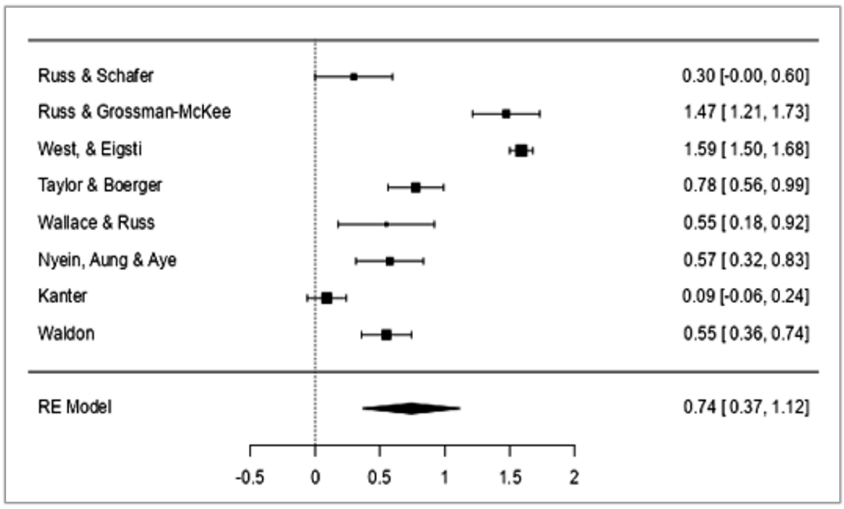

Figure 2: Forest Plot for Visualizing Effect Size

The forest plot presents the results of each study and the overall combined effect in a meta-analysis. Each horizontal line represents a single study, with the square at its canter indicating the study's effect size and the square's size reflecting the study's weight in the analysis. Longer lines show wider confidence intervals, signifying less precise results, often due to smaller sample sizes. The vertical line in the middle represents the "line of no effect," where results crossing this line are not statistically significant. At the bottom of the plot, the diamond shape represents the overall pooled effect size, with its canter indicating the combined effect and its width reflecting the confidence interval. In this plot, the diamond does not cross the line of no effect, suggesting that the overall effect is statistically significant. However, the variability in the positions of individual studies, with some far from the pooled effect, indicates possible heterogeneity among the studies. So, the forest plot shows a statistically significant overall effect based on the pooled data.

Table 3. Publication Bias Assessment[3]

Test Name	value	p
Fail-Safe N	1746.000	< .001
Begg and Mazumdar Rank Correlation	0.036	0.901
Egger's Regression	-0.793	0.428
Trim and Fill Number of Studies	1.000	.

The results of the publication bias assessment indicate that the findings of the meta-analysis are robust and not significantly affected by bias. The Fail-Safe N analysis indicated the number of additional studies with null results (no effect) that would

need to be added to the analysis to make the overall effect size non-significant. A very high Fail-Safe N (e.g., 1746) suggests the results are robust, as it would take an extremely large number of unpublished null studies to overturn the findings. The p-value < .001 confirms the robustness of the effect. This implies no major concern about publication bias. The Begg and Mazumdar Rank Correlation Test shows a very small correlation value (0.036) with a non-significant p-value (0.901), indicating no evidence of a relationship between study size and effect size, and therefore no indication of bias, as shown in Table 3. Similarly, the Egger's Regression Test, which examines funnel plot asymmetry, provides a regression coefficient of -0.793 with a p-value of 0.428. This result is also not significant, further supporting the absence of 'publication bias'. Finally, the 'Trim and Fill' analysis estimates that only one study might be missing to correct potential asymmetry in the funnel plot, which is negligible and does not meaningfully affect the results, as shown in Table 3.

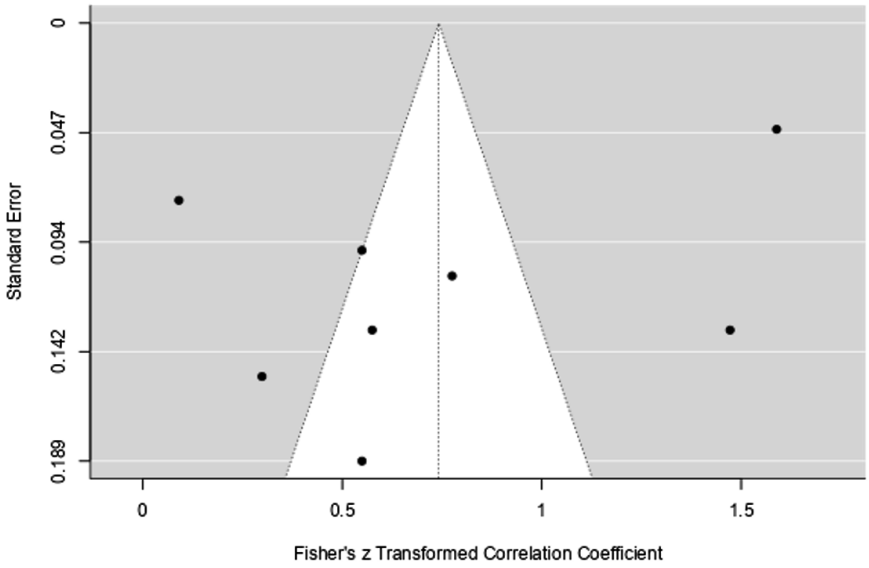

Figure 3. **Funnel Plot Analysis to Identify Publication Bias**

In a well-balanced meta-analysis without bias, the points (representing studies) should be symmetrically distributed around the central vertical line (the overall effect size). Figure 3 shows that the plot appears slightly asymmetrical, with more points on one side, suggesting a potential publication bias or heterogeneity among the studies. Smaller studies (lower precision, further from the top) show more variation and scatter widely. Larger studies (higher precision, near the top) cluster more tightly around the effect size. The white triangle represents the expected range of study results if there were no bias. This funnel plot indicates possible asymmetry, which might point to publication bias or differences in study quality or methodology.

5. Discussion

The systematic review and meta-analysis examined the role of fantasy in fostering divergent thinking in students, with the aim of synthesizing existing evidence and providing insights into the effectiveness of fantasy-based interventions. A total of 8 studies were included in the meta-analysis, with a combined participant pool of over 1,000 students. The findings suggest that fantasy-based approaches in education generally have a moderate to large positive effect on divergent thinking, as indicated by the 'overall effect size' of 0.7417 (95% CI: 0.3668 to 1.1166). This result provides strong evidence that engaging students in fantasy-based tasks or learning environments can indeed foster creativity, imagination, and divergent thinking. The significant positive effect size, combined with the robust statistical methods employed, supports the notion that fantasy can be a valuable tool in enhancing students' cognitive flexibility and problem-solving abilities. However, the heterogeneity of the studies is an important factor to consider. The high I^2 value (96.72%) indicates that the studies included in the meta-analysis exhibit considerable variability in their effect sizes. This suggests that while the overall trend is positive, the strength of the effect may vary based on specific factors, such as the type of fantasy-based intervention, the age or developmental stage of the students, and the educational context. These factors are likely to moderate the effectiveness of fantasy in fostering divergent thinking, which is supported by the range of observed Fisher r-to-z transformed correlation coefficients (from 0.0902 to 1.5890). Therefore, while the pooled effect size is positive, it is essential to recognize that the true impact may differ across different educational settings. The assessment of publication bias provides reassurance that the results are not influenced by selective reporting or other biases. The high 'Fail-Safe N' value (1746), along with non-significant results from the "Begg and Mazumdar Rank Correlation" and "Egger's Regression Test", indicates that publication bias has no significant impact on the results. These tests provide confidence in the robustness of the results, although the slight asymmetry observed in the funnel plot could indicate potential heterogeneity or differences in study quality, rather than an outright bias.

There are a number of limitations on this study, even with these promising results. The inclusion of only eight studies limits the generalizability of the findings. Furthermore, the meta-analysis revealed a high degree of heterogeneity (I^2 = 96.72%), indicating substantial variability among the included studies. Furthermore, the included studies' quality differed, with some

exhibiting a higher risk of bias as a result of methodological flaws. The findings of this study have significant significance for educational practice, policy, and future research despite these limitations.

6. Conclusion

This meta-analysis provides strong evidence that fantasy-based interventions can effectively promote divergent thinking in students. While the overall effect is positive and statistically significant, the presence of substantial heterogeneity across studies suggests that further research is needed. This will help refine educational practices and optimize the use of fantasy as a pedagogical tool.

Moreover, the findings underscore the importance of integrating creative and imaginative approaches, such as fantasy, into mainstream educational curricula. Educators and policymakers should recognize the value of fantasy not only for enhancing creativity but also for promoting cognitive flexibility and problem-solving skills. By fostering environments that support imaginative engagement, schools can contribute to the holistic development of learners and better prepare them for the challenges of the 21st century.

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Endnotes

[1] "Preferred Reporting Items for Systematic Reviews and Meta-Analyses" (PRISMA) was used as the process of study selection.

[2] Tau² Estimator: Restricted Maximum-Likelihood

[3] Fail-safe N Calculation Using the Rosenthal Approach