p-ISSN: 2184-044X e-ISSN: 2184-1489 ISBN: 978-989-35106-3-6 © 2023
https://doi.org/10.36315/2023v1end138

REVIEWING THE LITERATURE ON THE INTERPLAY OF CREATIVITY AND CRITICAL THINKING IN EDUCATION

Maria Gkouzioni, Eirini Kleidara, Zafiria-Sabrina Shehu, Panagiota Koulouri, & Lefkothea-Vasiliki Andreou
Department of Biological Applications and Technology, University of Ioannina (Greece)

Abstract

The significance of creativity in education is very well established in both research and literature. At the same time, a strong interest has emerged in exploring critical thinking and its role in educational settings. Importantly, recent literature has suggested a relationship between these two factors. To this end, we ran Google Scholar searches employing combinations of the keywords “creativity”, "critical thinking" and “education”. The co-occurrence of creativity and education or critical thinking and education in the title of publications returned about 4,270 and 2,010 results respectively. Notably, all three keywords yielded 64 publications. The latter involved mostly case studies, followed by good practices, empirical studies, primary research, theoretical advances, and secondary research. The focus is evenly distributed between teachers and learners. Furthermore, in terms of the learner-focused studies, these mostly concern higher education contexts. A rise is also observed in the interest of the combined examination of creativity and critical thinking in education, with an upward trend of publications in the last decade. Moreover, this body of literature primarily involves the consideration of creativity and critical thinking in a variety of educational scenarios and less the investigation of their interaction. Further tapping on the issue reveals an association between these factors and a possible impact of gender. Nevertheless, this interplay appears rather complex, also affected by several educational elements, such as personal and interpersonal stances, but also technological and methodological goals. Our findings indicate that even though creativity and critical thinking are widely considered as essential 21st century skills, their interaction in education is somewhat understudied in the literature.

Keywords: *Creativity, critical thinking, education, teaching and learning.*

1. Introduction

Cognitive neuroscience research of creativity has provided insights for its application in education (Zhou, 2018). However, those insights have not still found their way into the classroom practices (Fischer, Goswami & Geake, 2010). Similarly, several methods and conceptions of teaching appear to inhibit critical thinking in the classroom, even though critical thinking is regarded as a crucial skill for the education of individuals (Pithers & Soden, 2010). Even more so, there seems to be a gap in literature regarding the relationship between creativity and critical thinking in educational settings (Vincent-Lancrin et al., 2019; Shubina, Kwiatek & Kulakli, 2021). Therefore, the present study aims to identify the implementation of this interaction through the investigation of the relevant educational literature and to clarify whether scientific interest on the topic has increased over recent years.

2. Methods

A literature search was conducted, in December 2022, in incognito mode so as not to bias search results by personal browsing preferences. The following databases were used: Google Scholar, Scopus, ERIC and IEEEXplore. A total of 3 constructs was used, one for each round respectively, “creativity AND education” (namely, Construct1; C1), “critical thinking AND education” (namely, C2), and “creativity AND “critical thinking” AND education” (namely, C3), and search was restricted to document title. All results were considered, without any further limitations, also concerning publication year.

Selection criteria were established for the further analysis of the publications returned from the literature search round employing construct C3. Those involved including publications reported in the English language, that are accessible online and include of course all three keywords in the title, while duplicates were removed.

Results were inspected in terms of criteria being met, by three of the researchers and scrutinized by a fourth author.

3. Results

Numerical search results for each literature search round and for each database are depicted in Table 1. The great majority of publications derives from the Google Scholar database with Scopus, ERIC, and IEEE*Xplore* following. These results consist mostly of case studies, followed by good practices, empirical studies, and theoretical advances. Focus is distributed evenly between teachers and learners and the learner-focused studies concern mostly the higher education.

Subsequently, the focus of analysis was shifted to the combined C3 results across databases. The application of the selection criteria yielded a number of 26 publications which are listed on Table 2. Information on these publications is organized and presented in Table 2, in terms of publication year, type of study (i.e., theoretical, empirical), study focus (i.e., teachers, learners or both) and educational level (i.e., secondary, tertiary, or not defined/applicable). There is a substantial number of case studies in this body of work. This oeuvre is divided to empirical studies and theoretical advances with empirical studies constituting a marginal majority. Furthermore, the empirical studies comprise mostly qualitative as opposed to quantitative studies. As far as content is concerned, most publications involve the implementation of creativity and/or critical thinking in education and less the interplay of these factors in the educational setting. Some interesting findings include the following observations. First, creativity and critical thinking are inextricably linked to the engagement with social affairs (Rennie, 2022). The two competencies share a two-way relationship (Njonge, 2022) and should be symbiotically integrated in the educational process (Berry, 2022; Shubina & Kulakli, 2019). Students should engage in activities promoting creativity and critical thinking from an early age, for these to be instilled and available to students when they reach higher educational levels (Njonge, 2022). Moreover, as far as the educational process is concerned, creative and critical thinking implementation does not only refer to students or teachers but to both. Implementation of these factors leads to more versatile teaching (Luka & Dukku, 2017) and to students acquiring a more inclusive perception of subjects (Nganga, 2019).

Finally, there seems to be a radical increase of publications in the domain since 2019, suggesting an upward trend in the field. More specifically, literature search results span across the time period of 2011-2022. Importantly, 69% of results were published after 2019 and 58% of results were published after 2020 onwards.

Table 1. Literature search results across databases and constructs used in this study.

Constructs / Databases	C1	C2	C3
Google Scholar	4,270	2,010	64
Scopus	1,123	657	6
ERIC	442	334	4
IEEE*Xplore*	41	12	0

Table 2. C3 results combined across databases.

ID	In-line Citation	Year	Type	Focus On	Level
1	(Adeleye, 2018)	2018	Theoretical study	T & L	School setting
2	(Agbowuro & Keswet, 2016)	2016	Theoretical study	T	n/a
3	(Berry, 2022)	2022	Theoretical study	T	n/a
4	(Chaim, 2016)	2016	Empirical study	T	n/a
5	(Cooper, Carpendale, Mansfield & Marangio, 2021)	2021	Empirical study	T	n/a
6	(Hahn, 2022)	2022	Empirical study	L	Tertiary Education
7	(Hebebci & Usta, 2022)	2022	Empirical study	L	Secondary Education
8	(Lau, 2021)	2021	Empirical study	T | L	n/a | Secondary Education
9	(Leest & Wolbers, 2020)	2020	Empirical study	L	Tertiary Education

10	(Luka & Dukku, 2017)	2017	Theoretical study	T	n/a
11	(McPartland, 2020)	2020	n/a	n/a	n/a
12	(Montana-Hoyos & Leimatre, 2011)	2011	Theoretical & Empirical	L	Tertiary Education
13	(Nganga, 2019)	2019	Empirical study	T	n/a
14	(Njonge, 2022)	2022	Theoretical & Empirical	L	Secondary Education
15	(Okereke & Oladeji, 2020)	2020	Empirical study	L	Tertiary Education
16	(Olanibi, 2019)	2019	Theoretical study	T	n/a
17	(Pepe, 2018)	2018	Empirical study	L	Tertiary Education
18	(Powell, 2021)	2021	Theoretical study	T | L	n/a | School setting
19	(Rennie, 2022)	2022	Theoretical study	L	School setting
20	(Shafat, 2020)	2020	Theoretical study	L	Tertiary Education
21	(Shubina & Kulakli, 2019)	2019	Theoretical & Empirical	L	Tertiary Education
22	(Shubina, Kwiatek & Kulakli, 2021)	2021	Empirical study	L	Tertiary Education
23	(Siri, Del Puente, Martini & Bragazzi, 2017)	2017	Empirical study	T | L	n/a | Tertiary Education
24	(Trolian, 2018)	2018	Theoretical study	L	Tertiary Education
25	(Utama, Sudirman, Widyasari, Savitri & Morika, 2022)	2022	Theoretical & Empirical	L	Tertiary Education
26	(Vincent-Lancrin, 2022)	2022	Theoretical study	T	n/a

** "T" refers to Teachers and "L" to Learners*

4. Discussion

Further tapping on the interplay of creativity and critical thinking reveals an association between these factors and a possible impact of gender (Shubina, Kwiatek & Kulakli, 2021; Shubina & Kulakli, 2019). Nevertheless, this interplay appears rather complex, also affected by several educational elements, such as personal and interpersonal stances, but also technological and methodological goals (Shubina & Kulakli, 2019).

Our findings here indicate: (1) interest in the topic has recently attracted attention with most publications originating from 2019 onwards, (2) the literature focus is on higher education and (3) even though creativity and critical thinking are widely considered as essential 21st century skills (Hebebci & Usta, 2022), their interaction in education is somewhat understudied and merits further investigation (Berry, 2022; Shubina, Kwiatek & Kulakli, 2021).

References

Adeleye, J. O. (2018). Implications of critical thinking, creativity and information technology on education. *KIU Journal of Social Sciences*, *4*(3), 75-81. Retrieved from https://www.ijhumas.com/ojs/index.php/kiujoss/article/view/365

Agbowuro, C., & Keswet, L. A. M. (2016). Critical thinking and creativity in science and technology education for sustainable development. *International Journal of Innovative Research and Advanced Studies (IJIRAS)*, *3*(12), 73-78. Retrieved from https://www.ijiras.com/2016/Vol_3-Issue_12/paper_17.pdf

Berry, A. (2022). Final commentary: Education in the 21st century: STEM, creativity and critical thinking. In A. Berry, C. Buntting, D. Corrigan, R. Gunstone & A. Jones (Eds.), *Education in the 21st Century, STEM, Creativity and Critical Thinking* (pp. 177-191). New York, NY: Springer Cham.

Chaim, O. C. (2016). *Developing competences through individual assessments in an Engineering Education context: creativity and critical thinking* [Master's thesis, University of São Paulo]. Retrieved from https://www.teses.usp.br/teses/disponiveis/18/18157/tde-17012017-105102/en.php

Cooper, R., Carpendale, J., Mansfield, J., & Marangio, K. (2021, June). *Creativity and critical thinking in secondary science pre-service teacher education.* Paper presented at the Australasian Science Education Research Association Annual Conference 2021, Adelaide, South Australia, Australia. Abstract retrieved from https://asera.org.au/ASERA%2052-Conference%20program.pdf

Fischer, K. W., Goswami, U., Geake, J., & The Task Force on the Future of Educational Neuroscience. (2010). The Future of Educational Neuroscience. *Mind, Brain, and Education*, *4*(2), 68-80. Retrieved from https://onlinelibrary.wiley.com/doi/10.1111/j.1751-228X.2010.01086.x

Forawi, S. A. (2016). Standard-based science education and critical thinking. *Thinking Skills and Creativity, 20*, 52-62. doi: 10.1016/j.tsc.2016.02.005

Hahn, S. (2022). *Critical thinking or critical creativity: applying De Bono's six thinking hats to speech-language pathology education and practice* [Master's thesis, University of Louisville]. doi:10.18297/etd/3870

Hebebci, M. T., & Usta, E. (2022). The effects of integrated STEM education practices on problem solving skills, scientific creativity, and critical thinking dispositions. *Participatory Educational Research, 9*(6), 358-379. Retrieved from https://doi.org/10.17275/per.22.143.9.6

Lau, C. Y. (2021). A Visual Culture Art Education (VCAE) model for promoting creativity and critical thinking skills in senior art education in Hong Kong. *Australian Art Education*, *42*(2), 166-183. Retrieved from https://search.informit.org/doi/10.3316/informit.528965753485358

Leest, B., & Wolbers, M. H. J. (2020). Critical thinking, creativity and study results as predictors of selection for and successful completion of excellence programmes in Dutch higher education institutions. *European Journal of Higher Education*, *11*(1), 29-43. doi: 10.1080/21568235.2020.1850310

Luka, E. P., & Dukku, M. G. (2017). The use of critical thinking and creativity in teacher education in Nigeria. *Journal of Educational Foundations*, *7*. Retrieved from https://www.ajol.info/index.php/jef/article/view/169264

McPartland, T. J. (2020). Education and the process of inquiry: Community, creativity, and critical thinking. *Method: Journal of Lonergan Studies*, *11*(1), 37-57. Retrieved from https://doi.org/10.5840/method20201114

Montana-Hoyos, C., & Lemaitre, F. (2011). Systems thinking, disciplinarity and critical thinking in relation to creativity within contemporary arts and design education. *Studies in Learning, Evaluation, Innovation and Development*, *8*(2), 12-25. Retrieved from https://www.academia.edu/14318131/_2011_Systems_thinking_disciplinarity_and_critical_thinking_in_relation_to_creativity_within_contemporary_arts_and_design_education

Nganga, L. (2019). Preservice teachers' perceptions and preparedness to teach for global mindedness and social justice using collaboration, critical thinking, creativity and communication (4cs). *Journal of Social Studies Research*, *10*(4), 26-57. Retrieved from https://jsser.org/index.php/jsser/article/view/1262

Njonge, T. W. (2022). Situating critical thinking and creativity as enablers of value-based education among secondary school students in Kenya. *Journal of Education and Learning*, *1*(1), 1-12. doi:10.51317/jel.v4i1.44

Okereke, E. C., & Oladeji, A. D. (2020). Perceived influence of social media usage on creativity and critical thinking skills of business education students in colleges of education in southwest Nigeria. *Journal of the Business of Education*, *3*(1), 138-144. Retrieved from https://www.kwasujtbe.com.ng/index.php/JTBEKWASU/article/view/51

Olanibi, S. A. (2019). Fostering critical thinking and creativity in education using folktale as a teaching strategy in Yoruba traditional early childhood education. *FUDMA Journal of Educational Foundations*, *1*(2), 37-44. http://journal.fudutsinma.edu.ng/index.php/fujef/article/view/1144

Pepe, O. (2018). The impact of the creativity levels of the students who study at the school of physical education and sport on their critical thinking dispositions. *World Journal of Education*, *8*(5), 185-191. doi:10.5430/wje.v8n5p185

Pithers, R. T., & Soden, R. (2010). Critical thinking in education: a review. *Educational Research*, *42*(3), 237-249. Retrieved from https://www.tandfonline.com/doi/abs/10.1080/001318800440579

Powell, E. (2021). Innovative instructional methods integrating 21st-Century competencies in mathematics education: Communication, collaboration, critical thinking, creativity. In H. Dhir (Ed.), *Handbook of Research on Barriers for Teaching 21st-Century Competencies and the Impact of Digitalization* (pp. 234-252). Hershey, PA: IGI Global. Retrieved from https://doi.org/10.4018/978-1-7998-6967-2.ch013

Rennie, L. J. (2022). Stimulating creativity and critical thinking in integrated STEM education: The contribution of out-of-school activities. In A. Berry, C. Buntting, D. Corrigan, R. Gunstone & A. Jones (Eds.), *Education in the 21st Century, STEM, Creativity and Critical Thinking* (pp. 99-117). New York, NY: Springer Cham.

Shafat, G. (2020). Critical thinking and creativity in engineering education. *Afeka Journal of Engineering and Science*, *2*, 73-78. Retrieved from https://www.afeka.ac.il/media/1600505/%D7%90%D7%A4%D7%A7%D7%942%D7%90%D7%A0%D7%92%D7%9C%D7%99%D7%AA-%D7%90%D7%99%D7%994.pdf#page=73

Shubina, I., & Kulakli, A. (2019). Critical thinking, creativity and gender differences for knowledge generation in education. *Literacy Information and Computer Education Journal*, *10*(1), 3086-3093. doi: 10.20533/licej.2040.2589.2019.0405

Shubina, I., Kwiatek, P., & Kulakli, A. (2021). The relationships between critical thinking and creativity among university students in contemporary education: Empirical analysis of gender differences. *The New Educational Review*, *65*, 87-98. doi: 10.15804/tner.2021.65.3.07

Siri, A., Del Puente, G., Martini, M., & Bragazzi, N. L. (2017). Ethnopsychiatry fosters creativity and the adoption of critical and reflexive thinking in higher education students: insights from a qualitative analysis of a preliminary pilot experience at the Faculty of Medicine and Surgery, University of Genoa, Italy. *Advances in Medical Education and Practice*, *2*(8), 321-324. doi: 10.2147/AMEP.S114473

Trolian, 2018) Trolian, T. L. (2018). The neuroscience of learning and development: Enhancing creativity, compassion, critical thinking, and peace in higher education ed. by Marilee J. Bresciani Ludvik (review). *Journal of College Student Development*, *59*(6), 779-782. doi: 10.1353/csd.2018.0075

Utama, I. D., Sudirman, I. D., Widyasari, R. K., Savitri, M. A., & Morika, D. (2022). Assessing critical thinking skills and creativity skills of higher education students by using ASSURE models. *Journal of Higher Education Theory and Practice*, *22*(1), 54-65. Retrieved from https://www.proquest.com/openview/d1f2fe9768a4191c01418d2a871cdda4/1?pqorigsite=gscholar&cbl=766331

Uzunöz, F. S., & Demirhan, G. (2017). The effect of creative drama on critical thinking in preservice physical education teachers. *Thinking Skills and Creativity*, *24*, 164-174. doi: 10.1016/j.tsc.2017.02.018

Vincent-Lancrin, S. (2022). Fostering students' creativity and critical thinking in science education. In A. Berry, C. Buntting, D. Corrigan, R. Gunstone & A. Jones (Eds.), *Education in the 21st Century, STEM, Creativity and Critical Thinking* (pp. 29-47). New York, NY: Springer Cham.

Vincent-Lancrin, S., González-Sancho, C., Bouckaert, M., de Luca, F., Fernández-Barrerra, M., Jacotin, G., Urgel, J., & Vidal, Q. (2019). *Fostering students' creativity and critical thinking: What it means in school*. [OECD Publishing]. doi: 10.1787/62212c37-en

Zhou, K. (2018). What cognitive neuroscience tells us about creativity education: A literature review. *Global Education Review*, *5*(1), 20-34. Retrieved from https://ger.mercy.edu/index.php/ger/article/view/367