

## Fostering post-secondary vocational students' critical thinking through multi-level tasks in learning environments

**Zhanar Sabyrovna Bekbayeva** <sup>a1</sup>, Department of Vocational Education at Saken Seifullin Kazakh Agrotechnical University, prospekt Zhenis 62, Nur-Sultan, 010011, Kazakhstan, <https://orcid.org/0000-0002-6070-4195>

**Temir Tlekovich Galiyev** <sup>b</sup>, Department of Vocational Education at Saken Seifullin Kazakh Agrotechnical University, prospekt Zhenis 62, Nur-Sultan, 010011, Kazakhstan, <https://orcid.org/0000-0003-2680-0738>

**Nazymgul Albytova** <sup>c</sup>, Department of Social Pedagogics and Self-knowledge at L.N. Gumilyov Eurasian National University, Satpayeva 2, Nur-Sultan, 010000, Kazakhstan, <https://orcid.org/0000-0003-0931-4420>

**Zhazira Meirhanovna Zhazykbayeva** <sup>d</sup>, Department of Agrarian Technique and Technology at Saken Seifullin Kazakh Agrotechnical University, prospekt Zhenis 62, Nur-Sultan, 010011, Kazakhstan, <https://orcid.org/0000-0002-9626-7775>

Assem Bolatbekovna Mussatayeva <sup>e</sup>, L.N. Gumilyov Eurasian National University, Satpayeva 2, Nur-Sultan, 010000, Kazakhstan, [a.b.mussatayeva@gmail.com](mailto:a.b.mussatayeva@gmail.com), <https://orcid.org/0000-0002-2522-943X>

### Suggested Citation:

Bekbayeva, Z. S., Galiyev, T. T., Albytova, N., Zhazykbayeva, Z. M., Mussatayeva, A. B. (2021). Fostering vocational students' critical thinking through multi-level tasks. *World Journal on Educational Technology: Current Issues*. 13(3), 397-406. <https://doi.org/10.18844/wjet.v13i3.5948>

Received from March 31, 2021; revised from May 15, 2021; accepted from July 15, 2021;

Selection and peer review under responsibility of Prof. Dr. Servet Bayram, Yeditepe University, Turkey.

©2021 Birlesik Dunya Yenilik Arastırma ve Yayıncılık Merkezi. All rights reserved.

### Abstract

In today's labour market, being competitive requires, in addition to technical skills, several twenty-first-century career competencies, including the capacity to think critically. Although the literature on teaching methods designed for enhancing students' reflective thinking abounds, the contribution of special tasks with varying complexity to learners' critical thinking capacity, to our knowledge, has not been earlier investigated. Hence, the present investigation sought to investigate the effect of multi-level critical thinking activities introduced into classes on the critical thinking level of post-secondary vocational students. This cross-sectional study employed the Starkey Critical Thinking Test adapted for the Russian-speaking population in order to measure critical thinking level in a sample (n = 218) of vocational students. Results showed that among students whose classes were complemented by critical thinking tasks, almost half of subjects with low and test scores eventually shifted to a medium scoring cohort. Eleven learners who were medium scorers at the beginning gained high-level results at the end point. Meanwhile, only a small percentage of those no-treatment participants with initially low performance on the critical thinking test eventually moved into the medium level, as well as from the latter into a high achievement category. The independent two-tailed t-test revealed a significant difference between posttest scores observed in control and intervention groups. It can be therefore suggested that critical analysis of thought-provoking materials with subsequent class presentation and discussion can provide catalytic conditions for developing learners' reflective thinking abilities. It was recommended that future studies using similar intervention should involve a larger sample and deal with qualitative data to extend the research and increase its validity.

**Keywords:** Education; higher-order thinking; reflective thinking; vocational students.

\* ADDRESS FOR CORRESPONDENCE: Zhanar Bekbayeva, Department of Vocational Education at Saken Seifullin Kazakh Agrotechnical University, prospekt Zhenis 62, Nur-Sultan, 010011, Kazakhstan  
E-mail address: [bekbayeva@inbox.ru](mailto:bekbayeva@inbox.ru) / Tel.: +7-708-951-2045

## 1. Introduction

### 1.1. Background

In the current era of increasing information flow, learners who wish to succeed in the job market must be able to navigate the plethora of resources, being conscious of which information is useful, unnecessary or misleading. They should be able to find the data they need, prioritise and organise it, distinguishing facts from opinions, recognizing alternative facts and misinformation, and countering them argumentatively. Moreover, a major challenge for students in the 21st century is to acquire the capacity to think critically. This assumedly means being able to achieve judgment after the alternatives have been scrutinized, respecting the arguments and evidence available (Vieira & Tenreiro-Vieira, 2016). In other words, to think critically means to grasp information, examine it rigorously, subject it to scepticism, compare it with opposing views and with what is already known about the topic, and only then take a stance on the matter. Critical thinkers also must possess capabilities to examine new ideas from multiple perspectives, make judgements about the credibility and value of information, and assess the relevance of new information to their needs (Flores et al., 2012; Loes & Pascarella, 2017).

Despite academic literature exuberates with scholars' attempt to define what critical thinking is (Cáceres et al., 2020; Dekker, 2020; Heidary, 2020; Nurhakim et al., 2021), a clear understanding of this term has still been muddled. Because of that, uncertainty surrounds the concept and purport of critical thinking and it is almost invariably looked at in an intuitive way. Moore (2013) scrutinised a plethora of works that address the notion of critical thinking and interviewed academics from a variety of disciplines. Eventually, seven ways to see critical thinking were inferred: as a form of self-reflexiveness, as the making of judgements, as a skeptical view of knowledge, as the building up of knowledge, as a careful reading of text, as a form of rationality, and as an activist engagement with knowledge. It appears inevitable to deal with such a multifaceted concept.

In today's labour market, being competitive requires, in addition to technical skills, several twenty-first-century career competencies (for a review of the 21st-century skills, see van Laar et al., 2020), among them the capacity to track skills and values relevant to the current job market, as well as the ability to reflect on what opportunities a particular job offers and make appropriate career decisions (Meijers et al., 2017; Darling-Hammond et al., 2020). Obviously, such competencies call for critical thinking. Meanwhile, some studies claim students nowadays show quite low critical thinking levels (Deechai et al., 2019; Palavan, 2020). Education institutions thus need to shape learning environments conducive to the cultivation of those vital skills, including critical thinking. Unfortunately, even in such advanced countries as Sweden, vocational education is reportedly often centred on labour skills required to execute certain tasks in a workplace, although positive shifts have been observed in that area (Rönnlund et al., 2019).

Among techniques that educators have employed in order to develop students' critical thinking are blogging (Lee, 2011), simulation (Eyikara & Baykara, 2017), case-study learning (Straková & Cimermanová, 2018), and flipped classrooms (Yavuz & Ozdemir, 2019). In particular, the use of problem-based learning has recently been reported to improve several critical thinking skills of vocational students significantly ( $p < 0.001$ ) relative to their counterparts taking a standard vocational course (Suarniati et al., 2019). The authors attribute this to experimentally applied learning activities directed towards the building of students' analytical and communicational capacities.

Nevertheless, the scientific literature provides some sobering evidence. El Soufi and Sea (2019) conducted a systematic review of nearly two thousand studies describing the impact of sundry methods (like brainstorming techniques or self-evaluation) supposed to foster critical thinking skills of higher education students learning English as a foreign language. The authors examined the quality of the papers

through the Sieve tool with a scale from zero to five, where a higher value means a higher quality of research. Even though almost all included studies reported positive experimental outcomes, none of them received more than two points due to various deficiencies in their design. The authors, therefore, came to the conclusion that it was impossible to confidently assert the effectiveness of any of the experimentally assessed methods for developing critical thinking among English language learners in higher education.

### *1.2. The importance of the research*

Although the literature on teaching methods designed for enhancing students' reflective thinking abounds, the contribution of special tasks with varying complexity to learners' critical thinking capacity, to our knowledge, has not been earlier investigated. The present study could thus improve our understanding of whether classroom activities may be conducive to the improvement of students' critical thinking capabilities, adding to the existing body of literature about the subject.

### *1.3. The purpose of the research*

Hence, this cross-sectional study sought to determine whether significant differences in critical thinking existed between students whose classes were complemented by critical thinking activities and those exposed to a non-remodelled course.

## **2. Methods**

### *2.1. Sample and procedure*

This experimental quantitative research took place over the period between September 2018 and May 2020. The participants (n = 218) were voluntarily involved female and male students of several technical and vocational education and training programmes at the Saken Seifullin Kazakh Agrotechnical University in Kazakhstan. The span of the participants' age was between 17 and 19. The subjects were selected according to available sampling. There were a control group (n = 110) with no interference in the educational course and an intervention group (n = 108) that was given multi-level tasks (Figure 1) supposed to engage students in higher-order thinking through the critical analysis of popular science articles proposed by a teacher (the research team member) with subsequent class presentation and discussion. An example of a critical-thinking task can be seen in Appendix. In the 2018/2019 academic year two classroom hours per week were allocated to reading, analysing and discussing the instructional materials, whereas in the 2019/2020 academic year one classroom hour per week was devoted to the experimental activities. Ultimately, a total of 90 classroom hours were assigned to the intervention. The students predominantly worked in groups with a teacher guiding and facilitating the process by leading discussions on topics, giving question prompts, and so forth. Due to the COVID-19 pandemic, critical thinking activities were carried out remotely through the Platonus platform starting from March 2020.

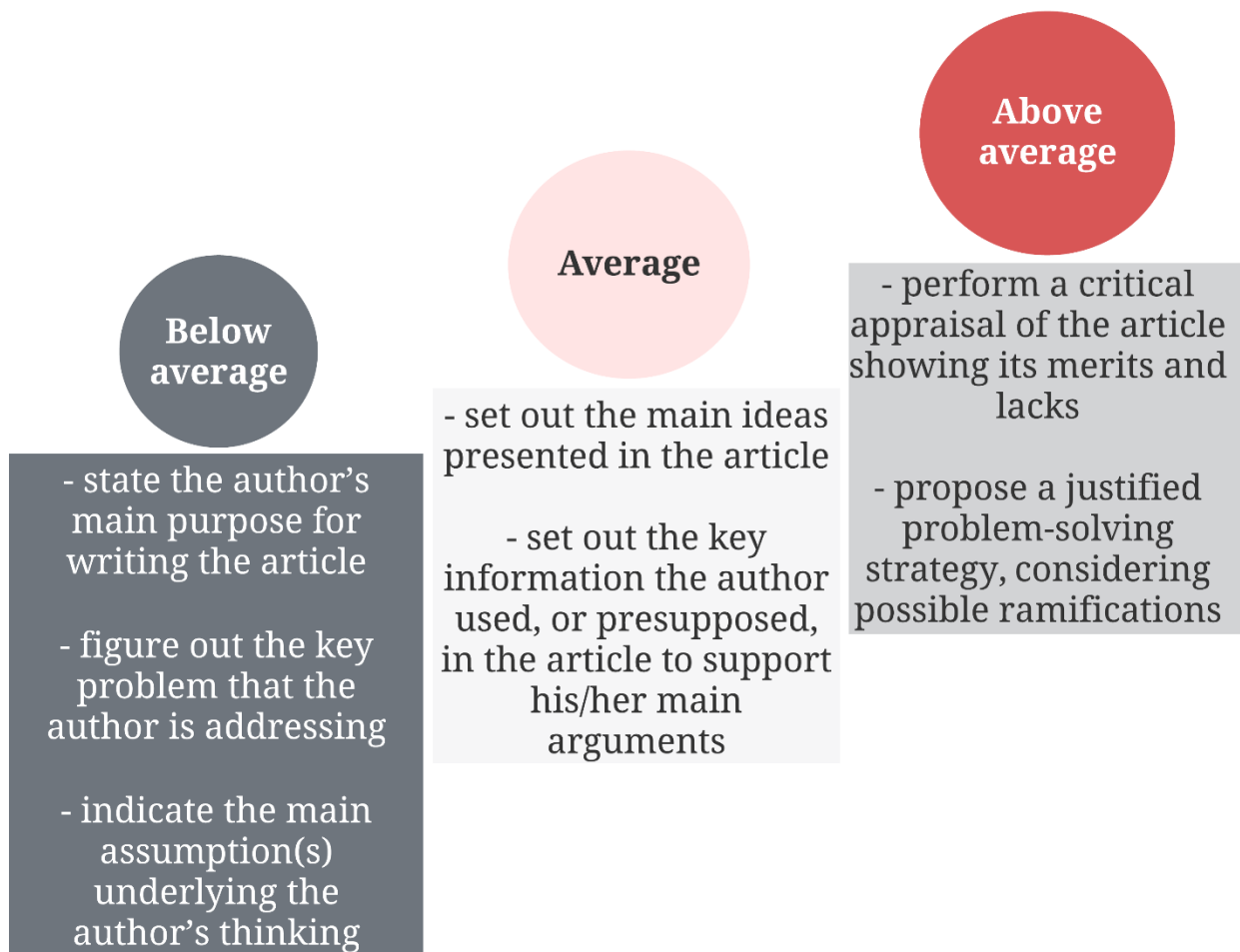


Figure 1. The gradation of complexity of tasks used to develop vocational students' critical thinking

## 2.2. Data collection and analysis

To examine whether there was any effect of the intervention on the students' critical thinking, the Starkey Critical Thinking Test adapted for Russian-speaking individuals from its original English version was given to both groups as pretest and posttest. The adapted test is reduced from thirty to twenty-seven four-option questions which are formulated more concisely as compared to the original test. Moreover, there is a 30-minute time limit in the adapted version. The author reported the test-retest reliability of 0.74 ( $P < 0.001$ ), Ferguson's discrimination index of 0.97, Cronbach's alpha of 0.71, and the item difficulty between 0.28 and 0.85 with a mean of 0.54 (Lutsenko, 2014). The text in the original language can be consulted, for example, in a paper by Husna (2019).

The study protocol was approved by the ethics committee at the Saken Seifullin Kazakh Agrotechnical University (approval number 1437-RM). Besides, all the individuals provided informed consent to be involved in the experiment.

Between-group differences were analysed through an unpaired two-tailed t-test at a 0.05 level of significance encompassing residual diagnostics checking for a possible violation of the normality

assumption. No violations were detected. The procedures were performed by means of GraphPad Prism 9 for Windows (GraphPad Software, San Diego, California, USA).

### 3. Results

As depicted in Figure 2, the critical thinking pretest found no significant difference between the experimental group and the comparison one ( $t(216)=0.357$ ,  $p=0.722$ ). Neither very low-level scores (less than 7) were obtained from pretest or posttest, nor were those designated as of very high level (more than 25).

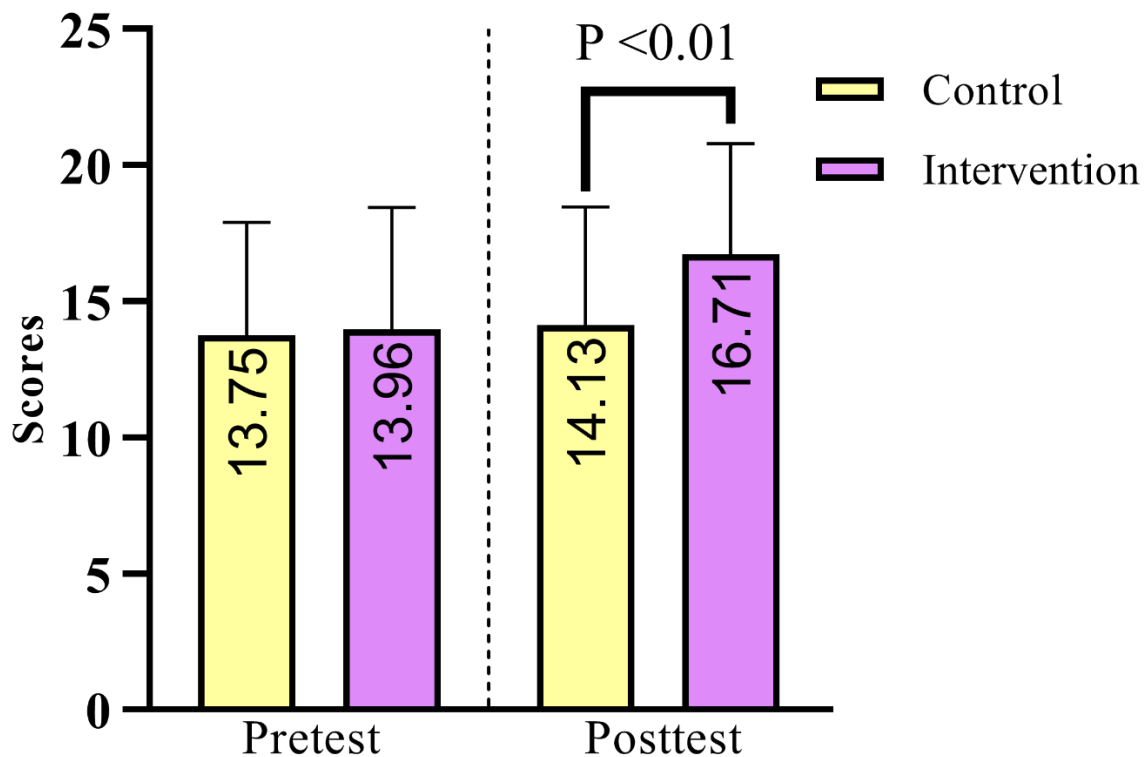


Figure 2. Results of the Starkey Critical Thinking Test among vocational students presented as means and their standard deviations

Figure 3 provides an itemized overview of the transitions in students' critical thinking performance from one level to another across the experiment. Thus, it can be seen that in the control group only a small percentage of participants with initially low (7-10 scores) performance on the critical thinking test eventually moved into the medium level (11-20 scores), as well as from the latter into a high achievement category (21-25 scores).

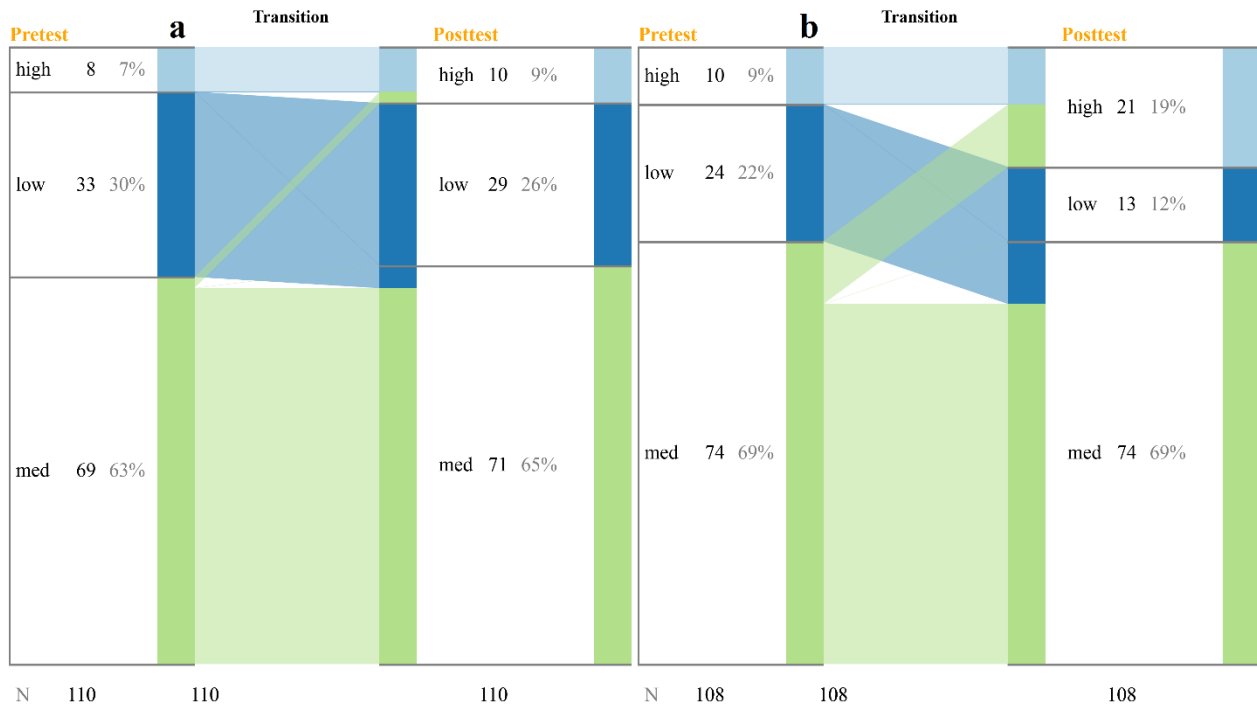


Figure 3. The transitions of vocational students' performance on the Starkey Critical Thinking Test between pretest and posttest phases in the control group (a) and the intervention group (b)

Meanwhile, almost half of individuals in the experimental group with low test scores shifted to a medium scoring cohort upon completion of the intervention. Furthermore, eleven students who were medium scorers at the beginning of the research ultimately gained high-level results. As is evident from Figure 2, there was a significant difference between posttest results in control and intervention groups ( $t(216)=4.530, p=0.000$ ).

#### 4. Discussion and conclusion

Critical thinking has been around for 2,500 years and it draws its source from the philosophical trend promoting standards of thought anchored to the ideas of ancient thinkers (Socrates, Plato, and Aristotle) and their medieval and modern followers (Fahim & Masouleh, 2012). Despite there is no unitary definition for critical thinking, it is generally considered the ability to assess the reasoning and identify fallacious arguments (Song, 2016). Some academics extend the concept of critical thinking beyond the traditional emphasis on judicious evaluation of relevant statements, advocating that critical thinking also requires non-cognitive skills, including a proclivity for such systemic intellectual operations (Shaw et al., 2020). Furthermore, Bishara (2021) describes critical thinking as the ability to evaluate an intellectual product.

As already noted above, the impact of the use of multi-level tasks on learners' critical thinking capacity has not received considerable attention in the literature, so our findings filled this gap and can be put into practice. The findings could be combined with those of Hashemi and Ghanizadeh (2012), who claimed a beneficial influence of critical discourse analysis of journalistic materials with follow-up presentations made by post-secondary students on their reflective thinking skills.

The results obtained from the present study might have implications for institutions planning to apply analysis and reflections on sundry thought-provoking texts along with spoken interactions to cultivate learners' critical thinking abilities. With regard to the aspect of cooperation, a structural equation modelling analysis (Lu et al., 2021) proved that, inter alia, students' peer interactions had a direct impact on college students' higher-order thinking skills. Nonetheless, interpreting results of her study involving undergraduate students in computer-mediated communication via blogging and face-to-face interaction modalities, Lee (2011) judged that asynchronous communication emerged to be favourable for improving participants' critical thinking abilities due to the provision of more time to reflect on their ideas.

New Zealand scientists conducted a study on undergraduate students enrolled in a management course that included critical analysis and communication performed through small group tutorials along with class lecture/workshops with follow-up semi-structured interviews that incorporated problem-solving tasks (Phillips & Bond, 2004). The authors characterized the outcome as disappointing, inferring the inadequacy of integrating critical thinking activities in education for generating that quality in line with employers' demands.

However, several empirical studies have concluded that honed critical thinking tends to benefit the academic achievement of learners, including college students (Hohmann & Grillo, 2014; D'Alessio et al., 2019). Having undertaken a longitudinal correlational research on nursing students, Pitt et al. (2015) came to illation that high-level critical thinking is a momentous contributory factor towards students' academic performance. The findings set out herein could therefore have practical implications for instructional programs aimed at better learners' academic outcomes by fostering their critical thinking.

It was argued that aside from refining their capability to fulfil reflective thinking operations and tasks, learners also should ideally have a propensity for executing the skills, and even more, they should be performed regardless of contexts, domains, and disciplines (Bunt & Gouws, 2020). That is particularly pertinent given that critical thinking is mentioned among generic competencies related to a wide context of professional development (Gamble, 2016). In the meantime, Spector and Ma (2019) hypothesize that this is only possible under conditions of goal-oriented behaviour and strong self-regulatory mechanisms. Hopefully, students' capacity to process information critically fostered through text analysis and discussion praxis might be translated for novel challenges and broaden real-life contexts beyond classroom activities. For instance, vocationally trained workers can transfer the approach of applying critical thinking into their professional activities and career. On the other hand, a link was revealed between critical thinking level and self-regulation (Ghanizadeh, 2011).

Although objectives and approaches existing in vocational education are different from those of tertiary education, some scholars believe in the prospects of building such models of teaching, which could ensure equipping students with both job skills and higher-order thinking skills (Ismail, 2013; Ismayati et al., 2020). The current study, in particular, may further inform curriculum development strategies and thereby contribute to the shift towards a learning model that enhances reflective thinking.

As for the limitations of this investigation, the main one is the lack of qualitative data gathered through interviews and alike. Besides, it deals with a relatively small sample recruited from one institution, so generalization of the findings is hardly applicable. Thus, future research is encouraged to address these shortcomings.

Overall, the results of the present study indicate that vocational students exposed to multi-level tasks aimed to propel the development of their critical thinking were found to outperform their counterparts engaged in conventional classes on the critical thinking outcome measure. This offers probabilistic evidence that critical analysis of various thought-provoking materials with subsequent class

presentation and discussion can provide catalytic conditions for developing learners' reflective thinking abilities.

## References

- Bishara, S. . (2021). The cultivation of self-directed learning in teaching mathematics. *World Journal on Educational Technology: Current Issues*, 13(1), 82–95. <https://doi.org/10.18844/wjet.v13i1.5401>
- Bunt, B., & Gouws, G. (2020). Using an artificial life simulation to enhance reflective critical thinking among student teachers. *Smart Learning Environments*, 7, 1-19. <https://doi.org/10.1186/s40561-020-00119-6>
- Cáceres, M., Nussbaum, M., & Ortiz, J. (2020). Integrating critical thinking into the classroom: A teacher's perspective. *Thinking Skills and Creativity*, 37, 1-18. <https://doi.org/10.1016/j.tsc.2020.100674>
- D'Alessio, F. A., Avolio, B. E., & Charles, V. (2019). Studying the impact of critical thinking on the academic performance of executive MBA students. *Thinking Skills and Creativity*, 31, 275-283. <https://doi.org/10.1016/j.tsc.2019.02.002>
- Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, 24(2), 97-140. <https://doi.org/10.1080/10888691.2018.1537791>
- Deechai, W., Sovajassatakul, T., & Petsangsri, S. (2019). The need for blended learning development to enhance the critical thinking of Thai vocational students. *Mediterranean Journal of Social Sciences*, 10(1), 131-140. <https://doi.org/10.2478/mjss-2019-0013>
- Dekker, T. J. (2020). Teaching critical thinking through engagement with multiplicity. *Thinking Skills and Creativity*, 37, 1-9. <https://doi.org/10.1016/j.tsc.2020.100701>
- El Soufi, N., & See, B. H. (2019). Does explicit teaching of critical thinking improve critical thinking skills of English language learners in higher education? A critical review of causal evidence. *Studies in Educational Evaluation*, 60, 140-162. <https://doi.org/10.1016/j.stueduc.2018.12.006>
- Eyikara, E., & Baykara, Z. G. (2017). The importance of simulation in nursing education. *World Journal on Educational Technology: Current Issues*, 9(1), 02–07. <https://doi.org/10.18844/wjet.v9i1.543>
- Fahim, M., & Masouleh, N. S. (2012). Critical thinking in higher education: A pedagogical look. *Theory and Practice in Language Studies*, 2(7), 1370-1375. <https://doi.org/10.4304/tpls.2.7.1370-1375>
- Flores, K. L., Matkin, G. S., Burbach, M. E., Quinn, C. E., & Harding, H. (2012). Deficient critical thinking skills among college graduates: Implications for leadership. *Educational Philosophy and Theory*, 44(2), 212-230. <https://doi.org/10.1111/j.1469-5812.2010.00672.x>
- Gamble, J. (2016). From labour market to labour process: Finding a basis for curriculum in TVET. *International Journal of Training Research*, 14(3), 215-229. <https://doi.org/10.1080/14480220.2016.1254367>
- Ghanizadeh, A. (2011). An investigation into the relationship between self-regulation and critical thinking among Iranian EFL teachers. *Journal of Technology & Education*, 5(2), 117-124.
- Hashemi, M. R., & Ghanizadeh, A. (2012). Critical discourse analysis and critical thinking: An experimental study in an EFL context. *System*, 40(1), 37-47. <https://doi.org/10.1016/j.system.2012.01.009>
- Heidari, K. (2020). Critical thinking and EFL learners' performance on textually-explicit, textually-implicit, and script-based reading items. *Thinking Skills and Creativity*, 37, 1-8. <https://doi.org/10.1016/j.tsc.2020.100703>
- Hohmann, J. W., & Grillo, M. C. (2014). Using critical thinking rubrics to increase academic performance. *Journal of College Reading and Learning*, 45(1), 35-51. <https://doi.org/10.1080/10790195.2014.949551>



- Bekbayeva, Z. S., Galiyev, T. T., Albytova, N., Zhazykbayeva, Z. M., Mussatayeva, A. B. (2021). Fostering vocational students' critical thinking through multi-level tasks. *World Journal on Educational Technology: Current Issues*, 13(3), 397-406. <https://doi.org/10.18844/wjet.v13i3.5948>
- Husna, N. (2019). Developing Students' Critical Thinking through an Integrated Extensive Reading Program. *TEFLIN Journal*, 30(2), 212-230. URL: <http://journal.teflin.org/index.php/journal/article/view/727/0>
- Ismail, N. (2013). Defining vocational education and training for tertiary level education: Where does problem based learning fit in? - A literature review. *Proceedings from the 4th International Research Symposium on Problem-Based Learning*. Kuala Lumpur, Malaysia. URL: <https://www.semanticscholar.org/paper/Defining-Vocational-Education-and-Training-for-does-Ismail/59e67c795626743fd8ab30bf406f6538c42e6a30>
- Ismayati, E., Muslim, S., Kusumawati, N., Rahmadyanti, E., Hilmi, M., & Wrahatnolo, T. (2020). Critical study of research results about TVET and TEFA's role in social, economic, and education development in the country. *Journal of Education, Teaching and Learning*, 5(1), 106-113. URL: <https://journal.stkipingskawang.ac.id/index.php/JETL/article/view/1823>
- Lee, L. (2011). Blogging: Promoting learner autonomy and intercultural competence through study abroad. *Language Learning & Technology*, 15(3), 87-109. <http://dx.doi.org/10.125/44264>
- Loes, C. N., & Pascarella, E. T. (2017). Collaborative learning and critical thinking: Testing the link. *The Journal of Higher Education*, 88(5), 726-753. <https://doi.org/10.1080/00221546.2017.1291257>
- Lu, K., Yang, H. H., Shi, Y., & Wang, X. (2021). Examining the key influencing factors on college students' higher-order thinking skills in the smart classroom environment. *International Journal of Educational Technology in Higher Education*, 18(1), 1-13. <https://doi.org/10.1186/s41239-020-00238-7>
- Lutsenko, E. L. (2014) Adaptatsiya testa kriticheskogo myshleniya L. Starki [Adaptation of L. Starkey's critical thinking test]. *Visnik Kharkivs'kogo natsional'nogo universitetu imeni V. N. Karazina. Seriya: Psikhologiya*, 55, 65-70. (In Russian). URL: <http://dspace.univer.kharkov.ua/handle/123456789/9999>
- Meijers F., Lengelle R., Winters A., Kuijpers M. (2017) A dialogue worth having: Vocational competence, career identity and a learning environment for twenty-first century success at work. In: de Bruijn E., Billett S., Onstenk J. (eds) *Enhancing teaching and learning in the Dutch vocational education system. Professional and practice-based learning*, vol 18. Springer, Cham. [https://doi.org/10.1007/978-3-319-50734-7\\_7](https://doi.org/10.1007/978-3-319-50734-7_7)
- Milto, L., Sultanova, L., & Dubrovina, I. (2020). Fostering critical thinking skills among future teachers. *E-mentor*, 4(86), 13-21. <https://doi.org/10.15219/em86.1478>
- Moore, T. (2013). Critical thinking: Seven definitions in search of a concept. *Studies in Higher Education*, 38(4), 506-522. <https://doi.org/10.1080/03075079.2011.586995>
- Nurhakim, S., Sasmayunita, A. T., & Sri Wahyuni, S. S. (2021). Speaking students' improvement through critical thinking concepts and Youtube media. *Psychology and Education Journal*, 58(2), 9042-9049. <https://doi.org/10.17762/pae.v58i2.3593>
- Palavan, Ö. (2020). The effect of critical thinking education on the critical thinking skills and the critical thinking dispositions of preservice teachers. *Educational Research and Reviews*, 15(10), 606-627. <https://doi.org/10.5897/ERR2020.4035>
- Phillips, V., & Bond, C. (2004). Undergraduates' experiences of critical thinking. *Higher Education Research & Development*, 23(3), 277-294. <https://doi.org/10.1080/0729436042000235409>
- Pitt, V., Powis, D., Levett-Jones, T., & Hunter, S. (2015). The influence of critical thinking skills on performance and progression in a pre-registration nursing program. *Nurse Education Today*, 35(1), 125-131. <https://doi.org/10.1016/j.nedt.2014.08.006>
- Rönnlund, M., Ledman, K., Nylund, M., & Rosvall, P. Å. (2019). Life skills for 'real life': How critical thinking is contextualised across vocational programmes. *Educational Research*, 61(3), 302-318. <https://doi.org/10.1080/00131881.2019.1633942>
- Shaw, A., Liu, O. L., Gu, L., Kardonova, E., Chirikov, I., Li, G., ... & Loyalka, P. (2020). Thinking critically about critical thinking: validating the Russian HElighten® critical thinking assessment. *Studies in Higher Education*, 45(9), 1933-1948. <https://doi.org/10.1080/03075079.2019.1672640>

Bekbayeva, Z. S., Galiyev, T. T., Albytova, N., Zhazykbayeva, Z. M., Mussatayeva, A. B. (2021). Fostering vocational students' critical thinking through multi-level tasks. *World Journal on Educational Technology: Current Issues*, 13(3), 397-406. <https://doi.org/10.18844/wjet.v13i3.5948>

Song, X. (2016). 'Critical Thinking' and Pedagogical Implications for Higher Education. *East Asia*, 33(1), 25-40. <https://doi.org/10.1007/s12140-015-9250-6>

Spector, J. M., & Ma, S. (2019). Inquiry and critical thinking skills for the next generation: from artificial intelligence back to human intelligence. *Smart Learning Environments*, 6(1), 1-11. <https://doi.org/10.1186/s40561-019-0088-z>

Straková, Z., & Cimermanová, I. (2018). Critical thinking development — A necessary step in higher education transformation towards sustainability. *Sustainability*, 10(10), 3366. <https://doi.org/10.3390/su10103366>

Suarniati, N. W., Ardhana, I. W., Hidayah, N., & Handarini, D. M. (2019). The Difference between the effects of problem-based learning strategy and conventional strategy on vocational school students' critical thinking skills in civic education. *International Journal of Learning, Teaching and Educational Research*, 18(8), 155-167. <https://doi.org/10.26803/ijlter.18.8.10>

van Laar, E., van Deursen, A. J., van Dijk, J. A., & de Haan, J. (2020). Determinants of 21st-century skills and 21st-century digital skills for workers: A systematic literature review. *Sage Open*, 10(1), 1-14. <https://doi.org/10.1177/2158244019900176>

Vieira, R. M., & Tenreiro-Vieira, C. (2016). Fostering scientific literacy and critical thinking in elementary science education. *International Journal of Science and Mathematics Education*, 14(4), 659-680. <https://doi.org/10.1007/s10763-014-9605-2>

Yavuz, F., & Ozdemir, S. (2019). Flipped classroom approach in EFL context: Some associated factors. *World Journal on Educational Technology: Current Issues*, 11(4), 238-244. <https://doi.org/10.18844/wjet.v11i4.4296>

## Appendix

**Карточка – разноуровневых заданий 4.1**  
*Объект изучения: Воля человека и психология саморегуляции*

Уровень сложности	Задание	Балл	Методы, форма работы
Третий уровень (сложный)	Сформулируйте рекомендации по проблеме профилактики и преодоления стресса студенту вуза	90-100%	Модель, программа
Второй уровень (средний)	Определите факторы (положительные и отрицательные), влияющие на протекание стресса у человека	70-80%	Системный анализ
Первый уровень (легкий)	Определите причинно-следственные связи стресса (прямые, опосредованные, простые и сложные)	50-60%	Рыбный скелет

Appendix. An example of a task used by the research team to develop vocational students' critical thinking (in Russian)