

Developing critical thinking skills in higher education institutions

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Abstract

In the modern era, there exists a demand for qualified job candidates who possess the 21st century/transferrable/soft skills. One of the most required soft skills on the labour market is critical thinking, which implies such high cognitive skills as judgment, evidence, analysis, and argumentation. Critical thinking means thinking purposefully, and it can be developed through time. Developing critical thinking at universities became a very popular concern in recent years, because the tertiary education system prepares employees for the future labour market and employers are seeking those candidates who have different soft skills, such as critical thinking, problem-solving, resilience, communication and many other soft skills. The goal of the current study was to reveal whether the purposeful application of methods that develop critical thinking in the classroom is effective with regard to developing critical thinking skills in students. The experimental method was chosen for the research. Pre- and post-questionnaires were used in the experimental and control groups. 52 students from the strategic management course participated in the study. It was concluded that purposeful teaching with activities that develop critical thinking has a positive effect on developing critical thinking skills. The article can be useful for university administration representatives, such as program heads, deans and all those specialists who create university programs, courses, and curricula.

Keywords: critical thinking skills, soft skills, higher education

1. Introduction

Since the Enlightenment, critical thinking has been considered the main scientific innovation in the educational system. The promotion of critical thinking in higher education has been increasingly demanded by society in the 21st century. In recent years, the demand on soft skills has increased, and they have become needed not only to become successful in the job market but also to handle life challenges. In the modern world, employers are looking for job candidates who possess the so-called 21st century skills or soft skills (Amashukeli et al., 2017; Khabeishvili, 2022; Sá & Sepra, 2022). The higher education field and, precisely, the university system, should address this need, as it gives graduates the main skills and knowledge which are demanded for employment (Cornalli, 2018). The business community, scholars, and many international organisations such as the Organisation for Economic Cooperation and Development (OECD), the International Labour Organisation (ILO), and the World Bank share the recommendation to countries to increase the number of students with a tertiary education degree, as it ensures the population has relevant soft skills for employment and wellbeing of people. Future employees need hard and soft skills to become successful, solve problems, be flexible, and have persistence, resilience, and creativity (Cornalli, 2018).

Employers name the most crucial soft skills for the modern labour market: critical thinking, integrity, communication, courtesy, responsibility, social skills, positive attitude, professionalism, flexibility, teamwork, and work ethics, etc. Years ago, technical skills, also called hard skills, were first crucial for the workplace, but now soft skills are becoming more in demand and essential for career success (Robles, 2012). A recent survey conducted by the National Association of Colleges and Employers (NACE, 2023) about the competencies explored what employers prefer when hiring employees. The results showed that employers rated the need for critical thinking/problem-solving as the most needed skill for a career. Critical thinking is usually related to other skills

that are considered key in the 21st century; critical thinking is related to metacognition, motivation, and creativity (Bezanilla et al., 2019).

Moreover, in recent years, it has become a popular topic among scholars to study the development of concrete soft skills, such as critical thinking, at universities. Active learning has become quite a popular concern in the higher education field in recent years. Students show greater motivation, joy, interest and confidence in active learning classrooms. Therefore, the active learning method develops critical thinking in students. The concept of active learning was introduced in the 19th century, when student-oriented approaches became more prevalent than the traditional passive learning model (Dzaiy & Abdullah, 2024).

Critical thinking skills are among the priorities in education. They contribute to the state's global economic competitiveness. Critical thinking, as a mental process, is characterised by objectivity, perseverance, and involvement when a person faces a problem, an opposing opinion, or a disagreement. Critical thinking improvement is often classified as the most important goal of formal education, as the ability to think critically ensures success. Unfortunately, teaching critical thinking skills is sometimes only part of a higher education curriculum. This constitutes the central problem of the current research.

In Georgia, there is a gap in both the application of critical thinking skills and research on their development and efficiency. The current article aims at bridging this gap. The article describes the approaches to and methods of critical development of thinking skills. It aims to answer the questions about why the improvement of critical thinking is important for employers and future job candidates, and how critical thinking has become one of the most required soft skill on labor market nowadays. The data of the research tackles the crucial role of developing critical thinking and the importance of active learning in this process.

2. Literature review

In recent years, students' thinking skills have been widely discussed among psychologists and educators. Thinking skills are related to critical thinking, which has become crucial for the higher education field due to the increase in the volume of professional information that graduates need to apply in the workplace. Critical thinking requires higher-order thinking skills, such as the ability to apply critical evaluation and give evidence for their opinions. Critical thinking is valued as one of the important soft skills needed for everyday life and the modern workforce. According to Aston (2023), for example, analytical individuals who can think out of the box are highly valued on the job market.

Universities should educate graduates who possess critical thinking skills, who can question, analyse and interpret events, but also who are creative, open-minded, curious, innovative and act with academic ethics, demonstrating socially responsible behaviour. The German university approach of *Bildung* represents the idea that universities should raise human beings and not only job candidates for the modern job market. Many universities in Europe and America share this idea of *Bildung*. In this realm, developing critical thinking is very important, in particular, the Socratic questioning idea (Aston, 2023).

In the process of developing soft skills, including critical thinking, the role of teachers is essential. Teachers should help students learn to express their ideas, opinions, and raise their voice. They can use Socratic questioning method, as it can stimulate to pursue thoughts in many different fields, to explore complex ideas, to find the truth, to speak about some problematic issues. The Socratic questioning is very connected with critical thinking because the art of questioning is important for excellence of thought (Dzaiy & Abdullah, 2024).

Teachers can apply Socratic questioning for two reasons: firstly, to teach students distinguish what they know and what they do not know and secondly, to foster students' abilities to ask Socratic questions, so they can use Socratic tools in daily life (Fahim &

Masouleh, 2012). The critically thinking person is something like a critical consumer of information, they are driven to seek reasons and evidence. They must master certain skills of thought in order to think critically and question some ideologies. The skill to judge the credibility of some information has become very popular to deliver at colleges and universities, with developing critical thinking (Fahim & Masouleh, 2012).

Critical thinking is considered as reflective thinking, judging what to believe or not, critical thinking is a logical deciding on how to think, it is the process of using reasoning to discern what is true and what is false. Facione (1990) defines critical thinking as skills – interpretation, analysis, etc., and at the same time as a character. American Philosophical Association’s attempt to provide a definitive account of the concept is: ... a “purposeful, self-regulatory judgement which results in interpretation, analysis, evaluation and inference. ... CT [critical thinking] is a liberating force in education and a powerful resource in one’s personal and civic life... The ideal critical thinker is habitually inquisitive, well informed, trustful of reason, open-minded, flexible, fair-minded in evaluation ... [and] honest in facing personal biases (Facione, 1990, p.2).

Critical thinkers are open-minded, creative, analytical, communicative, intuitive, and flexible human thinkers. According to Giancarlo and Facione (2001), critical thinking implies a well-organized and self-directed cognitive process that leads to high quality thinking, which consists of evaluation, investigation, measurement and reformulation of thinking.

Kuhn and Dean (2004) describe the development of critical thinking as a progression from a child’s belief in a single truth, through the adolescent perspective that all views are equally valid, to the eventual realisation in maturity that rather than facts or opinions, knowledge consists of judgments, which require support in a framework of alternatives, evidence and argument.

Nieto and Saiz (2011) define critical thinking as a set of cognitive functions and dispositions of the highest order, different from more simple skills. Furthermore, active learning develops critical thinking by triggering cognitive processes. Critical thinking is the ability to think purposefully.

Some people are better at decision-making and at problem-solving than others, they are cleverer and have a high ability to think critically. They use their knowledge and intelligence to make more reasonable decisions than others. The most distinguished characteristics of the critical thinker are open-mindedness and skepticism. Having an open-minded position means to examine things from different critical perspectives, looking for positive and negative sides of certain issues (Fahim & Masouleh, 2012).

Critical pedagogy is focused on developing students’ critical consciousness. The goal of critical pedagogy is to improve critical thinking among students. Critical pedagogy implies to combine theory with practice. It is oriented on such relations between individuals, when critical thinking is a personal characteristic and is considered as an important soft skill. Moreover, critical thinking is developed within social interactions; social connections are very important in this regard (Fahim & Masouleh, 2012).

Of course, it is not enough only to teach critical thinking, if students do not want to use it appropriately. Critical thinking is also an attitude or disposition to want to think critically. Critical thinking is best developed when students think regarding different issues, rather than teaching it as an autonomous skill. Critical thinking needs a critical thinker to have both the ability to think critically and the disposition to search for truth, justice, and evidence. It is important to teach students critically, because if we do not teach them to have critical dispositions, we implicitly lead them to harmful, illogical, and emotional-only thinking (Fahim & Masouleh, 2012).

People are not born with well-developed critical thinking skills, they are developed through time. Humans have a natural disposition to follow authorities and not to question them. To develop critical thinking the following strategies are recommended: annotating – underlying key words, writing some comments, making questions in the margins, making notes, bracketing and

highlighting important parts of the text. The second method is previewing – it implies to have a preconception of what the text is about and how it is formatted. The third approach is contextualizing – when a person reads a text, it is critical to read it from his or her lens (Fahim & Masouleh, 2012).

Active learning became an increasingly popular concern in higher education field during last years. Students show greater motivation, joy, interest and confidence in active learning classrooms. The concept of active learning was introduced in the 19th century advocating for experimental, student-oriented approaches against the passive learning model (Dzaiy & Abdullah, 2024). Active learning gives students autonomy, encouraging them to take meaningful ownership of their education. When students verbally articulate explanations, justify solutions, make judgments, and evaluate arguments during active learning, they engage in the types of complex cognitive work that improves critical thinking skill (Dzaiy & Abdullah, 2024).

Active learning is defined as any teaching method that involves students actively in the learning process with different activities and focuses on developing their thinking abilities rather than them information from the teacher, which they passively memorize. The active learning approach develops critical thinking in classrooms. The methods for active learning include collaborative group-work, problem or case-based learning, simulations, games, discussions, and case studies. Active learning contributes to developing students' critical thinking, teamwork skills, motivation, engagement, and problem-solving skills (Dzaiy & Abdullah, 2024).

Collaborative learning implies an approach when students work together in small groups achieving a common goal. Such activities require positive interdependence, individual accountability, group processing, and social skills. During problem-based learning (PBL), students explore real-life problems in small groups while the teacher is a facilitator. PBL improves critical thinking, problem solving, self-regulated learning, and collaboration. One of the important active learning approaches is debates. Debates develop critical thinking, argumentation skills, content analysis, and persuasive speaking. Active learning improves students' learning outcomes, social skills, motivation and engagement in the study process. Active learning develops such important skills as critical thinking, problem solving, teamwork, communication, lifelong learning, which are essential for career and personal success (Dzaiy & Abdullah, 2024).

Experimental learning involves students in hands-on activities which are tied to course concepts. Here are used different methods, such as simulations, lab work, field work, creative projects, and service learning (Dzaiy & Abdullah, 2024). Discussion is another method for active learning. Open-ended discussions support students to achieve understanding of different perspectives. Techniques like think-pair-share, small group dialogues, whole-class debates, and online discussion forums enable student participation. Discussions develop critical thinking skills, as students have to elaborate different arguments and evaluation of some cases (Dzaiy & Abdullah, 2024).

Writing activities develop thinking and metacognitive skills. Journals, concept maps, reflective essays, research reports, and other writing tasks encourage the development of critical thinking, communication, and problem-solving. Active learning develops different soft skills – critical thinking, problem solving, communication, collaboration, self-directed learning.

There exist different approaches regarding critical thinking development as a skill. 'Specificists' believe that critical thinking can only be taught within a discipline (Moore, 2011). In contrast, 'generalists' opinion is that elements of critical thinking are generic and transferable, and can be taught in isolation (Aston, 2023). Correspondingly, there are different approaches to the development of critical and other soft skills at university: the parallel approach (a separate course in the curriculum) and the embedded approach (developing critical and other soft skills within various subjects (Cinque and Kippels, 2023).

There existed a wide-spread concern, that critical thinking is a Western definition and concept. But nowadays, in globalised higher education system many students come together from different countries and cultures. The understanding of critical thinking is

related to different cultures and the idea that it is only a Western concept, is a stereotype. According to Aston (2023), critical thinking as a concept can be found in even syllogistic arguments in both Buddhism and Hinduism. Socratic questioning can be found in Buddhism and Confucianism. Interpretations of texts are in Islamic tradition of *ijtihad*.

It is commonly agreed that critical thinking involves independence of thought, but some sociological factors might have influence on it. For example, pressure to confirm, group affiliation, socially constructed silence and denial, and framing. Framing implies when the values, the life experience and the social cues of the people are constructed. The power of framing has a significant influence on critical thinking, as framing that means cultural and group affiliation dominance leads to appreciation and respect to other peoples' opinions that might lead to suppress critical thinking (Aston, 2023).

One of the key approaches to developing critical thinking is case study. The case study is adaptable for every subject and it involves problem-based learning and promotes the development of analytical skills. Case studies connect specific academic topics with the real world. Working with case studies increases student motivation to participate in class activities. And because of that case study is widely used in business administration field for developing critical thinking (Aston, 2024).

Another modern and effective way for improving critical thinking is playing educational games, such as role play (Rashid & Qaisar, 2017). Role play can promote such critical thinking dispositions as open-mindedness, fairness, perseverance, and empathy.

The analysis of the impact of pedagogical work reveals that effective critical thinking development is determined by many factors. Firstly, these factors are personal, for example, student's learning style and motivation; secondly, methodological - methods, pedagogical techniques, duration of classes, feedback, and contextual - classroom atmosphere, and incentive system as leading factors (Aston, 2024).

Nowadays, besides the traditional activities for critical thinking development, there are interactive mobile applications specifically aimed at developing critical thinking skills, such as Logic Master, Can You Escape, Skillz, Brain games, Brainiton, Unblock me, and others. The interactive learning classroom environment activates brain, helps learners improve memory, speed, flexibility of thinking, and problem-solving skills. It has been empirically proved that the game *Lumosity premium subscription* had a positive impact on students' critical thinking skills. Critical thinking will be more effectively developed when it is taught within media literacy, sociology, and psychology disciplines and has a relatively long and purposeful impact on the student's brain activity (Song & Cai, 2024).

Teachers should also reflect on their practices and introduce varied study approaches and methods. The development of critical thinking is highly related to instructional factors. The methods such as case studies, data analysis, writing and rewriting, class discussions enhance critical thinking.

Therefore, it is important to prioritize including development of critical thinking in university programs and courses. Also, it is essential to have a balance between theory and practice. According to Walker (2003), it is very important to question oneself and social opinions, engage students in classroom debates, and use written assignments. Teachers use mostly three groups of methodologies. Firstly, the methodologies that are mostly applied to develop critical thinking related to oral and written communication, reading and text analysis, oral and written reflection, and argumentation; secondly, methodologies, such for instance, case studies, collaborative and cooperative learning, connecting real problematic issues with life, and problem and project-based learning; and thirdly, these methodologies are used less: assessment, follow-up, and feedback, questioning, evaluation, interpretation, and justification, research, other methodologies - flipped classroom and role playing. From these methodologies, the most effective, according to university teachers, are the ones that are mostly used in the classroom: reading, analysis, and synthesis of information; oral and written communication, and case studies (Bezanilla et al., 2019).

Actually, universities should teach students how to think and not what to think. Case studies are a good way to encourage students to activate their critical thinking (Rabeea et al., 2020). Case studies provoke problem-solving skills, higher-order thinking skills, which create the basis for networked thinking. Case studies make students analyse and solve problems, which activates critical thinking skills (Mahdi et al., 2020).

Critical thinking is related to some cognitive skills such as analysis, interpretation, evaluation, explanation, inference, and self-regulation. From the teachers' perspective, there exist two approaches regarding critical thinking development. Firstly, critical thinking is considered to be a complex combination of knowledge, skills and predispositions that teachers can teach to their students using proper stimuli. Secondly, critical thinking is a general skill that is more or less independent of teachers' impact. Research and experience reveal that the first approach is relevant (Song & Cai, 2024). Therefore, it is essential to persuade university lecturers that it is both possible and necessary for them to develop their students' critical thinking skills.

Blended learning is often used for the improvement of critical thinking in the class environment. This approach is based on a combination of hands-on classes, classroom discussions, online discussions, interactive simulators, and various assessment methods that involve and guide students, as well as ensure a productive interaction with the teacher (Song & Cai, 2024).

3. Methodology

3.1. Methods

To get objective results, a quantitative method permitting causal conclusions – pre/post experiment - was used. The experiment was conducted in a large private university in Tbilisi, Georgia.

The experimental treatment lasted for one semester (14 study weeks). Before the experiment started, the students filled out pre-experimental questionnaires to measure their critical thinking skills. While the students from the control group studied the traditional way, the students from the experimental group additionally (but in the same time frames) received special treatment to develop their skills of critical thinking. During the seminars in Strategic Management (2 hours per week), in addition to the activities the students normally participated in, the students of the experimental group were involved in the following activities for the development of critical thinking:

- Crossword puzzle (using the terminology under study);
- Peer feedback (on essay, presentation, project, etc.);
- Discussion forum;
- Case studies (analysis of cases in groups);
- Given as homework: developing difficult questions from the previous week's materials.
- Evaluation of information (how useful, applicable, true, etc., it is);
- While working in pairs or small groups, each person (taking turns) should have the role of a critic;
- Development of criteria for evaluation;
- Evaluating the quality of sources on the internet;
- Watching a debate and analysing the given arguments.

Two teachers worked with two experimental groups and two with two control groups. Teacher qualification and experience were equal (PhD in their sphere, teaching the given course for over 10 years). The same course books and syllabi were used in all groups.

After the treatment, post-experimental questionnaires were conducted. The results were analysed with SPSS 25.

The hypothesis of the study was that the systematic application of the suggested activities for the purposeful development of critical skills would improve the level of students' critical thinking skills.

3.2. Research participants and tools

From the batch of senior students (a total of 120 students) taking the course in Strategic Management, 60 students were selected at random, and 52 of them agreed to participate in the experiment.

To select the participants of the experiment, university administration permission was needed first, then those lecturers in whose (control) groups questionnaires would be held had to be persuaded, then the lecturers who would agree to teach the experimental groups according to the methodology requested by the researcher had to be selected, and, finally, students from both the control and experimental groups had to express their informed consent.

26 senior students were randomly placed in two control groups and 26 in two experimental ones.

There was no need to validate the research tool as it was slightly modified (shortened) by the researcher based on Duru and colleagues' (2022) Critical Thinking Skill Scale, which was assessed by the authors for reliability and validity.

3.4. Results and analysis

The obtained results are presented in Tables 1-5 and Figures 1 and 2.

Table 1. Critical thinking skills level in the experimental group (pre-experimental results)

Item	Mean	Median	Mode	Standard deviation	Skewness	Kurtosis
1. When I learn about something new, I never take it for granted – I try to analyze it, find evidence (facts) for or against it, and to make independent conclusions.	2.03	2.00	1.00	1.03	.38	-1.24
2. When I'm given a task, I decide how important it is for my personal or professional development. If it is, I may spend a lot of time and energy necessary to fulfill it.	2.26	2.00	1.00	1.48	1.32	1.22
3. When I fail to do something or do it worse than I expected/hoped, I analyze what I did wrong.	1.96	2.00	1.00	1.07	.92	-.33
4. In every piece of information I try to find out the most important things about it.	1.76	1.50	1.00	1.03	1.68	3.01

5*. I have problems telling a story in short and clearly, separating important details from unimportant ones.	3.57	4.00	5.00	1.83	-.41	-1.37
6. When somebody did something wrong/bad, I try to understand the reasons/causes.	1.84	2.00	1.00	.97	.91	-.12
7. In all pieces of information, I try to find something useful for me personally.	1.96	1.50	1.00	1.15	.77	-.91
8. Though I do not like failures, I do my best to learn lessons from each failure and not to repeat the mistakes made.	2.26	2.00	1.00	1.51	1.23	.93
9. While making a decision, I weigh all possible benefits and risks/challenges and try to choose the option with maximum benefits and minimum risks.	2.15	2.00	1.00	1.28	1.03	.04
10. I analyze my successful strategies and try to apply them and improve/develop them, if necessary.	2.56	2.00	1.00	1.61	1.06	.39
Average mean	2.24					

* The calculations for item 5 were done in reverse order, as the meaning of the item is negative.

In Table 1, items 3, 6, and 7 represent a normal distribution (the means, medians, and modes are close to each other, the standard deviation is not high, and skewness and kurtosis are between -2 and 2). This reveals that the means are reliable. The results for other items are heterogeneous; however, the ones with a positive skew (items 1-4 and 6-10) reveal that the real situation may be better than the means tell us.

The mean of item 5 is higher than 3.1 (marked in red), therefore, it is possible to say that this aspect of critical thinking (the ability to separate unimportant things from important ones while trying to tell the story in short) is dissatisfactory, other aspects are reasonably good (between 2.0 and 3.0 - not marked by any color) or good (between 1 and 1.99 - marked in green). The average mean $M=2.24$. Therefore, it is possible to say that the students mostly positively assess their critical thinking skills; however, it is still desirable that they are better developed, especially the skill of separating important details from unimportant ones.

Table 2. Critical thinking skills level in the control group (pre-experimental results)

Item	Mean	Median	Mode	Standard deviation	Skewness	Kurtosis
1. When I learn about something new, I never take it for granted – I try to analyze it, find evidence (facts) for or against it, and to make independent conclusions.	2.23	2.00	1.00	1.40	.70	-.90
2. When I'm given a task, I decide how important it is for my personal or professional development. If it is, I may spend a lot of time and energy necessary to fulfill it.	2.04	1.00	1.00	1.37	1.04	-.27
3. When I fail to do something or do it worse than I expected/hoped, I analyze what I did wrong.	1.96	1.00	1.00	1.45	1.5	1.33
4. In every piece of information I try to find out the most important things about it.	1.84	1.00	1.00	1.22	1.60	1.83
5*. I have problems telling a story in short and clearly, separating important details from unimportant ones.	3.60	4.00	1.00	2.02	.46	-1.7
6. When somebody did something wrong/bad, I try to understand the reasons/causes.	1.61	1.00	1.00	.94	1.19	.051
7. In all pieces of information, I try to find something useful for me personally.	1.57	1.00	1.00	.75	1.51	2.85
8. Though I do not like failures, I do my best to learn lessons from each failure and not to repeat the mistakes made.	1.46	1.00	1.00	1.1	2.8	7.38
9. While making a decision, I weigh all possible benefits and risks/challenges and try to choose the option with maximum benefits and minimum risks.	1.53	1.00	1.00	1.02	3.47	14.7
10. I analyze my successful strategies and try to apply them and improve/develop them, if necessary.	1.42	1.00	1.00	1.02	3.82	16.8
Average mean	1.93					

In Table 2, only item 6 represents a normal distribution; therefore, its mean result is reliable. Other obtained results are heterogeneous; however, as their skewnesses are positive and the higher than normal kewnnesses (above 2) point to the numerous similar answers, the real situation may be better than their means tell us.

The means of item 5 are higher than 3.1 (marked in red), therefore, it is possible to say that this aspect of critical thinking (the ability to separate unimportant things from important ones while trying to tell the story in short) is dissatisfactory, other aspects are reasonably good (between 2.0 and 3.0 - not marked by any color) or good (between 1 and 1.99 - marked in green). The average mean $M=1.93$. Therefore, it is possible to say that the students mostly positively assess their critical thinking skills; however, it is still desirable that they are better developed.

The initial results in the two groups are quite comparable, so the groups are fit to conduct the experiment in them. Tables 3 and 4 present the post-experimental results.

Table 3. Critical thinking skills level in the experimental group (post-experimental results)

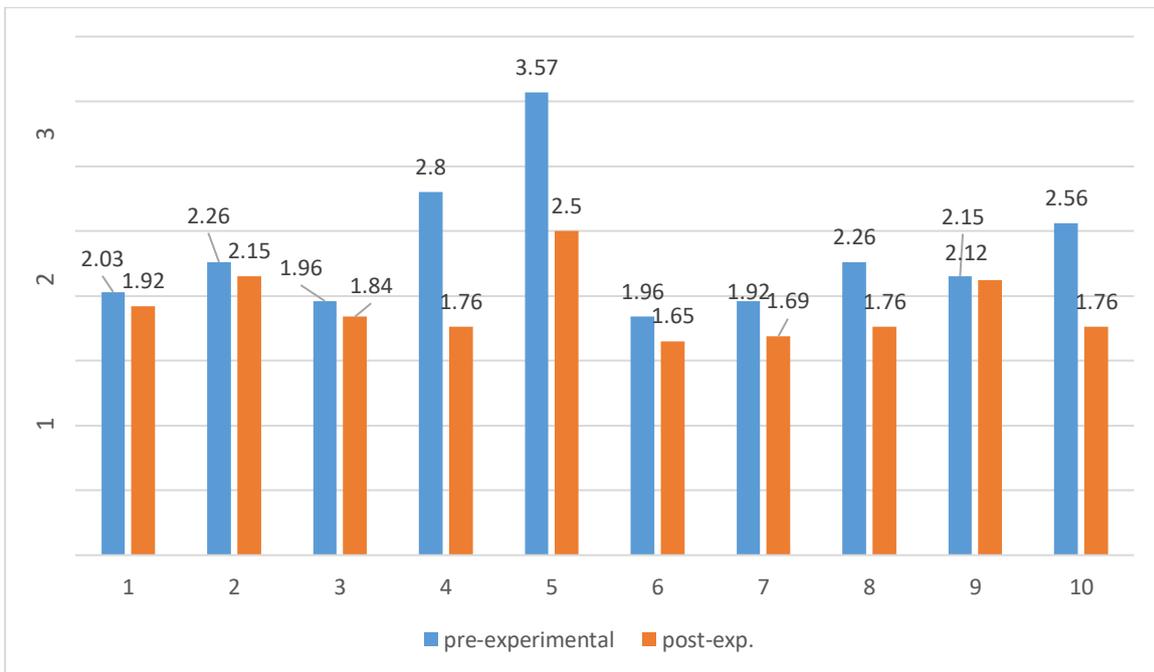
Item/answer/number of respondents	Mean	Median	Mode	Standard deviation	Skewness	Kurtozis
1. When I learn about something new, I never take it for granted – I try to analyze it, find evidence (facts) for or against it, and to make independent conclusions.	1.92	2.00	2.00	1.09	2.15	6.91
2. When I'm given a task, I decide how important it is for my personal or professional development. If it is, I may spend a lot of time and energy necessary to fulfill it.	2.15	2.00	2.00	1.15	1.69	3.90
3. When I fail to do something or do it worse than I expected/hoped, I analyze what I did wrong.	1.84	2.00	1.00	.78	.29	-1.27
4. In every piece of information I try to find out the most important things about it.	1.76	1.50	1.00	.95	1.11	.39
5*. I have problems telling a story in short and clearly, separating important details from unimportant ones.	2.50	2.00	1.00	1.82	.95	-.60
6. When somebody did something wrong/bad, I try to understand the reasons/causes.	1.65	1.00	1.00	.98	1.89	4.29
7. In all pieces of information I try to find something that is useful for me personally.	1.69	1.00	1.00	1.08	1.68	2.45
8. Though I do not like failures, I do my best to learn lessons from each failure and not to repeat the mistakes made.	1.76	1.00	1.00	1.17	2.24	6.01

9. While making a decision, I weigh all possible benefits and risks/challenges and try to choose the option with maximum benefits and minimum risks.	2.38	2.00	1.00	1.74	1.21	.15
10. I analyze my successful strategies and try to apply them and improve/develop them, if necessary.	1.76	1.50	1.00	1.11	2.42	7.86
Average mean	2.04					

Items 3 and 4 represent a normal distribution; therefore, their means are reliable. In items 1, 2, 6, 7, 8 and 10, kurtosis is higher than 3, which means that many answers are close to each other. The positive skewnesses reveal that the real results may be better than the means. The standard deviation for items 5 and 9 is higher than 1.2; therefore, the views on these items are heterogeneous.

None of the means is more than 3, which indicates that no aspects of critical thinking skills were found dissatisfactory, while in the pre-experimental results, one item yielded dissatisfactory results. Besides, the average mean equals 2.04 (it was 2.24 in the pre-questionnaire, the improvement is by .2). Therefore, it is possible to speak about the improvement of the situation. The items marked in green (1, 3, 4, 6, 7, 8, and 10) reveal the result between 1 and 1.99, which is very good. Other results, not marked in any colour, are reasonably good. To make the comparison of the pre- and post-experimental results in the experimental group more visual, Figure 1 was developed.

Figure 1. Comparison of pre- and post-experimental results of critical thinking skills in the experimental group



It is possible to see that all items improved the results, minimum by .09 and a maximum by 1.07. Therefore, all components of critical thinking skills improved. Compared to Figure 2 further in this section, the experimental group did better than the control group.

Table 4. Critical thinking skills level in the control group (post-experimental results)

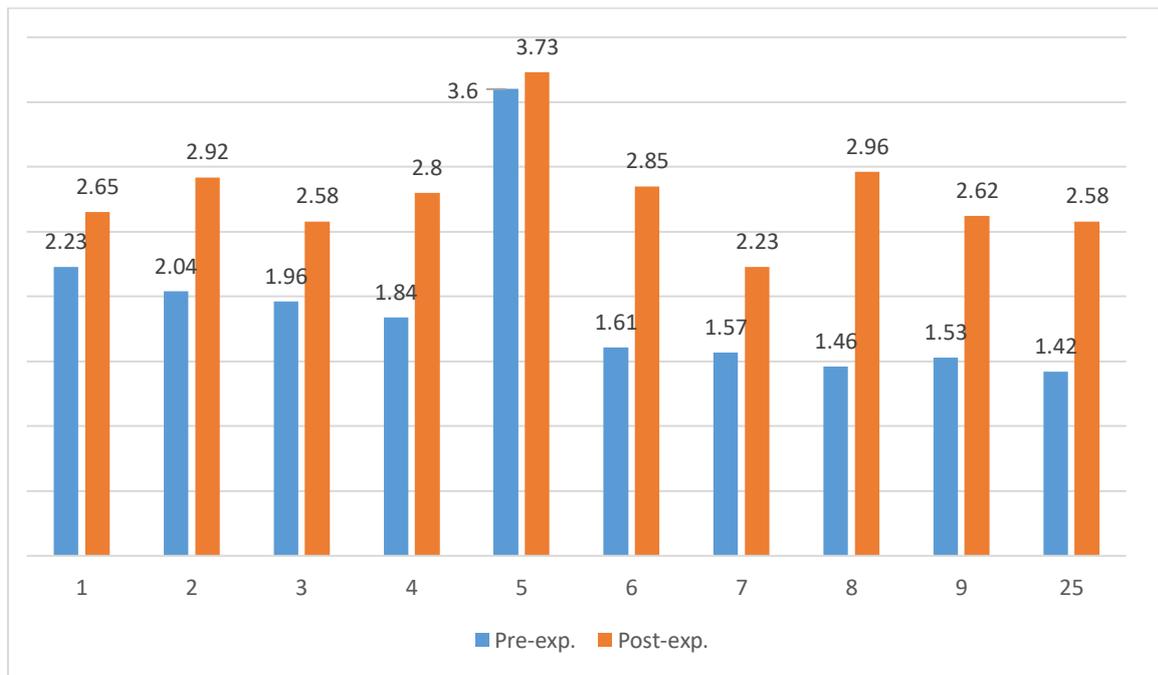
Item	Mean	Median	Mode	Standard deviation	Skewness	Kurtosis
1. When I learn about something new, I never take it for granted – I try to analyze it, find evidence (facts) for or against it, and to make independent conclusions.	2.65	2.50	2.00	1.32	.37	-.92
2. When I'm given a task, I decide how important it is for my personal or professional development. If it is, I may spend a lot of time and energy necessary to fulfill it.	1.96	2.00	2.00	.96	1.56	3.34
3. When I fail to do something or do it worse than I expected/hoped, I analyze what I did wrong.	2.92	3.00	2.00	1.41	.05	-1.38
4. In every piece of information, I try to find out the most important things about it.	2.58	2.00	2.00	1.14	.41	-.81
5*. I have problems telling a story in short and clearly, separating important details from unimportant ones.	3.73	4.50	5.00	1.82	-.55	-1.29
6. When somebody did something wrong/bad, I try to understand the reasons/causes.	2.85	3.00	1.00**	1.49	.36	-.86
7. In all pieces of information, I try to find something useful for me personally.	2.23	2.00	2.00	1.11	.46	-1.06
8. Though I do not like failures, I do my best to learn lessons from each failure and not to repeat the mistakes made.	2.96	3.00	3.00	1.43	.25	-.69
9. While making a decision, I weigh all possible benefits and risks/challenges and try to choose the option with maximum benefits and minimum risks.	2.62	2.00	2.00	1.44	.57	-.61
10. I analyze my successful strategies and try to apply them and improve/develop them, if necessary.	2.58	2.00	2.00	1.31	.88	.51
Average mean	2.71					

** The lowest mode is marked; it is a bimodal case.

In Table 4, the results of items 4 and 7 represent a normal distribution. Other results, marked in yellow, are heterogeneous; however, only the result for item 5 has a negative skewness, all other results have positive skewnesses, which reveals that the real situation is better than the means reveal.

The mean result of item 5 is higher than 3.1 (marked in red), therefore, it is possible to say that this aspect of critical thinking (the ability to separate unimportant things from important ones while trying to tell the story in short) has remained dissatisfactory, while other aspects are reasonably good (between 2.0 and 3.0 - not marked by any color) or good (between 1 and 1.99 - marked in green). The average mean $M=2.71$. The average mean for the pre-experimental results was 2.93 (in the pre-experimental results, it was 1.93, so it became worse by 1.0). Besides, Figure 2 demonstrates that the results became worse for all items. Therefore, although the mean results are only a little worse, if the results are analysed item by item, it can be seen that all items reveal the trend of worsening of critical thinking skills without purposefully working on them. It is possible to say that the students mostly positively assess their critical thinking skills, however, the skills' level has, to some degree, deteriorated.

Figure 2. Comparison of pre- and post-experimental results of critical thinking skills in the control group



To be sure that the results obtained in the experimental group are significantly better than those in the control group, a paired-samples T-test was conducted.

Table 5. Paired samples T-test for critical thinking skills

	Paired differences					t	df	sig (2-tailed)	
					95% confidence interval of the difference				
	M	SD	st. error mean	lower	upper				
Var 1(initial results) - Var 2 (final results)	.68	.01	.01	.55	.81	68.00	1	.01	

T=68 (much more than 1), and $p=.01 < .05$ at 95% confidence interval of the difference reveals that the obtained difference between the experimental and control group results is statistically significant.

3.5. Discussion

The study aimed to reveal how purposeful learning of critical thinking in the classroom was translated into the development of critical thinking skills. As a result, the purposeful teaching of critical thinking was shown to have a positive influence on the development of critical thinking in students.

This finding is consistent with Fahim and Masouleh's (2012) study, which found that people are not born with effective critical thinking skills; they only have certain inclinations to do analysis better than others. The researchers found that purposeful development of critical skills enhances them in all students, not only in those who are genetically inclined to critical thinking.

Thaiposria and Wannapiroonb (2015) found that using inquiry-based activities via the application of social networks increases students' critical thinking skills. Saepuloh et al. (2021) revealed that students' critical thinking skills can be increased through problem-based learning. Ekahitanond (2013) and Chakarvarti (2022) showed that peer feedback activity in an online discussion forum can raise the level of students' critical thinking skills. Ononiwu (2021) and Fadilla et al. (2021) came to the conclusion that online discussion forums are beneficial tools for critical thinking skills' development. Boumediene et al. (2021) applied classroom debate to develop their students' critical thinking skills and concluded that the students' critical thinking skills improved. The major difference between these articles and the current research is that they assessed the efficiency of one particular activity/approach for critical skills' development, while the current research assessed the ability of systematic applications of a complex of activities to improve students' critical thinking.

4. Conclusion and Recommendations

According to the current research, the results regarding critical thinking are positive. Students positively evaluated their critical thinking skills as revealed in the results of the pre-experimental questionnaire in both groups, control and experimental ones; however, critical thinking skills should be better developed.

In the framework of the post-experimental questionnaire results, students in both groups also positively assessed their critical thinking skills; however, there was a certain decrease in the control group's results, while the experimental group's results increased as all components of critical thinking skills were improved. The difference between the mean results in the control and the experimental group was found to be statistically significant.

To sum up, it can be said that purposeful teaching of critical thinking skills via the suggested activities has a positive impact on their development. The hypothesis of the study was confirmed.

As a recommendation, it can be said that these activities should be more actively applied in the process of teaching at the university. As for the directions of further research, it would be interesting to conduct both a larger scale of experiment and a qualitative study regarding the development of critical thinking in the higher education field. It would be useful to explore how, with what methods, lecturers develop their students' critical thinking. Also, it is crucial to study why it is important to develop this skill in students, and what it will mean to the students.

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