Critical Thinking as a Cognitive Educational Technology

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Abstract. The article deals with higher education issues related to the formation of students' intellectual work skills. The research objective of the paper was to consider critical thinking as a cognitive technology in education. In this regard, the didactic and structural approaches to the study of critical thinking do not contradict one another: each approach is a logical complement of the other and reveals certain aspects of the complex concept of critical thinking, giving emphasis to the argument, which is a tool, used both in critical and dogmatic thinking. By the general competence we mean principles of thinking, the ability to produce a reasoned piece of oral and written language, understanding and analysis of philosophical issues, considering the essence and value of the information. Among the professional competencies, the following should be listed: the ability to reconsider the gathered experience critically, the ability to collect, process, and interpret the data of modern research, to form judgments about the value and impact of the professional activity. The logical competence draws focused attention to the critical argument, regarding it throughout the course Logic. It is concluded that critical thinking can be seen as a cognitive educational technology for the formation of logical competence.

Introduction

Education in the classical sense of the term suggests the process of knowledge transfer from one subject or community to another subject or subjects, in case of group training. The substance of conventional teaching, according to N.V. Lyachenkov and A.N. Yarygina, is clearly demonstrated by the example showing the distinction between a "supporting" conventional approach to education and "innovative" types of training. Supportive training is aimed at maintaining and reproduction of the existing culture, social experience and social system. This type of training and education ensures the continuity of the socio-cultural experience and is commonly found in higher education institutions.

Innovative training stimulates the introduction of breakthrough changes in the existing culture and social environment. It can readily be noticed, that the educational technology, based on the traditional paradigm of "supporting teaching", are organized around the principle of transmission and reproduction of finished model answers by the student, thus developing mainly the reproductive abilities of the trainee (the stereotypes of perception, thinking, and social behaviour) [1, p. 254].

This is precisely why new conditions require the development of new cognitive educational technologies, which will provide logical processing of information, ensure the effective students' understanding of the real world, develop trainees intellectually and adapt them to life in the information-intensive environment. T.P. Kovina believes that "cognitive approaches in training are aimed at the development of critical thinking that implies the following skills:

1. The ability to distinguish between actual data and value judgments.
2. The ability to differ facts and assumptions.
3. The ability to detect the logical links.
4. The ability to highlight specific subject links.
5. The ability to detect actual errors and logical fallacies in reasoning.
6. The ability to distinguish the essential arguments from the irrelevant ones.
7. The ability to differ reasonable and unreasonable evaluation "[2, p.300].

The increase in the rate of information gain develops the cognitive activity of an individual, and practically speaking, reflects her/his verbal and cogitative ability. Hence, the development of students' logical competence should be the fundamental goal of the modern education.

The concept of finished education, which ensured the compliance of the gained knowledge with the professional requirements for almost the whole period of labour activity, has gone. The role of logical competence to develop the subject's ability to master new fields of knowledge must increase and become one of the main

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university training results [13]. Logical competence partly forms the following:

1. Communicative skills implying the ability to understand the question asked, to shape a relevant answer, to accept the interlocutor's viewpoint, to find the discordance and concurrence of opinions, to build a dialogue constructively and to formulate and represent the position.
2. Information handling skills meaning the ability to follow the general logic of presentation, highlighting the key points and understanding of the relationships, and to analyse information obtained from different sources.
3. Organised thinking skills implying the ability to structure the task, singling out and distributing operations necessary for its solution.

All of this makes the overall readiness of the subject to learning in general, and then to her/his professional activities under the constant need to acquire new knowledge rapidly and effectively within the constantly changing content and nature of her/his work [8, p. 130].

For the very reason theoretical and practical importance of teaching logic cannot be overstated. The modern approach to education implies that the study of this discipline is aimed at the formation of students' general and professional competencies.

Among the general competences we can single out the possession of principles of thinking, the ability to produce a clear and reasoned piece of oral and written language, understanding and analysis of worldview and life-purpose issues, considering the essence and value of the information in the information society, and others.

Among the professional competencies, the following are to be listed: the ability to reconsider the gathered experience critically, the ability to collect, process, and interpret the data of modern scientific research, to form judgements about the value and impact of one's own professional activity [4, p. 28].

Despite the fact that Logic is considered to be a humanitarian course unit, it clearly demonstrates the unity of theoretical and practical knowledge. While holding a course in this subject, theoretical information must be backed up by practice activities otherwise it becomes utterly worthless and has no relation to the actual professional practice. Maintaining the balance between theory and practice and teaching students to speak sense about any subject should become the lecturer's primary goals. If special focus is laid on the practical side of the subject, students study this academic discipline with great interest and understand its significance. Due to the lack of time (in the context of distance learning) theoretical data appear to be unattached from practice that leads, in students' words, to their perception of Logic as a boring, complicated and useless course and a waste of time.

According to I. I. Matyushina the practical part of studying Logic consists of two interrelated processes:

- the study of laws, regulations, and standards, that is, the development of reasoning skills;
- the ability to see the violation of these rules, wandering from them, that is the development of critical thinking [9, p. 115].

One cannot focus on a separate process of these, as any rule can be fully understood only when getting the idea of its applicability or having a clear understanding of how this rule can be broken. It is no coincidence, that all the rules proposed by the course in logic are sure to be studied in conjunction with the typical mistakes of their violations.

Practice has shown that the student will not see the errors in the specific cases, as it all seems to be the same due to the fact that she/he has learned the rules, but has not turned attention to typical violations.

However, if a student concentrates on violations of rules rather than the rule itself, almost all the examples will be regarded as incorrect. For this very reason while studying the definition, concept classification, and rules of question formulation, students are given examples of correct and incorrect logical definitions, classifications, questions. As long as students analyse tasks, they learn to criticise in a carefully argued manner (without being engaged in fault-finding), pointing out the rules broken and errors made.

The principle of unity of rule understanding and its violation works, when it comes to the study of logical laws. So, '... a matter of logic cannot be non-practical and the right mindset is bound to be critical', or logic should be practical, and thinking should be critical [9, p. 115].

Methods

The crisis of the education system gave rise to the idea of critical thinking application as a method, technology or special social practice in teaching [7; 10; 11; 16]. You can be unaware of critical thinking, but nevertheless, a critical attitude is always present in reasoning. All history of philosophy since the times of ancient Greece bore witness of that: critical arguments in Plato's dialogues, systematic Aristotle's criticism of Plato's conceptual ideas, special interpretation of Kant's critique, and in the 20th century, Karl Popper considered critical thinking and a critical tradition to be the core of rational thought [12].

Results

Critical thinking as an educational technology

Nowadays critical thinking is taught as an academic discipline in a number of universities in the USA, the United Kingdom, Canada and other countries. Let us denote this approach to the critical thinking study as didactic.

G.V. Sorin and I.N. Griftsova, being proponents of this approach, believe that in the context of the real educational and pedagogical process, critical thinking is first of all to be understood as a new subject area, based on an interpretation of classical formal logic. Secondly, critical thinking is considered a synthetic field of knowledge that arises from historical and philosophical thought, and its development embraces the modern

interdisciplinary space of logic, methodology of science, history of philosophy, media studies [5, p. 65 - 66].

Critical thinking as an academic course is characterized by a number of features:

1. Commitment of logical knowledge to the practical application in specific humanitarian, social, political and scientific areas.
2. Analysis of various errors during reasoning.
3. Interest in the analysis of interrogative forms, defining their place and role in decision-making and conflict management.

It is widely thought that the course of Critical thinking includes the abilities to work with the concepts, to produce a clear and reasoned piece of written or oral language, to ask questions and to provide relevant answers, to identify errors during reasoning. This being the case, through the prism of the above-mentioned positions, history of philosophy merges into critical thinking and becomes an important factor for the course development [5, p. 68].

How do ideas of critical thinking differ from the traditional formal logic? The difference lies in considering the problem of the relationship of formal and informal ways of reasoning, as well as the problems of forms of reasoning themselves. For classical logic the logical form is regarded as the main concept, forms of reasoning are important when considering informal ways of reasoning and applicable within the framework of such modern courses as critical thinking, argumentation theory, and informal logic [14].

Formal logic and critical thinking

The relation between formal logic and critical thinking is as follows: formal logic was constituted in the Middle Ages, the theoretical development of critical thinking, argumentation theory, non-classical logic occurred in the second half of the 20th century, and the term 'critical thinking' in its social and philosophical sense was first proposed by Jürgen Habermas in 1970 [6, p. 24].

It is conspicuous that formal logic seeks complete formalisation, whereas critical thinking and argumentation theory try to take into account the context of reasoning and features of the subject, including emotions and mood. Modern trends aim at rationalisation and systematisation of discussions, whatever the field of reasoning is, relying on the development of formal logic, but becoming pragmatically oriented [7, p. 171].

It has to be noted that classical logic often lacks pragmatism and clearness in its practical application. The tendency of formal logic towards the representation of ideal forms of thinking appears to be the essential difference from critical thinking, theory of argumentation, and informal logic that address directly the texts analysis and actual conversations.

An interesting structural approach to critical thinking was proposed by the famous Russian logician, V. N. Bryushinkin. He regards critical thinking as a 'sequence of mental actions aimed at checking the statements to clarify their discrepancy to the accepted facts, norms, and values' [3, p. 30]. This refers to the constant readiness for the search of new facts and rules that can show the actual falsehood, logical groundlessness or denial of a generally accepted view. According to V.N. Bryushinkin, dogmatic thinking is regarded as the opposite of critical thinking. It is known that although critical thinking is related to the constant readiness to revise old knowledge, it stands for the continuity in it, as there should always be the ground for criticism. Therein the critical tradition lies:

1. Acquisition of forerunners' views.
2. Consistency and coherence check of these views.
3. Clear stating of contradictions, inconsistencies, discrepancies to facts and norms.
4. Advancement of a new concept free of contradictions found.

Conclusion

Education is treated as the process throughout of which different competencies of the learner are developing. Thus, knowledge is the level and range of learner's competence. It is the competence consisting of a set of skills to perform some or other form of professional activity in a creative manner that forms the basis of the modern education value.

Thus, the logical competence may be viewed as a component of professional competence, and critical thinking will allow modern specialists to improve their proficiency continuously on the basis of the following competencies development: social relationship, capacity to self-education and oral presentations, independent acquisition of knowledge, analytical and synthetical skills.

Summarizing we would like note that the didactic and structural approaches to the study of critical thinking, dealt with in the paper, do not contradict each other. Each of them, being a complement to the other and revealing certain aspects of the complex concept of critical thinking, focuses on reasoning. The argumentation is a tool used both in critical and dogmatic thinking. The difference between the types of thinking is determined by the attitude of the subject: critical or dogmatic. If the preference is given to critical thinking, it is to include a critical attitude (search of inconsistencies, the choice depends on the subject) and critical reasoning (aimed at the justification of these inconsistencies).

It is the logical competence as a component of professional competence that pays focused attention to the critical argumentation, considering it to be a part of the courses of Logic and Logical foundations for reasoning, allowing applying the knowledge of logic in successful professional education [10; 15, p. 234].

All the above allows for the conclusion that the formation of critical thinking can be considered as a cognitive technology in education.

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