DOI 10.29042/2018-2877-2883

Helix Vol. 8(1): 2877-2883

Development of Integrative Skills in Higher-Education Students

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Received: 15th December 2017, Accepted: 20th December 2017, Published: 31st December 2017

Abstract

This study deals with the development of critical thinking in higher-education students and identifies the integrative skills that a graduate student will need in their future professional activity. Also, the article exposes the features of teamwork in the development of critical thinking in students. We suggest a model of development of critical thinking in higher-education students and identify pedagogical conditions for the effectiveness of critical thinking development in higher-education students during teamwork.

Keywords: Education, Student, Critical Thinking, Team, Integration.

Introduction

It is undeniable that investigations related to the study of critical thinking are of prime relevance in modern society. Our analysis of studies on critical thinking that have appeared in recent years in various abstracts and full-text databases, namely EBSCO, Elsevier (Science Direct), and Taylor & Francis, has shown the existence of increasing interest in this subject. Many studies claim a need for the development of critical thinking in higher-education students jointly with other skills needed for their future professional activity.

Masumeh Taie [1] considers the development of critical thinking abilities and introduces the concept of the "critical thinking movement". This movement has evolved as a reaction against the failures of many educational programs to meet their objectives since many college graduates are not qualified enough for real professional endeavors and do not possess higher-order thinking skills.

Slađana Živković [2] describes a "critical movement model", i.e. a "critical thinking model" suggested by researchers for teachers and students involved in the process of developing critical thinking. Preparing students for real professional activities requires them to have "high-order thinking skills" allowing to discover a prospective professional activity and educate graduate students as independent doers capable of thinking creatively and critically.

Researchers at a Malaysian tertiary institution [3] consider critical thinking among "soft skills", as integrative skills, together with such skills as problem-solving, lifelong learning, and information management.

Two Australian researchers, Al-Mahmood and Gruba [4], have studied critical thinking in the field of computer sciences. They replace the term "soft skills" with "employability skills". These authors believe that, even though the above-mentioned skills are integrated into higher-education programs and are developed during the learning process, "employability skills" are actually realized only when graduates get into a real professional environment.

The point of view of the authors of the present paper is that future professionals' critical thinking starts forming during their learning process and it is an inseparable part of their professional competence. The latter is just a set of skills of a certain type (e.g., mental, practical, communicative, etc.), motivational guidelines, and value orientations able to be applied in a professional practical activity. The process of development of the latter includes learning various competences that can be identified with skills based on knowledge and experience of practical application in different situations.

The integration of skills in the training process in higher-education schools, namely teamwork skills, critical thinking, the ability to put into practice their own ideas using a creative and innovative approach, also appears in Renée-Pascale's study [5], which is aimed at researching students' teamwork during the study of various disciplines.

The study [6], performed by another group of scientists, had the goal of assessing the efficiency of teamwork in the completion of students' projects. A total of 165 respondents participated in the survey. Based on the outcome of the study, the authors of the paper gave the following list of skills ranked according to their efficiency in students' teamwork:

Leadership skills—43%;

Critical thinking and problem solving—36%;

Communication skills—34%;

Teamwork skills—30%.

The above-mentioned results point to the following conclusion: a group of students becomes a single unit only when each member possesses the integrative skills that must be present among the competences of every future professional, namely critical thinking and teamwork abilities. These conclusions have been confirmed, in particular, in our experimental study, which had a more complex structure than the one described above (see [7]).

Methods

By analyzing the skills associated with training and team working, one can see that many of them match those skills required when critically thinking during an activity. Moreover, teamwork effectiveness

depends directly on the development level of critical-thinking skills.

Let us describe in more detail those concepts allowing to identify (see [8]) critical-thinking skills: reflection–criticism– criticality –self-criticism–evaluation–self-evaluation–evaluative judgment. By analyzing these concepts, we managed to identify skills making critical thinking possible in practical activities.

Reflection is connected to the ability to make sense of one's own actions and become aware of those schemes and rules according to which a person acts.

Criticism and criticality arise in the ability to independently defend one's own convictions and find answers to objections, in the ability to analyze information or opinions for evaluation and validation. Criticality includes not only "evaluation/assessment" but also the ability to think dialectically, i.e. the ability to apply scientific methods and the rules and principles of logic (argumentation, demonstration, refutation) in a scientific manner.

Self-criticism is associated with criticism but has some specific traits showing itself in the ability to analyze one's convictions, arguments and reasons for critical evaluation and correction, self-evaluation and self-correction, the ability to actualize such personal qualities as curiosity (inquisitiveness), power of observation, spontaneity (relaxedness), audacity, and tactfulness.

Evaluation and self-evaluation are associated with the organization of control and self-control and include the ability to contrast final results against goals, tasks, activity plan, the ability to analyze the causes of inconsistency and own mistakes, the ability to make decisions to exclude work inconsistencies.

Evaluative judgment manifests itself in the ability to compare, contrast, generalize, and concretize someone else's and own opinions.

People's striving for criticality and self-criticism is great. However, the lack of knowledge and skills to apply knowledge in practice is able to lead to nitpicking, i.e. wrong criticism.

Criticism can take the form of an ordinary quarrel to find out "who's right", or that of a scientific discussion, as a result of which either a common opinion arises or the opponents disagree and each one keeps their own opinion. The logical expression of thoughts is what distinguishes criticism from nitpicking.

Is it really necessary to teach students critical thinking? Or does this skill develop itself? It is an unquestionable truth that critical thinking is shaped by the logic of life and depends on natural abilities and inclinations, as well as on social environment and social education. Nevertheless, a purposeful educational process is the most effective way to develop critical thinking. Critical thinking does not automatically appear as a collateral effect of conventional education in any field of knowledge. Rather, systematic efforts are to be applied to improve thinking ability if one wants to reach the expected result.

The goal of our study is to develop a model aimed at developing critical thinking in higher-education students. This model is suggested as a general guide for teachers with a basic goal: prepare and conduct training sessions aimed at creating and developing critical thinking in higher-education students.

To determine the methods for developing critical thinking, we referred to the concept of developmental learning (V. V. Davydov) [9] and problem-based learning (M. I. Makhmutov) [10], which are based on the ideas of reflection, systematicity, and criticism of thinking. Problem-based learning is aimed at developing cognitive independence in learners, as well as their creative abilities and creative thinking. "... If we know that there is something that we do not know about the object, for example, some manifestations thereof, or how some components of the object communicate with each other, we already have some kind of problem-based knowledge".

"The problem consists in the fact that the subject should comprehend that, by means of the available knowledge and experience, it is impossible to solve the difficulties and contradictions that have arisen in this situation" [11, p. 292]. M. I. Makhmutov's concept of problem-based learning appeals to the conclusions of Soviet psychology about productive and reproductive forms of thinking and asserts that problem-based learning is the most important means of developing thinking and creating skills of productive cognitive activity in learners. However, since the issues related to critical thinking had not been sufficiently developed by that time in psychology, this concept does not emphasize special pedagogical methods aimed at developing critical thinking.

As is known, problem-based learning (finding a way out of a problem situation) is a process consisting of several stages, and has a certain sequence of thinking actions, namely: a) analysis of an emerging problem situation; b) posing the problem (verbal formulation); c) suggesting a hypothesis (assumption) about the method that should be used to solve the problem; d) proving the hypothesis (in fact, this is the solution of the problem); e) verifying the solution correctness [12].

The interconnection of all thinking forms within the learning process takes place as students perform the following actions [13]:

1. Study of such concepts as "mind criticism", "mind self-criticism", "criticism", "self-criticism", and application of these concepts in everyday life;

2. Critical analysis and evaluation of political, economic, and social situations in a region or country, also abroad and in diverse fields of activity;
3. Discussion on mistakes committed during the solution of problems and tasks, choice of the most rational solution methods through the organization of discussions and debates;
4. Writing reviews (in senior classes) of own and other authors' literary works on the basis of critical analysis of the text;
5. Discussion of books, articles, short stories, tales, etc., then writing essays on these works, searching for (own and other's) mistakes in them, and discussing them;
6. Solving problems related to criticism and self-criticism;
7. Creating abilities and skills by training the ability to demonstrate or refute hypotheses that have been suggested in the past either in some fields of science or within problem-based learning processes in various subject areas;
8. Special training in the procedure of demonstration and refutation on the basis of materials from history, physics, chemistry, biology, and other subject areas;
9. Organization of discussions on sports, movies, TV shows, "sensational" articles published in the press; critical analysis of discussions, debates, experiment processes, etc.

There have been various attempts in the literature on psychology and pedagogics to identify the stages of development of critical thinking [14]:

1. The first and most important stage is the preparation of teachers having the ability to think critically and being capable of developing this type of thinking in students;
2. Creation of motivations for the development of this ability;
3. Acquisition of a system of special logical operations and actions by students;
4. Teaching students to use these operations (i.e. skills) in their learning activity and while communicating with other persons of their age and with adults;
5. Systematic training, adjustment of activity, exercises aimed at developing critical thinking skills.

Researchers dealing with these problems [15, 16, 17] have noted that teaching students critical thinking, especially while working in teams, allows them to apply theoretical skills acquired in seminars and training sessions in practical situations. They highlight the following stages of critical thinking implementation:

– Problem identification;
– Systematic observation;
– Brainstorming;
– Starting to solve the problem;
– Setting short-term goals;
– Argumentation based on qualitative indicators;
– Feedback and self-evaluation.

Researchers of another team believe that there are three main stages in the development of critical thinking: challenge, comprehension (cognition) and reflection (cogitation) [18]. In our opinion, however, a fourth stage is to be added, namely generalization and evaluation. All these stages are not simply interrelated but also interdependent. The realization of critical thinking and, consequently, its formation is possible to a certain extent at any stage, anytime an alternative exists, while analyzing a problem situation (the analysis requires a critical attitude).

Results

1. We have developed and implemented a model of development of critical thinking in students under conditions of team learning. The model contains the following structural components: acquisition of knowledge on logical, problem-based, and creative thinking by students; learning basic logical concepts; development of abilities to make critical judgments as critical arguments of a tolerant nature; learning to identify logical errors committed during critical evaluation of phenomena.
2. We have experimentally tested and have given theoretical grounds for the pedagogical conditions that contribute to the development of critical thinking in higher-education students under conditions of team learning: the use of the project method in team learning, monitoring the development of critical thinking in students during team learning, training teaching staff to conduct lessons aimed at developing critical thinking in students.

According to the analysis of the results and the conclusions drawn, we can conclude that the overall tasks of our research have been solved, and the results obtained have a theoretical and practical significance.

Discussion

Based on the study of the stages and methods of critical thinking development in higher-education students under conditions of team learning, we have managed to produce a model of development of critical thinking in students (Fig. 1).

Objectives: development of critical thinking in higher-education students as a result of team learning.

Goals of Critical Thinking Development:

– Acquisition of knowledge on logical, problem-based, and creative thinking by students;

– Teach students basic logical concepts: reflection–negation–criticism–self-criticism–criticality–self-criticism–argumentation–demonstration–

refutation–evaluation–self-evaluation–evaluative judgment;

– Development of abilities to make critical judgments as critical arguments of a tolerant nature;
– Teach students to identify logical errors committed during critical evaluation of phenomena.

Didactic Conditions for the Development of Critical Thinking:
– Use of the project method in team learning (development of creative abilities in students, skills of business interaction and cooperation as a result of interaction between teacher and student);
– Monitoring the development of critical thinking in students during team learning (level of development of critical thinking, value orientations and interests, attitude of team members toward their duties, attitude toward learning, real and potential opportunities of students);
– Training teaching staff to conduct lessons aimed at developing critical thinking in students (using acquired knowledge and skills in various situations within the educational process, improving the level of skills, creating the necessary conditions for development of the teacher's personality, understanding the theoretical foundations of critical thinking and realizing why students need critical thinking, acquaintance with modern achievements in pedagogical science and practice for a creative approach to pedagogical innovations).
When all the above-mentioned conditions are met, it is possible to develop critical thinking skills in higher-education students. Moreover, we assert that the development of critical thinking through team learning increases, on the one hand, the educational process effectiveness and, on the other hand, the level of general and professional education of future specialists getting them ready for working in business teams.

Methods:
The authors of various studies [19] (A.I. Lipkina and L.A. Rybak, and others) consider four issues: 1) students' attitude toward their evaluation by a teacher; methods: questionnaires, observation, conversations with students; 2) students' self-evaluation in educational activities; methods: self-review, self-characterization; 3) development of an adequate critical and self-critical evaluation of the performance of training tasks; 4) education of a critical approach to acquired knowledge; methods: review of works written by themselves or by classmates, before and after evaluation by a teacher; students' characterization and self-characterization, etc.

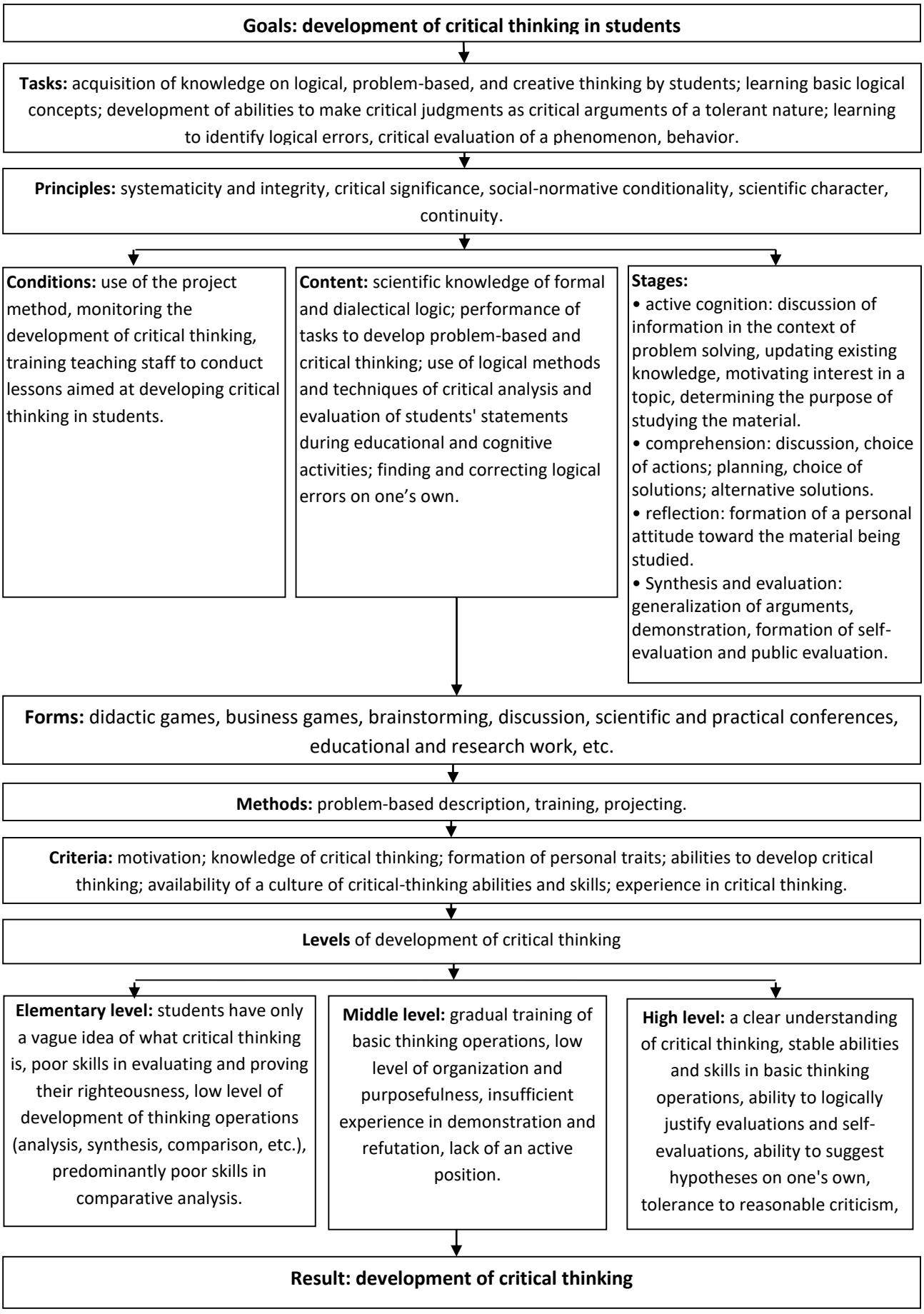
Course Content
1. Inclusion of matters requiring critical understanding by students in new academic topics.
2. Inclusion of various forms and types of criticism in the academic information and material proposed to team members.
3. Arrangement of group tasks and problems requiring that critical thinking be applied as a part of the training process in various subject areas.
4. Thematic distribution of the training session materials with the purpose of developing critical thinking in accordance with the tasks of developing critical thinking of team members.
5. Determination of the level of students' critical thinking.

Forms of Teaching
1. Use of critical thinking in group problem solving taking into account individual traits of team members.
2. Teamwork while solving problem-based and cognitive situations aimed at developing critical thinking abilities and skills.
3. Group work taking account of the distribution of roles among members of a team for the execution of tasks aimed at developing critical thinking.

Teaching Methods
1. Use of rating systems to determine students' readiness to acquire teaching material and information, and choice of a pedagogical technology in accordance with the level of students' ability to learn.
2. Motivate students to critically comprehend the content of training sessions and cultivate a critical attitude toward statements and actions.
3. Establishing the level of development of critical thinking ("low", "middle", "high") within the structure of pedagogical technology.
4. Use of problem-based training technologies: problem-based reasoning method, heuristic method (*ad absurdum* method, exclusion of superfluous data, and reliability assessment of a source of information), research method, dialogical method, methods to motivate students to perform logical tasks on their own using critical thinking techniques, i.e. anytime a question arises: "What if?", "What's that?".
5. Use of the logical method (analysis, synthesis, comparison, generalization).

6. Use of the reflexive, problem-based and critical thinking method, as well as inductive and deductive inferences.

What does the learner's activity consist of?



Content of Learning
1. Acquiring knowledge on formal and dialectical logic.
2. Execution of tasks aimed at developing problem-based and critical thinking.
3. Use of logical methods and techniques of critical analysis and evaluation of students' statements during their educational and cognitive activity.
4. Finding and correcting logical errors on one's own.

Forms of Learning
1. Group work in training sessions aimed at executing tasks requiring critical analysis of texts and assignments.
2. Group work aimed at performing logical and cognitive tasks.
3. Role-based logical and cognitive tasks associated with critical analysis in training sessions.

Learning Methods
1. Determination of one's own level of readiness to assimilate academic information and material.
2. Execution of logical tasks (procedure of demonstration and refutation, identification and generalization of methods for solving problems, problem solving, etc.).
3. Performance of creative assignments.
4. Performance of exercises associated with the transference of critical analysis methods to a new situation, and training of critical thinking abilities and skills (writing reviews on other students' works, or on any work of literature, finding and correcting mistakes in one's own writing, etc.).

Culture of Critical Thinking
– Mastery of the culture of speech;
– Mastery of the culture of discussion and debate;
– Ability to enter the communication process in a psychologically correct form;
– Acceptance and consideration of all the ideas suggested by team members;
– Free expression of one's own opinion and each team member's opinion since this fosters openness;
– Responsibility for one's own point of view;
– Ability to talk properly introducing pauses when necessary;
– Adherence to the rules for expressing ideas
– Reaching general agreement on various issues;
– Finding the truth in discussions and debates;
– Expressing objections to an opponent's view;
– Ability to hear and listen to an interlocutor's view;
– Goodwill;
– Constructive criticism;
– Tolerance;
– Mutual understanding.

Conclusions
Integrative skills: teamwork and critical thinking ought to be included in the professional competences of future specialists. The development of these skills is only possible in a dedicated training system of students in special courses and seminars, using interactive technologies that teach thinking and working in practical situations.

Critical thinking of higher-education students consists of a system of socially and personally significant critical thinking qualities acquired as part of the learning and teaching process. Teaching students in teams contributes to developing their critical thinking, namely acquiring and suggesting assumptions and hypotheses and searching for the most rational methods to solve problems and tasks, finding mistakes and shortcomings in the course of learning as well as in social life in order to overcome them, creating an atmosphere of interaction, teaching to accept criticism and respond to it after careful consideration, taking an active stance.

Conflict of Interest
The author confirms that the data presented does not contain any conflict of interest.

Acknowledgement
The work is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University

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