also its resource efficiency. The device name with a brief description can be proposed by the instructor or invented by the students. The goal of the bankers and elective administrators – select the device that would guarantee maximum profit. The ecologists should verify the proposed device environmental safety. The consumers can be either students or instructors from other groups.

Active teaching methods could include watching English videos. For example, the students have a list of questions which he/she should answer during and/or after watching the video. The students review a set of questions, then exchange questions between each other, checking the correct answers and adding necessary information.

Oral test involves debates devoted to such topic as “Who generates the development of a society – an engineer or a scientist?” [3].

It should be noted that the students compile a glossary, i.e. they write down 5-10 words in each class throughout the semester. The written test involves writing an essay based on a topic associated with the student’s future profession and including as many glossary words as possible.

The students highly praised the application of above-mentioned active methods in the teaching process. The questionnaire survey showed that the students actively and thoroughly prepared their study assignments. According to the student-respondents, such active methods as debates, discussion, seminars-conferences have two advantages: (1) monitoring one’s communicative skills and (2) depth-in understanding of specific topics associated with the student’s future profession.

Thus, the following methods applied in teaching the discipline “Professional Content-based English Language” embrace such skills and abilities as:

- activation of thinking and behavior;
- motivation – promotion in learning, teaching process management and personal engineering activities;
- administrative response to teaching process;
- understanding technological processes, engineering problem – solving and their promotion;
- experience exchange (personal and professional);
- motivated interest in studying engineering;
- material acquisition and consolidation (in Russian);
- development of individual, intellectual and behavioral skills and abilities under non-standard conditions;
- English proficiency for graduates;
- implementation of CDIO standards;
- enhancement of engineering education.

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Application of International CDIO Standard and Innovative Approach in the Methodology of Scientific Creativity

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Innovative methods of scientific work combined with the international CDIO initiative criteria are a new approach to engineering education. The article presents the assessment tools and evaluation techniques which can be applied during various master’s thesis project stages, with main focus being paid to “production” in parts «testing» and «validation». The present article is the continuation of the work done previously.

Keywords: innovation in higher engineering education, methodology of scientific research on the particular algorithm.

Engineeering education of the previous period consisted in the development of the following chain: «learning – engineering knowledge development – skill acquisition – practice». The essence and spirit of the CDIO International Program are focused on development of features of engineering education relevant to the contemporary state of society, science and technology. Thereby, academic process implies the following elements: «learning – practice – engineering knowledge development – practice – skill acquisition – practice – outcome correlation – practical application of the whole knowledge volume». Further education under the slogan «life-oriented education» forms an individual «learning trajectory».

Competence approach to higher engineering education sets the task of tool development for future master’s competence formation and corresponding innovative methodical supplement for their realization. CDIO program sets a through goal: «graduates are to be ready for complex engineering activity: Conceive, Design, Implement, and Operate engineering products, processes, and systems of the contemporary environment based on team work of specialists» [3, p.5].

CDIO standards are focused on «eliminating the contradictions between theory and practice in engineering education» through «enhancement of practice-oriented learning process as well as introduction of problem and project learning techniques» [3, с.2]. The given contradictions include a gap between theory and practice, irrelevence of educational practice to the level of contemporary scientific theory development also predetermined by such an unprecedented achievement as IT-technologies. According to the researcher’s statement, codirector of Concept Labs CA, chief engineer of BT Labs P. Cochran: «Imagine this school with children that can read and write, but with teachers who cannot, and you have a metaphor of the information age in which we live» [4, 5]. It is referred to school, but this feature is also relevant to the stage of higher education.

At Tyumen State Oil and Gas University a proproedantic course of «Methodology of scientific work» was introduced for masters of major «Electrical Power and Electrical Engineering». Its key task is preparation for master’s dissertation. It is performed by means of innovative developments in the sphere of scientific creativity methodology.
combined with the focus on masters’ knowledge formation about the key stages of international standard of CDIO engineering education (program 4P). An essential part of learning-teaching process is monitoring-reviewing materials (didactic and monitoring-assessment means), since tests are of low efficiency due to the variety of research themes. Formal part of research in the form of Master dissertation is checked for consistency to GOST standards by a code manager. The question is how to arrange an objective assessment of the projects? How to overcome subjectivity? What are the assessment criteria? Can they be strictly specified?

Suggested methodology implies application of such methods as annotation, definition of key words, abstracting, reviewing as innovative elements forming evaluation of the developed project both in general and in parts. In this case the essence, idea, assignment of annotation and report are not mystery for master students, as a result masters attain the idea of difference of master’s dissertation as a research project from a report overcoming an annoying erroneous approach typical to the schools of self-learning.

The situation with assessment of master dissertation content is more complex and interesting (testing, validity checking). Suggested methodology suggests consistent and interconnected performance of mutual monitoring allowing for feedback between researchers, basic forms of mutual monitoring being formalized as well, performed by using a number of monitoring-assessment tools in the form of tables completed by students. For example, the task is given to mutually annotate the materials of dissertation obtained at the intermediate stage. At the lecture the task is performed at the stage of research feasibility study (Implementation) in terms of CDIO can be made by means of scientific methods of annotation or revising/rewriting of power systems (in case of non-critical attitude the results are selectively checked again, the cause may be absence of comments, remarks, questions), «correcting actions» - «error correction», or answer the questions defending the parts of research. The monitor’s task is to arrange «pairs» of reviewed-reviewer using the principles «strong student-weak student», «strong student-strong student», or randomly; hand out the forms, collect, check out their completion, countersign with the words «checked, meets the requirements», checked, should be redetected by mentor.

This algorithm made great impression on male master-students as, in the course of the first business game they could, apart from the expected knowledge enrichment, compare their level of skills-competence-qualification with that of other group members bringing the elements of competitiveness. Female master-students showed higher degree of loyalty, inclination to assign «hidden» strengths to an opponent. Hence, at the first class «Selection of research theme» during 5 minutes of the business game «Hello, what do you do?» a group of 20 students selected: 1. The most topical (interests) theme of master dissertation - «Project management». The most «unusual» theme, 3. themes - «doubles». There was even so to say «side effects» as soon as students solved some super-problem that had not been set by the teacher – they managed to guess who of master-students joined after bachelor graduation of similar major. «Supporting documents» came from Tyumen State University of Civil Engineering and who came from classical Tyumen State University. Results served as a particular placement test permitting for the development of general criteria of evaluation applicable for their engineering activity, 2) new ideas and approaches, 3) new problems for practical cases 4) challenges that should be managed at the nearest class 5) the form of training. Formalized form of review can serve as a supporting documents that reflects the state of engineering project at this or that stage of research.

The parts for final assessment analysis and mutual reviewing the materials of master dissertation also include: title page, plan of dissertation, and the following parts – relevance, degree of problem development, theoretical background, methodical background, subject, goal, objectives of research, problem statement, 

according to the offered scheme (form) or in a free format, put a checkers’s signature (in case of non-critical attitude the results are selectively checked again, the cause may be absence of comments, remarks, questions), «correcting actions» - «error correction», or answer the questions defending the parts of research. The monitor’s task is to arrange «pairs» of reviewed-reviewer using the principles «strong student-weak student», «strong student-strong student», or randomly; hand out the forms, collect, check out their completion, countersign with the words «checked, meets the requirements», checked, should be redetected by mentor.

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Table 1. Fragment of Review for Master Dissertation

<table>
<thead>
<tr>
<th>№</th>
<th>Name of dissertation section, volume, design</th>
<th>Name of dissertation, section, volume, design</th>
<th>Relevance to the requirements of design, GOST, CDIO international standard 1, industry documents and requirements</th>
<th>Logic of narration, its forms</th>
<th>Scientific validation or corresponding supporting documents</th>
<th>Evaluating judgments: (8 positive and 2 negative notes), tips for error correction</th>
<th>Corrective actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Theme of research</td>
<td>Approved (not approved by the department)</td>
<td>Relevant/irrelevant (explain why)</td>
<td>For example: «included in the department » (commercial agreement, approved by the department order), presented at V. I. Potanin’s contests etc.</td>
<td>For example: «reduce the number of words» «specify»</td>
<td>Enclose the abstract of the order</td>
<td></td>
</tr>
</tbody>
</table>

...testing were published in the materials of conferences held in Tomsk State University, Tomsk Polytechnic University [1], Tyumen State Oil and Gas University. They were also represented at the events held with the support of Association of Engineering Education of RF [2].

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