AMERICAN JOURNALS
Open Access, Peer Reviewed Journals

American Journal of Technology and Applied Sciences
ISSN (E): 2832-1766| Volume 16, | Sep., 2023

INTERRELATION OF SCIENCE AND EDUCATION IN ENGINEERING HIGHER EDUCATIONAL INSTITUTIONS: CHALLENGES AND OPPORTUNITIES

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A B S T R A C T

The article under discussion depicts the problems of the relationship between science and engineering higher educational institutions and possible approaches to overcoming them with the application of new technologies, creation of more flexible study programmes and active participation of students in research activities. The authors of the article consider that the case study method in engineering higher educational institutions offers a wide range of educational opportunities. It is necessary to use such educational methods through which students will be able to acquire both knowledge and skills and form the necessary set of professional competences. Thanks to the effective organisation of the educational process the student will be competitive in the labour market and will attract the attention of employers of serious and promising companies.

K E Y W O R D S

Case study method, educational technologies, innovative, educational process, making decisions.

Introduction

It was only by the beginning of the 20th century that technical sciences, which had their origins in practice, acquired the qualities of a true science, with all its inherent features: systematic organisation of knowledge, reliance on experience and experiment, construction of mathematical theories. At about the same time, the technical sciences developed their own fundamental research.

Nowadays, each technical science is a separate independent scientific discipline, with its own scientific apparatus, terminology, features that determine its relationship with technology.

The importance and necessity of education, as well as the need to constantly improve its quality, cannot be overestimated. Society continues to change dynamically. New conditions generate educational needs and stimulate their development in a new, more innovative context. A modern teacher is called upon to design the educational process by relying on the new content of the subject, on the new goal-setting and, most importantly, on the planned results of the educational programme [7, 8].

The Main Part

The use of active methods, intensive educational and information technologies by teachers changes the usual role of the teacher in the educational process as a translator of knowledge. It changes the traditional educational process and relations between its participants. The significant advantage of these technologies is that they provide new opportunities not only for the teacher, but also for the student [4]. The student turns from an object of learning into a subject of learning, consciously participating in the learning process and making decisions related to it.

Nowadays, both higher and secondary vocational education actively use non-game imitation active learning method - (case-study method) - a method of active problem-situational analysis, based on learning by solving specific problems - situations (solving cases).

Case (from English - case, situation) is an analysis of a situation or a specific case, a business game. It can be called a technology of analysing specific situations, a "private case". Case study was first developed at Harvard University in the 20s. In the USA, the case study method is used to gain skills in finding solution(s) based on real situations. Here is how the situation was in general: learners were introduced to the description of the problem posed; analysed the situation independently; diagnosed the problem and presented their ideas and solutions in a discussion with other students [2].

The essence of the technology is that it is based on descriptions of specific situations or case (from English "case"). The case presented for analysis should preferably reflect a real life situation. Secondly, the description should contain a problem or a number of direct or indirect difficulties, contradictions, hidden problems for the researcher to solve. Thirdly, it requires mastering a preliminary set of theoretical knowledge in order to refract it into the practical plane of solving a specific problem or a number of problems. In the process of working on a case study, additional information is often required from the participants themselves to analyse the situation. In the end, students find their own conclusions and solutions to the problem situation, often in the form of ambiguous multiple solutions.

There are several classifications of case studies:

- fictitious, so-called armchair or cabinet cases;
- real (field, natural);
- structured (those that contain the minimum required amount of information);
- unstructured (the maximum amount of information is provided when describing a particular situation).

In terms of complexity, cases are:

- illustrative learning situations;
- learning situations with a formed problem;
- learning situations with the formation of problems;
- applied exercises.

According to the established goals and objectives of the learning process, they can be:

- teaching analysis and evaluation;
- teaching problem solving and decision making;
- illustrating the problem, solutions or concept as a whole.

Cases are also divided by the degree of novelty of situations and the decision-making methods applied depending on it; by the stages of decision-making, for the practice of which case studies are used: by

hierarchical levels of decision-making, because different teachers consider the same situation differently; by specialization, when the same situation can be considered from the perspective of different specialties in different ways [3].

The purpose of the case method is to analyse the situation as thoroughly as possible by the whole group of students and to work out the best solution; at the end of the process the proposed algorithms are evaluated and one of the best options is chosen in the context of the problem.

Improvement of specialists' training takes place during students' practice in service centres. Focusing on this principle, the use of case-methods in the training process is indispensable [4].

The ideas of case method (situational learning method) for specialists of service areas are quite simple. Its use for service students is very productive, because there is no unambiguous answer in such tasks, there are several, which can compete with each other in the degree of truth. Teaching in this case departs from the classical scheme and students are required to find many truths in a problem field. Students do not master ready-made knowledge, but develop it with the help of co-operation between students and teacher [3].

The personality of a future specialist is subject to some requirements, including a high level of tolerance, empathy, benevolence, sociability, the condition of constant personal and professional growth, high resistance to stress and conflict situations.

To organise his/her productive professional activity, a future graduate should master a set of professional competences, which case technology will successfully allow to form [9].

When working on complex concrete situations, students identify the main problem, the reasons for its occurrence, as well as possible consequences and determine methods for correcting the behaviour of the participants of the situation.

The structure of a case is as follows: the situation itself is defined (it can be a case or a problem); the context in which the situation is located (chronological, historical, context of the place, peculiarities of the action or participants of the situation); comments to the situation, which are given by the author.

Stages of solving cases:

- familiarisation with the situation and the features it has;
- highlighting the main problem(s), necessary factors and personalities that have a real impact;
- concepts or topics for brainstorming are proposed;
- the consequences of a decision are analysed;
- direct solution of the case, i.e. one or more options (sequences of actions) are proposed, indicating the possible occurrence of problems, mechanisms for their prevention and solution.

It is very important, in our opinion, to familiarise students with skilled and unskilled behaviour in the process of professional activity.

Here is an example of the organisation of work on a case study task.

It is necessary to divide the group into subgroups consisting of 3-5 people. This division is due to the fact that the smaller the subgroup, the more involved the student is in the work. The level of personal responsibility for the result increases. The team is formed at the request of the students. In each group a leader should be chosen who will take the role of moderator and will be responsible for the actions of his/her team, will distribute questions among the participants, and will be responsible for the decisions made. At the end of the session, the moderator makes a report on the result of the work done.

The organisation of case work can be done in two ways. Either during all practical sessions each subgroup has to make one topic, or all subgroups simultaneously work on the same section of the case, entering into competition with each other in search of the most appropriate solution [1].

In the first case, the study group is one team that is divided into small groups. It is important that each subgroup is assigned responsibility for what decisions it makes to the other subgroups [3]. Subgroups should always share information both during the sessions and when discussing the results. For example, the subgroup responsible for the sales policy of the enterprise should be provided with information on product prices by the subgroup responsible for developing the pricing policy of the enterprise.

The second case is characterised by a large amount of classroom practice. Each subgroup is given time to go through all the topics of the training course in sequence. Subgroups represent different teams.

Note that when organising work with a case it is necessary to have an idea of the moderation method, which is widespread in Western higher schools, then the process of managing the assignment will be much easier. Such a method aims to teach teams to make quick decisions in changing conditions under time constraints, so it is directly related to case-based learning.

Different research methods are used in this case study:

- expert (knowledge, intuition, experience);
- analytical (most often mathematical formulas);
- experimental (scientifically designed experiment).

As a result of using case method, students gain not only knowledge, but also professional skills.

In our opinion, a case, which can provide a good result, should meet certain requirements: must fulfil the initially set purpose of creation; have the right level of difficulty for students; contain aspects of economic life; remain relevant for a certain period of time; contain pattern situations; develop analytical thinking; provoke discussion among students every time.

This method is a kind of project technologies. Let us note the main difference. The usual project technology assumes the solution of the existing problem with the help of students' joint activity, and thanks to the case method, the problem and ways of its solution are formed, the basis of which is a case, which acts as a technical task and a source of basic information for structuring effective actions of students, for the initial realisation of the problem.

The function of case-study is to teach students to solve complex unstructured problems, forcing them to work with real one-on-one situations. And for students of service direction, as the research shows, such situations in professional activity are not rare.

Technological and economic sphere is one of the most changeable, so the competitiveness of such a specialist depends on his ability to quickly orientate, the case method just gives such opportunities.

Conclusion

The essence of case-based learning consists in the development of group solutions to any professional situation, involving analytical thinking of students, thanks to which students receive effective preparation for professional activities that require decision-making in rapidly changing conditions. Therefore, case study is an integral component of all student learning for effective organisation of their work in higher education and their ability to navigate in professional activities.

References:

1. Egenisova A. K., Dujsenbaeva A. I. Ispolzovanie metoda kejs-stadi v obrazovanii // Mezhdunarodnyj zhurnal eksperimentalnogo obrazovaniya. - 2013. - № 7. - S. 129-132.
2. Jin R. K. Case Study Research: Design and Methods. - Newbury Park (CA): Sage, 1989. - P. 738.
3. Makarova I.A. Chelovek - istochnik resursov. Uchastniki obrazovatelnogo processa. Put pre-odoleniya krizisa v obrazovanii. Trudy mezhdunarodnogo simpoziuma Nadyozhnost i kachestvo. 2014. T. 1. - S. 334.
4. Margvelashvili E. O meste "kejsa" v rossijskoj biznes-shkole // Obuchenie za rubezhom. № 10. 2000. – S. 56.
5. Poluhina A.K. Kejs kak sredstvo kontrolya v uchebnom processe / Sidorov S.V. Sajt pedagoga- issledovatelya. 1998. – S. 17.
6. Prohorov V.Yu. Itogovaya gosudarstvennaya attestaciya: ucheb. posobie // V.Yu. Prohorov, V.V. Bykov, I.G. Golubev i dr. – M.: FGBOU VPO MGUL, 2013. – 211 s.
7. Prohorov V.Yu., Makarova I.A. STORITELLING kak sovremennaya strategiya prepodavaniya. Trudy mezh- dunarodnogo simpoziuma Nadezhnost i kachestvo. 2019. T. 2. - S. 149-151.
8. Prohorov V.Yu., Makarova I.A. Pomoshnik v obrazovatelnom processe srednego professionalnogo obucheniya. Trudy mezhdunarodnogo simpoziuma Nadezhnost i kachestvo. 2018. T. 1. - S. 315-317.
9. Smolyaninova O.G. Didakticheskie vozmozhnosti metoda case-study v obuchenii studentov: Sb. "In- novacii v rossijskom obrazovanii". M., 2000. – S. 57-58.