New Perspectives of Case Study Technology in the Context of Studying Semi-Structured Real and Educational Problems

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Abstract

Background/Objectives: The study presents theoretical and methodological foundations of case study technology, the innovative technique of interactive education, and the relevant modern approaches in the context of post non-classical learning methods. Methods: Methodological tools of the study include the interrelated systemic-synergetic, medium-based, problem-based, cultural and historical approaches that are applied to the logic of the ideas of sustainable development and the relevant principal methods as follows: information search, systemic-structural analysis, functional integration, retrospective reflection, expert diagnostics, scientific forecasting. Findings: The obtained scientific results are of theoretical and practical value and they represent the basis for further investigations in the area of the conceptual development of theoretical and methodological foundations and of the methodology of constructing and implementing the cases. For the first time in scientific theory the categorical essence and educational mission of the case study technique have been defined in the course of investigating the semi-structured real and educational problems. The conceptual foundations have been defined and justified including the advanced ideas and principles of design and implementation of the case study technology in the process of studying the semi-structured real and educational problems. The pedagogical model has been developed for studying these problems at three levels: theoretical and methodological, psychological and pedagogical, private and didactical. Applications/Improvements: The results of the study can be used by the specialists in the sphere of education for teaching problematic materials in the process of education of bachelor and master students.

Keywords: Case Study Technology, Case Study Technology in Studying Semi-Structured Real and Educational Problems, Case Study Stages, Interactive Education, Inactivating Learning, Problem Solving Algorithm, Situational Cases, Situational Learning

1. Introduction

Innovative processes in modern educational space are aimed at developing a person who is ready to live in the fast changing social and natural conditions, who is capable of taking the responsibility in the situations of uncertainty, capable of thinking beyond the existing preconceptions and of solving the urgent and the forecasted future problems. The modern challenge, the life-long process of education actualizes such qualities of the student as the ability for self-understanding, self-determination, openness, tolerance, dialogueness, responsible attitude and conscious creative life.

With this respect, the reproductive forms of translating the subject-oriented knowledge are gradually replaced by the new technological solutions that necessitate the revision of the process of education, of the methods of the interconnections that exist between the trainer and the trainee, of the reflective tools that predetermine the efficiency of these interactions.

As “organizational and methodological tools of pedagogical process” (B. T. Likhachev) the modern
educational technologies are primarily aimed at the formation of the capabilities to use different methods of “procuring knowledge”, of their development and transformation; different methods of exchanging the information, techniques of creating new knowledge and of making optimal choice in solving the problems.

The statements above predetermine the orientation and the modern interpretation of pedagogical technology as an important set of tools for the implementation of the new paradigm of interactive (initiative, dynamic) education. In pedagogical science interactivity is regarded as one of the factors intensifying the process of education, inasmuch as the interactive education makes it possible to successfully achieve the objective of activating the educational activity for the purposes of better perception and deeper understanding of the learning material for its individualization, for ensuring the continuous and multidirectional connections in the process of education. By definition, interactivity (from to interact) implies the ability to cooperate or to carry on a dialogue. Consequently, interactive education is based on the strategy of students’ active participation in the process of education, on their inclusion in the productive coordinated activity of educational, communicational or practice-oriented nature. With this type of education the dialogue should be regarded as a factor of tolerant unification and “co-measurement” of the subjects of pedagogical interaction, of their “artistic mutual creation”.

It should be noted that educational dialogue has a number of specific features. Dialogue as “free interaction” (G.S. Batishchev) is built of a series of commensurable positions that enrich each other and that are targeted toward one and the same result. The participants of this dialogue, without losing their self-sufficiency and self-value, “sovereignty of interlocutor”, represent the preconditions and the means for changing and developing one another. According to S. V. Belova the dialogue style of education becomes the efficient situation of development where the act of learning expands into the situation that makes it possible for a man to stand up effectively and independently facing the practical relations of one's life activities.

The problem of using the ideas of interactive education in designing modern pedagogical techniques has been discussed widely in educational literary sources. Such techniques include the following: technologies of problem-module education, technology of project activity, technology of dialogue interaction, game technique, reflective technologies, informational and communicational technologies.

Apart from the abovementioned technologies of interactive education, the case study technologies are gaining ever greater popularity. The “cases” have been introduced for the first time in Harvard Business School in 1924 as an alternative to the textbooks on economics. Since then, huge experience of using business cases for educational purposes has been accumulated in the West. In Russia the technology has been justified within the investigations of A. M. Gurevich, Ye. I. Mikhailova, O.G. Smolyaninova, etc. The analysis of Russian and foreign experience shows that the practice of using the case study technology is widely spread primarily in social and economic disciplines.

Thereat, the technology of case study under the modern conditions can be enriched with the new aspects and can “drift” from its traditional application area toward the new spheres of education.

Thus, the authors have dedicated this study to the above mentioned technique. This technology realizes the ideas of conceptuality and inactivating learning. The axiological version of selecting and implementing the contents of the case is rationalized. The problem is defined as a conceptual kernel and a didactical unit of the case study technology. The place of the semi-structured problems within the contents of the case studies has been identified and the algorithm for solving these types of problems has been suggested. The case stages have been identified and justified as follows: motivational, value-normative, informational, practical and content-related. The results of applying the case study technology in the process of education of bachelor students have been presented within the framework of this investigation. The specific features of designing and implementing ecological cases have been considered.

2. Concept Headings

The analysis of modern trends makes it possible to construct the technology of the case studies in the context of post non-classical methods of learning. This technology implements the ideas of contextuality and interactivity of knowledge (F. Varela, Ye. N. Knyazeva) where the learning object is considered within the complex of the environment that is being learned (“mutual activity”), where the act of learning expands into the situation that possesses certain topological properties, “here and now”
within the aspects of the event. The event is of a complex structure in space and time: the present (which reflects the methods of interaction and behavior now), the past (the reminiscences of the past are infused into the present behavior of the subject), the future (that reflects and anticipates the ways of future behavior); in spatial aspect the event is attached to the threads that go to the nearest, the adjacent and also to the remote and the global.

The learning is inactivating in the sense that a man perceives the surrounding world through actions only. The investigations of Ye. N. Knyazeva and of other scientists18-22 develop the idea about the inextricable connection that exists between the learning and the action and that is mediated by the activities and by the interactions with the environment that affects the subject of learning and that is being customized by this subject. Thus, in the context of situational, inactivating learning there is the “resonance unity” of the self-developing subject and the medium that is achieved through adaptation, search, acquisition and expansion of senses, through mutually agreed creative activity that starts the multidimensional mechanisms of personal life creation18.

One of the productive ways of learning is now represented by the fact that the subject becomes aware of one's own attitudes toward the studied objects as toward the values that correlate with the personal needs and ideals. Understanding, considering and interpreting the content of the case represent its perception from the perspectives of values and senses. It should be highlighted that “the values are not conveyed in the same way as the knowledge: the values cannot be learned, they have to be experienced” (V. Frank)21. Therefore, along with the rational methods of perception and thinking, great significance is attached to sensual perception; the verbal and the imaginative, logic and intuition, the analytical and the synthetic acquire mutually important values. This rapprochement and mutual enrichment of different methods of perceiving the surrounding world create favorable conditions for establishing universal knowledge.

3. Results

The case study technology is founded on teaching how to solve the vital real and educational problems. In this respect the problem represents the content kernel and the didactical unit of the technology.

The experts distinguish three classes of the problems:
- Structured, or quantitatively formulated problems, where all the relevant dependencies have been identified to such an extent that they can be expressed in numbers or symbols that could be ultimately evaluated numerically.
- Non-structured or qualitatively formulated problems that contain just the descriptions of the most important resources, attributes and characteristics and where quantitative characteristics are completely unknown.
- Semi-structured, or mixed problems that include both qualitative and quantitative elements; thereat, the qualitative, poorly defined and unknown aspects of the problems tend to dominate.

The semi-structured problems are usually used for the purposes of formulating the cases. Several specific features of such types of problems are identified as follows: the decisions that are to be made are usually associated with the future; the problems have a wide range of alternatives; the decisions made require large investments of resources and contain the elements of risk; the problems are internally complex, because different resources have to be combined to solve them. The decision-making methods of such problems imply the estimation of alternatives and the selection of decisions.

General algorithm for solving these problems can be defined as follows below:
- Identifying the problem.
- Determining the aggregate of sequential logical steps for studying the problem.
- The process of problem solving:
  - Specifying the task and selecting the objective;
  - Listing or inventing the alternatives;
  - Analysis of the alternatives;
  - Presenting the results.

The process of problem solving is represented as the determination of the precise sequence of activities shown in Figure 1.

Figure 1. The process of resolving the case study of semi-structured real and educational problems.
To formulate the case different information sources are used: scientific studies, reports, statistical data, social and political journalism, Internet resources, etc.

The sequence of operations with the case includes the stages as follows:

Motivation stage. It “starts” the process of accepting the problem from the perspectives of social significance and personal sense. The subject identifies oneself in the environment that is studied, revealing its meaning and universal value, determining the direct interrelations with it. As a result of such designation and correlation the interests and needs of the person are also correlated and regulated. This stage is primarily focused on the synthetic (co-perception) emotional perception and designation of the objects and phenomena under consideration in all their harmonic integrity.

Value-normative stage is associated with the methods aimed at the diagnostics of the materials of the cases that predetermine the necessity to solve the problem, the formulation of the limitations and criteria of this solution. This stage ensures the transformation of meanings and the “revision” of personal senses and value-based knowledge in the context of the real problems of the situation. Such “experienced” knowledge cannot be learned by a person but can only be built by the trainee himself through the conscious choice of the sense among all possible senses presented by the situation. Perceived, understood knowledge and values become one's personal possession and take subjective shape. Thereat, upon becoming personally valued they do not lose their form of socially meaningful values.

Here the methods of situational analysis and simulation seem to be most appropriate. The methods of situational analysis include the following: “brainstorm” method, factor analysis, two round interview, idea generation, etc.

Informational stage is associated with the methods of morphological analysis, associations and analogies, with the methods of test questions and the collective flipchart method, round table method, synthetic method, “discovery matrix” method. The methods of simulation help anticipate the solution of the most complex problems. The principal characteristic of the model is considered to be represented by the simplification of the real life situation it describes. It should be noted that modeling is the only systemic method that makes it possible to see the options of the future and to determine the potential outcomes of the alternative decisions, and also to compare them with each other in an objective manner.

Communicational stage is of special importance in the operations with the case. At this stage the informed selection of the alternative solutions to the preset problem takes place. Here the methods of multi-criteria evaluation and expert evaluation are used along with the factographic methods that imply forecasting based on the actual data on the development of the object in the present and in the past.

Practical-creative stage envisages the constructive, creative practice-oriented activity of the trainees on the implementation of the formulated and adopted decisions. Principal methods here are associated with the implementation of the decision and with the estimation of the obtained results.

Principal results of the operations with cases can include the development of the new educational product and the acquisition of the experience in solving the real problems. The students acquire good command of different methods of processing the new information aimed at definite result: orientation in modern flows of information, ability to work with different sources of information, to evaluate and to critically summarize journalistic, scientific and technical, interdisciplinary and professional information, to present the results of one's activities in individual or collective projects as reports and presentations. Besides, case study as an informational-communicational process is accompanied by the development of communicational competence through joint productive activity.

The development of conceptual foundations of the innovative technology and its implementation have been undertaken within the framework of the scientific research projects carried out at Fgboou Waugh K. Minin Nizhny Novgorod State Pedagogical University and Fgboou Waugh N.A. Dobrolyubov Nizhny Novgorod State Linguistic University.

As an example the authors of this study will describe the results of the investigation that was undertaken for the purposes of the scientific research project called “Theory and methodology of investigations of eco-design in megalopolis urbanized environment: scientific and educational discourse” implemented by Fgboou Waugh K. Minin Nizhny Novgorod State Pedagogical University under governmental assignment No. 2014/362.
which made it possible to identify a number of peculiar features in the development and implementation of the case study technology in studying semi-structured real and educational problems in the course of teaching the bachelor students at the Department of “Environment and Natural Resource Management”.

The authors of this study believe that the situational case creates optimal conditions for teaching how to solve the real and educational environmental problems based on the quantitative and qualitative information that is contained within these problems and that formulates the ecological problem, ensures the search, the selection and the justification of the optimal way to resolve this problem pursuing one of the available options.

The process of developing a situational case represents an aggregate of sequential activities as follows:

- Choosing the real environmental problem (space-time parameters, historical context, additional information that is an extra source of motivation for the trainees). The ecological problem is either presented “openly” or it has to be found in the information that is given within the case.
- Collecting the required information (statistical, factual) for analyzing the ecological problem and for searching for the alternative options of its justified resolution.
- Building the process chart of the ecological case that should include the assignments to organize the sequence of activities of the students to solve this environmental problem and to present the results of their activities.
- Introducing the ecological case into the process of education.

Within the system of ecological cases there emerges a “storyline” of the implementation and of studying the environmentally focused content within the triad: understanding – value orientations – practical activities. It has been established that ecological cases help ensure the following:

- Conscious and purposeful methods of perceiving the regularities of the organization of the ecological-cultural space, of its spatial-hierarchical differentiation, of studying the ecological spatially oriented interrelations between man and the environment (ecological interactions), of perceiving the ecological problems and situations as environmental contradictions and the ways for their optimization, etc.;
- Reflective methods of learning the objects and processes of the environment, focused on the “things that should be”;
- Deep purposeful reconstruction of the whole aggregate of personal senses in the context of co-evolutional investigation and creative transformation of the environment.

Apart from the intrinsic algorithm for solving ecological problems, environmental cases possess great world outlook potential. They actualize the perception of the role of man in the interrelations with nature, one’s responsibility for the nature and for the existence of humanity, rethinking one’s attitude toward life based on the principles of “ecological imperative” (N.N. Moiseyev), “reverence for life” (A. Schweitzer), “ecological consciousness” (A. Leopold). Moral principles orient the person toward the activities which are consistent with nature and culture within the environment and which are characterized by co-operation and mutual assistance. They predetermine the new understanding of the processes of interactions between man and nature based, on the one hand, on “multi-variant vision of the world” and, on the other hand, on the search for the “new unity” that would overcome the alienation of the human world that puts man “in the very center of the laws of the universe” (I. Prigozhin).

As a result of the investigation the conclusions have been made as follows: 1. The construction of situational cases is founded on the real ecological problems (problems of science, wide spectrum of practical activities and ecological ethics). 2. Situational case in ecological context ensures setting the problem as triad: understanding the ecological problem – environment-based value orientations – practical environmentally creative activity. This peculiar feature makes these cases different from the business-cases where the contradictions are reconciled at the level of formal logical thinking. 3. New knowledge and understanding “are born” in the course of the learning prognostic activity that includes different types of ecological thinking. 4. The domination-over-nature value orientations are overcome through the communicational activities. 5. The resolution of environmental situations results in the formation of the students’ ecological culture as an integral quality of the personality expressed through the aspects of cultural and ecological competences and spiritual and moral qualities of person.
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4. Discussion

Innovative trends, values and senses of the modern education have changed its targeting at the achievement of personal and socially meaningful results; the emphasis has shifted toward the development of man, of the one who is prepared to live in the fast changing social and natural environment, who is capable of taking responsibility in the situations of uncertainty, of thinking beyond the existing conceptions and of solving actual and expected problems.

These statements precondition the new focus and the modern interpretation of pedagogical technology as the important tools for the implementation of the new paradigm of interactive learning that realizes the principles of inactivating, situational, projective, constructive perception in the form of an open dialogue.

This work considers the case study technology in investigating the semi-structural real and educational problems as the precondition for implementing the ideas of situational, inactivating learning.

5. Conclusion

Under the conditions of modern educational practices, the reproductive forms of translating the subject-oriented knowledge are replaced by the new technological solutions that make it necessary to rethink the processes of education, the methods of interrelations between the teacher and the student, the reflective mechanisms that predetermine the efficiency of the interactions between them.

It has been established that applying the case study technology to investigating semi-structured real and educational problems would help identify the processes of understanding, evaluating and applying the knowledge to solving scientific and educational problems and to obtaining new experience in learning, communication and action; would help the students develop unorthodox thinking, the ability to see the problem and its solution in one's own way, the ability to justify one's own vital values, the willingness to come into partnership demonstrating tolerance towards one's opponents.

It should be noted that the theoretical, methodological and methodical results obtained in the course of the investigation have been proven in different spheres of practical applications including the comprehensive complex of programs and textbooks.

6. Acknowledgements

The study has been developed within the framework of scientific research project “Theory and methodology of investigations of eco-design in megalopolis urbanized environment: scientific and educational discourse” implemented at FGBOOU WAUGH K. Minin Nizhny Novgorod State Pedagogical University under governmental assignment No.2014/362 and based on the scientific research studies carried out at the Department of German Language and Translation Theory and Skills of FGBOOU WAUGH N.A. Dobrolyubov Nizhny Novgorod State Linguistic University.

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