Competence Raising Through Teaching of Sustainable Development Environmental Key Topics Implementing "Project Method"

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Abstract

Higher education in Armenia is currently facing the pressure of reform as well as tremendous opportunities for development. Implementation of these reforms is conditioned by the fact that **competence** is emphasized among knowledge, abilities, skills and values. The package of reforms also requires a new introduction to global environmental issues in higher education. In the conditions of the present ecological crisis one of the most important issues is to develop new approaches to ESD in higher education. The main problem of ESD is to raise the competence and participation of learners regarding environmental protection and resolution.

The UNESCO Chair on "Education for Sustainable Development" at the Center for Ecological-Noosphere Studies of the National Academy of Sciences of the Republic of Armenia in cooperation with the National Institute of Education of the Armenian Ministry of Education and Science are carrying out a series of trainings and seminars for educators and students from pedagogical institutes to increase their competence on key environmental topics in the context of sustainable development implementing project method of teaching. Pedagogical-oriented universities and vocational training institutions have been chosen, where trainings and seminars have been carried out with the best students and the teaching staff using project method. In the result of the trainings and seminars 44 teachers and learners from 5 universities, 3 vocational colleges, 5 high schools, 3 NGOs were trained in 3 regions of the Republic of Armenia (with different environmental problems). Evaluations were carried out and the best tested projects were presented at round table discussions.

Key words

Project method, education for sustainable development, environmental issues, different teaching methods, sustainability, competence.

Abstrakt

Vysokoškolské vzdělání v Arménii v současné době čelí tlaku vzdělávacích reforem, jakož i novým rozvojovým možnostem. Realizace potřebných změn souvisí s tím, že kromě znalostí, schopností, dovedností a hodnot jsou v procesu učení zdůrazňovány kompetence. Balíček reforem rovněž vyžaduje nové uvedení do globálních otázek životního prostředí ve

vysokoškolském vzdělávání. V podmínkách současné ekologické krize je jedním z nejdůležitějších úkolů navrhnout nové přístupy ke vzdělávání pro udržitelný rozvoj ve vysokoškolském vzdělávání. Hlavní cílem tohoto typu vzdělávání je pak zvýšit kompetence a účast žáků v ochraně přírody a při rozhodování.

Tzv. UNESCO Chair ve vzdělávání pro udržitelný rozvoj v Centru pro ekologicko-noosférických studií Národní akademie věd Arménské republiky ve spolupráci s Národním institutem vzdělávání arménského Ministerstva školství a vědy realizují řadu školení a seminářů pro pedagogy a studenty z pedagogických ústavů – cílem je zvýšit jejich kompetence v klíčových oblastech a tématech životního prostředí a v kontextu udržitelného rozvoje, a to prostřednictvím projektové metody výuky. Pro tato školení a semináře byly vybrány pedagogicky orientované univerzity a instituce odborného vzdělávání, kde se výuka vedla projektovou metodou s vybranými nejlepšími studenty a vyučujícími. Během těchto školení a seminářů (zabývajících se různými problémy v oblasti životního prostředí) bylo proškoleno 44 učitelů a studentů z 5 vysokých škol, 3 odborných škol, 5 středních škol, a 3 nevládních organizací působících ve 3 oblastech Arménské republiky. Byla provedena evaluace a nejlepší vyhodnocené projekty byly prezentovány na diskusích u kulatých stolů.

Klíčová slova

Projektová metoda, vzdělávání pro udržitelný rozvoj, otázky životního prostředí, různé vyučovací metody, udržitelnost, kompetence.

Introduction

Society regularly provokes rethinking of content knowledge and purpose. Educational reforms are aimed at fostering citizens' competences, essential knowledge and skills required for effective professional performance of real-world tasks. Higher education in Armenia is currently facing the pressure of reform. Implementation of these reforms is conditioned by the increasing emphasis on **competence** alongside knowledge, abilities, skills and values (Galoyan 2013, Stoof 2007).

The Council of Europe defines educational competence as the ability and willingness of an individual to learn throughout their whole lifespan. Encouraging educational competence involves:

- the promotion of the formation and development of research, communication and collaborative skills of learners,

- leading learners to publically beneficial activities,

- excellent oral and written communication skills to eliminate social isolation (Key, 2006).

The right to education is a basic human right. It is also a prerequisite for sustainable development and the most important factor for effective management, rational decision-making and the development of democracy. An awareness of issues and engagement in problem solving, changing attitudes to make the world more secure for an improved quality of life, developing competences and critical thinking, providing orientation in different circumstances and carrying out research are all key. There is a growing need to include innovative *technologies* in today's educational system, as it is impossible to solve environmental problems using only disciplinary teaching methods. Recenty-developed active methods have been supplemented with new elements to develop *educational technology*. Using new *educational technologies* with the components of content embedded in the learning process enables the presentation of current global environmental challenges at local, regional and global levels. Implementation of *project method* as one of the educational *technologies* equips learners with knowledge, helps them to form specific abilities and skills to become competent citizens in different life situations.

The *project method* is considered to be an essential and innovative part of the learning process. Projecting is basically used in different fields of human activity. *Project method* in the learning process is interactive. It contributes to gaining self-knowledge and helps to facilitate students' development of the skills and abilities. (Gasparyan 2013, Danielyan 2013, Salnikova 2011). The word "technology" comes from the Greek word, techne, which means "art, skill, cunning of hand", and logia,- "speech, science". Only in the mid-20th century, western countries, encorporating new technological means in learning proces, started to use *educational technology*, which is the form of organization of the learning process **(e-learning)** (Ispiryan 2011).

Lifelong education in ecology is a component at a number of different levels of the educational system of the Republic of Armenia. Currently reforms in the educational sector are aimed at improving the performance, efficiency and effectiveness of the sector, while ensuring high quality and equal access to education services for all, as well as improving transparency and accountability across the sector. This package of reforms requires a new way of integrating global issues into the educational sector based on the key topics outlined in the strategic program on ESD. On behalf of other countries Armenia has also joined the process implemented in frames of the "Decade of Education for Sustainable

Development", and takes the responsibility for its successful realization. According to the UNECE Strategy adopted in the framework of the Decade of ESD, the key environmental topics on SD are also taught in higher education (UNECE Strategy 2005). They are addressed through the implementation of educational technology, enabling learners to gain new knowledge, develop special competences, skills and values oriented to diverse situations and carry out research work (Stoof 2007).

In the conditions of the present ecological crisis one of the most important issues is to develop new approaches to ESD in higher education. The main problem of ESD is to raise the competence of the learners relating to environmental protection and resolution of these issues via direct participation i.e. to develop a competent citizen.

Environmental education, which is one of the components of ESD consists not only of education and learning but also informative and participation functions. In this case environmental education is viewed as a unique socio-cultural activity, which must be carried out by a competent citizen (Sergeyev 2007).

Modern environmental education is directed to:

- support dissemination of information on environmental protection and its historical development;

- develop new methodological standards and the conditions of scientific approaches to environmental problem-solving;

- raise society's civil responsibility for participating in environmental problem-solving processes with regard to sustainable development;

- strengthen learners' necessary and valuable knowledge of and orientations towards the ecological and social dimensions;

- support the creation of a harmonious relationship in the system composed of society, nature, and the economy.

Each period of time has its own special ecological paradigm that expresses the views, principles, conditions and relative sustainability of values which characterize the relationship between humans, nature and society. If until the second half of the 20th century, the ecological paradigm tended to the anthropocentric idea i.e. everything for mankind, then in the 1970s a new paradigm appeared: an environmental or ecocentric paradigm, characterised by the following features:

- harmonious development of nature and society; a beneficial unity,

- scientific decision-making to satisfy human needs,

- global activity of environmental systems and implementation of new technologies.

This package of reforms requires a new way of integrating global issues into the educational sector based on the key topics outlined in the strategic program on ESD. Application of new educational technologies with the components of content knowledge in teaching enables to present current global environmental challenges at local, regional and global levels (Law, 2014).

To incorporate the component of competence it is necessary:

- to formulate education objectives,

- to form the purpose of content knowledge,

- to develop educational technologies to allow mastery of the content,

- to develop appropriate evaluation systems,

- to prepare teaching personnel (Galoyan, 2004).

**Three components can be distinguished in educational process:**

1. **Methodological –** issues concerning the content and presentation of the content-related issues,

2. **Teacher's experience and skill –** conditioned by subjective factors,

3. **Technological component –** operating separately in educational process (Zimnyaya 2006).

Project method

Environmental problems regularly challenge educators trying to provide appropriate knowledge to different age groups. Environmental education is a dynamic, continuous and developing process that requires the introduction of new knowledge. To solve these problems new educational technologies are being incorporated in higher education, especially project method, where both practical and theoretical work is carried out by practitioners (Pakhomova 2000, 2003, Ispiryan 2011).

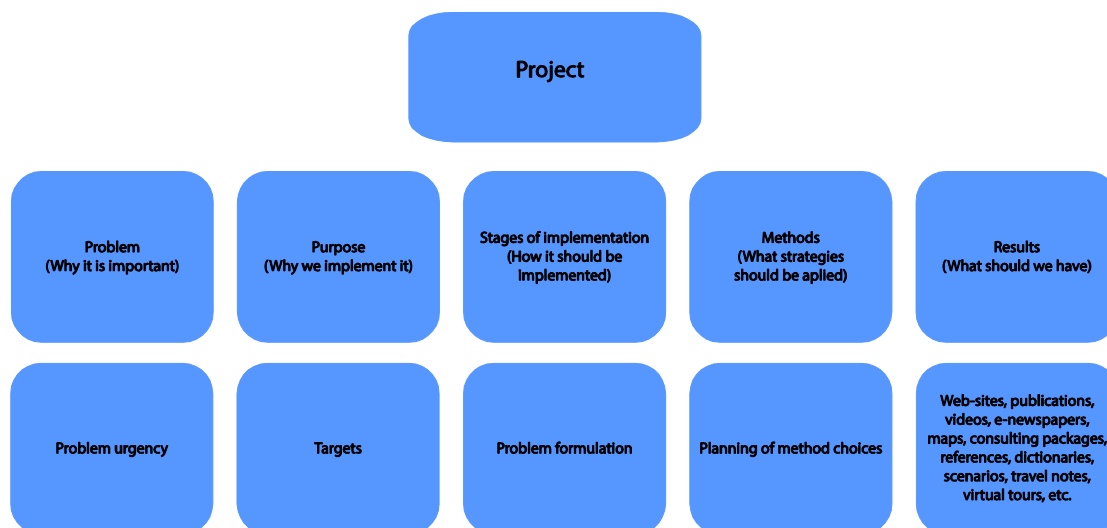Working with project method requires appropriate intellectual abilities i.e knowledge

Intellectual abilities required to work when implementing project method
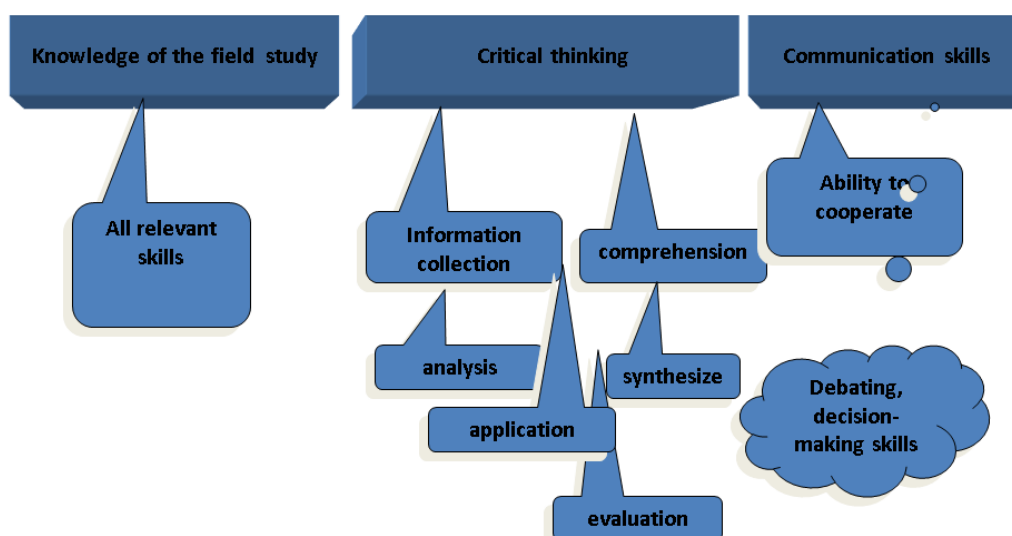
of the field of study, critical thinking and communicational skills (See scheme N 1).

Literature studies indicate and the scheme N 1 shows that the project method helps learners to gain new knowledge, take responsibility, organize research work, offer solutions, all the while simultaneously participating in these processes (Epshtein 2002). This will help foster citizens with critical and creative thinking competencies who can make decisions based on evidence, laws, standards, views, experiences and opinions. Becoming active and information-fluent persons, they are sociable with associates (Ispiryan, 2011; Petrosyan, 2012; Golub, 2003). When studying environmental issues the project method allows implementation of group or individual learning (Pakhomova 2000, 2003).

The development of this project method is complicated but purposeful work (Scheme N 2).

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│  important)  │ │ implement it)│ │ (How it should be  │ │ strategies   │ │  we have)    │
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│              │ │              │ │                    │ │ choices      │ │ videos, e-   │
│              │ │              │ │                    │ │              │ │ newspapers,  │
│              │ │              │ │                    │ │              │ │ maps,        │
│              │ │              │ │                    │ │              │ │ consulting   │
│              │ │              │ │                    │ │              │ │ packages,    │
│              │ │              │ │                    │ │              │ │ references,  │
│              │ │              │ │                    │ │              │ │ dictionaries,│
│              │ │              │ │                    │ │              │ │ scenarios,   │
│              │ │              │ │                    │ │              │ │ travel notes,│
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In scheme N2 all the elements of the project method are interconnected with each other. Research plays a key role as it is a system component and forms the learner's worldview.

As a result of the project method learners create websites, make publications, videos, e-newspapers, maps, consulting packages, directories, dictionaries, scripts, travel notes, virtual tours and more .

The **project method** is a multilevel system of associated phases which includes four main phases:

- preparatory stage,

- planning stage,

- organizational research stage,

- results presentation stage.

The project involves the learner's initial collection and study of information.

The project activity is based on the active application of practical elements. Project method has the following advantages:

- It helps to strengthen academic motivation;

- All positive achievements of the learners are combined;

- Learners get the chance to express themselves and have real freedom of choice in proposing goals and rules;

Becoming an active entity, they are fluent in information and open to their surroundings.

1. The preparatory stage prior to the project includes the following steps:

The project manager:

- Presents the problems providing learners' interest.

- Introduces learners to working activities, rules and assessment criteria of the project method,

- Forms project groups taking into consideration the learners' interests, individual capacity.

- Specifies the work to be done.

- Selects heads for each group.

- Decides tasks of each group corresponding to educational standard requirements.

2. Planning stage:

- Hypotheses are proposed to solve the problems.

- Possible results are discussed.

- Interim and final dates /schedule/ for work implementation are determined.

- Educational problems are distributed among the participants.

- Working plan is drawn up

- Information collection is recommended.

3. Research stage includes the following steps:

- Information collection and processing (information sources can be queries, views, experience, reports, as well as books and periodical publications, internet) and intermediate problem-solving.

- The chosen topic is substantiated and it is compared with proposed hypotheses and issues.

- Survey results are registered.

- Presentation of the work in the form of statement or report

4. ***Result presentation stage***

The stage includes the following steps:

- Result preparations;

- Presentation of the project results;

- Discussion of implemented work during the project;

- Assessment of the project work with the whole group and with each participants.

Project realisation

In 2013-2014 in the framework of the topic on "Teaching environmental issues using educational technology" funded by the state budget, international practice was studied. The project method is considered to be fundamental and innovative for organizing evironmental education. Since the 1990s project method has had its own place as a non-traditional teaching method among educational technologies, which are being carried out in leading countries of the world. It motivates the learners to carry out research and creative activities and gives an opportunity to find ways for problem solutions. Some active teaching strategies and forms are being replaced by educational technologies, to which our research work is devoted. Practices of European countries, the Russian Federation, the USA and Canada were studied. They were developed and presented during the training courses.

Vocational training institutions of higher education and participants representing different levels and realizing a formal education have been chosen. A training programme was prepared and implemented in two regions of Armenia and in Yerevan for a group of specialists. Teacher trainings and seminars were carried out in cooperation with the National Institute of Education of the Ministry of Education and Science and "ATP" charitable Foundation. UNESCO Chair on "Education for Sustainable Development" of the Center of Ecological-Noosphere Studies of NAS RA, specialists from GIZ, an organization providing education on "Sustainable Management of Biodiversity in the South Caucasus" participated as well. Consultations in various professional institutions were held. A plan was drawn up for the project process organisation, information was collected, topics and stakeholders were specified.

The next stage trainings and seminars were carried out for educators, students of pedagogical universities and the International Scientific-Educational Center, as well as for educators in cooperation with the UNESCO Chair on "Education for Sustainable Development" of Ecocenter, the National Institute of Education and Armenian Tree Project charitable foundation in the environmental education centres at the villages of Karin and Margahovit. The aim of the trainings was to introduce stakeholders to the project method and how to implement it during teaching ESD environmental topics (Abramyan 2014).

For this purpose a project was carried out involving both work done inside and out-side the classroom. Setting up the project, conducting the project activity, and presentation of the results was done inside the classroom. This project was implemented in the framework of natural and social science courses introducing key SD issues.

On the basis of these considerations, key environmental topics of sustainable development were chosen and developed through the use of different teaching methods:

- Biological and landscape diversity;

- Environmental protection (waste treatment);

- Ecological principles/ecosystem approaches;

- Climate change;

- Management of natural resources (including water, land, minerals, energy).

After projects were carried out and discussed in various educational institutions, reports on the most illuminating examples were published.

In 2013-2014 our work was conducted in the following stages:

1. Review and analysis of international experience;

2. Specification of the key SD environmental topics and drawing up the corresponding working plan;

3. Trainings and seminars with educators who are carrying out both formal and non-formal education;

4. Testing the key SD environmental topics, teaching and monitoring in various institutions through the project method (4 universities, 5 vocational colleges, 5 high schools, 3 NGOs);

5. Round-table discussions, presentations of best practices and recommendations;

6. Publishing the handbook including selected projects.

Results

Our observation shows that implementation of the project method in different higher education settings resulted in the beneficiaries (educators, students, teachers) gaining the following knowledge, skills, values and competences:

- advanced environmental knowledge,

- special competences to orientate themselves in the field of information and different situations,

- competences needed to carry out research,

- environmental-cultural values to use critical thinking to find innovative solutions.

Knowledge exhibited during the teaching process of the trainees (teachers and students of pedagogical institutes) shows the level of their competence development. Trainees' attendance at the lessons and monitoring make it possible to evaluate the effectiveness of trainings.

A methodological manual for educators of both natural and social sciences is in preparation which includes best practice examples to promote the implementation of the project method. It also provides an introduction to the new competences being developed.

Conclusion

As a result 44 teachers and learners from 5 universities, 3 vocational colleges, 5 high schools, 3 NGOs were trained in 3 regions of the Republic of Armenia (with different environmental problems). Environmental topics were specified and assistance was provided to the participants to carry out projects.

The choice of working topic was substantiated as well as the goal and objectives, educational technologies implemented during the work were described, information sources were discussed. Testing of the key SD topics teaching using the project method was implemented in 5 different formal and non-formal educational institutions. Round tables and discussions were organized and recommendations were made. These recommendations have been included in scientific articles and a methodological handbook (Gasparyan, 2013, Gasparyan, 2014, Abramyan 2014).

Through the implemented project method learners were given an opportunity to :

- think about environmental issues in a unified and integrated manner,

- work individually and in groups,

- develop conclusions from research work,

- make decisions and find solutions to various real-life situations for interdisciplinary analysis.

We can conclude that the aim to provide a competence component in the educational design has been provided.

Acknowledgements

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The UNESCO Chair was founded in 2011 on the basis of the Center for Ecological-Noosphere Studies (a research organization carrying out fundamental and applied studies in ecology and environmental protection) as a principally new type of a UNESCO Chair. The Center for Ecological-Noosphere Studies of the National Academy of Sciences, Republic of Armenia (Ecocenter NAS RA) unifies a number of laboratories and individual researchers involved in the field of ecological studies and generating interesting ideas.

Multidisciplinary investigations performed in the Ecocenter are oriented at the complex assessment of ecological state of territories and development of scientific and methodical fundamentals of ecological expertise and optimization of natural resource management processes.

The main purposes of the UNESCO Chairs on "Education for Sustainable Development" are to promote ESD, as wellintegrate scientific, educational and innovation processes.