The 6th International Conference Edu World 2014 “Education Facing Contemporary World Issues”, 7th - 9th November 2014

Inter- and transdisciplinary issues present in the school curriculum

Carmen-Gabriela Bostan*
Institute of Educational Sciences, 37, Str. Stirbei-Voda, Bucharest, Romania

Abstract

Present paper depicts aspects inter and transdisciplinary present in mechanisms and enforcement practices in the education curriculum. The research methodology approached is based on questionnaires distributed to teachers and students in two representative samples: schools with poor results in national and international assessments and schools with good results. The research results were developed from the analysis of mathematical statistics, in order to study the mechanisms of inter-and transdisciplinary curriculum implementation. As a novelty element, the research supports the new educational policy that aimed at increasing the adaptability of next generations to labour market of modern contemporary society.

Keywords: curriculum; inter and transdisciplinarity; didactical research; enforcement mechanism; education.

1. Introduction

The contemporary society, through spectacular progress of science, engineering and technology forces us to adapt to these challenges, whose are main feature is the complexity. Never before has the humanity experienced such complex problems, both in terms of causes and effects and in terms of their impact on people.

The complex and integrated character of such issues as globalization, migration, interculturality, environmental protection, informational explosion, poverty, conflicts, etc. claim a transdisciplinary educational approach. The establishment of a transdisciplinary culture, that might help eliminate tensions that threaten life on our planet, is impossible without a new type of education that take into account all dimensions of the human being. ”(Nicolescu, B., 1999)

* Corresponding author. Tel.: +4-021-313-6491; fax: +4-021-312-1447.
E-mail address: cagabosro@gmail.com
The change of perspective from mass production to the flexible market requires skills and knowledge more extensive than those provided by previous majors.

School systems must respond to changes in external conditions that redefine the needs that society has towards future generations.

Transdisciplinarity implementation in school supposes integrated approach to knowledge which is in same time between, within and beyond disciplinary; the finality is the present world, which implies the unity of knowledge, purpose that can not score in disciplinary investigation. Inter and transdisciplinarity are closely related, there is no clear line of demarcation between them, often overlap and, therefore, I think it can not be addressed separately, but together. However, interdisciplinarity presupposes transfer of methods from one discipline to another, which can create new disciplines, with the ability to multiply disciplinary boundaries, while transdisciplinarity transgress them. Disciplinarity and transdisciplinarity are not antagonistic but complementary; disciplinary research is put in a new light through the opening transdisciplinary in core of which is human subject, namely teacher, pupils and emotional relations between they and the object of knowing / corresponding learning experiences.

The central objectives of „Lisbon Agenda for growth and jobs” are education and training in 2020. It envisaged improvement the skills of all citizens required competitiveness, equity and social inclusion by creating a knowledge triangle.

The emphasis from Official Journal of the European Union (OJ C 142, 14.6.2002, p.1.) is on European cooperation in education and training policy in the Member States, thus contributing to the mobility of pupils, students and teachers. Based on these approaches, in May 2009, the Council has signed (Education and training 2020 - ET 2020) Strategic framework for European cooperation in education and training. It is based on developments in the period 2007 - 2009 found in the evaluation of achievements and national reports, focusing on the implementation of key competences (Official Journal of the European Union OJ L 394 of 30.12.2006).

This requires a new vision about education that is consistent with the modern, the technological and informational society in which we live in accordance with social, political and economic changes recent years. Educational reform requires taking into account both student and teacher and new skills both students and the teachers. Adaptation of teacher skills to curricular changes in the school system must take into account the factors that generated curriculum reform – the implications of science and technology developments, socio-cultural, economic and political aspects, both on the education system and labour market dynamics. It is needed that the scheme of teacher training system to respond to curriculum developments, technology training (teaching-learning methodology), teaching methods, educational tools that teachers should be trained to use them properly. Major trends of educational reforms at European level are: education for all, the relevance of the curriculum to the individual and society, the development of desirable attitudes and values, skills, critical thinking, concern for the adequacy of the training to the needs of each individual, maximizing the potential of every child, student-centred teaching and learning, curriculum centred on the demands of society, holistic assessment of the performance, adaptability in the labour market.

The contents of modern education are influenced by three types of factors and conditions:
multiplication of sources and messages of contemporary world;
changes in the finalities structure of education;
need to build unity and completeness of students' personality (Manolescu, M., 2013).

In this context, in 2012, Curriculum Laboratory of the Institute of Educational Sciences has developed research report "Mechanisms and enforcement practices and curriculum development at school level and class level."

1.1. Theoretical proof

Demarches of inter and trans-disciplinary approaches, and capitalization their for personal and social level have general objectives the analysis of
• advantages, difficulties and limits of inter and trans-disciplinary curriculum approach using a variety of strategies and technologies teaching;
• impact of inter-and transdisciplinary approaches, on society and everyday life;
• way in which development of capacity type transdisciplinary assists increasing personal and professional in contemporary society.

Curricular change creates mechanisms to promote innovation through dissemination which seeks to hasten the slow processes of change, so that triggered phenomena can reach critical mass which, in turn, could bring a fundamental change respectively a mutation in the whole system.

For success, any intended for changing curriculum developed by educational policies have to find a favourable psychological climate in society, to educators, will be supported without reserve by all educational institutions to foster autonomy and creativity of those who would adopt it.

The research takes into account that the formation of cognitive tools consist of:
• stages / levels: early treatment (sensations) primary deep processing (perception), forming mental images (representations) abstract mechanisms (thinking): 1. integration 2. categorization and conceptualization 3. building reasoning 4. problem solving, 5. decision-making, mechanisms of retrieval systems (memory)

2. Research presentation

The present paper is based on research of the Laboratory Curriculum in 2012, with attempts to link the normative policies and implementation of this in curriculum management at school level and class level. The choice of schools under analysis was made taking into account the results of the international test TIMSS 2007 and at national tests, so the study was held for schools in which students have achieved good results in international assessments and national assessments, or schools that ranked poorly (N = 6, 3 rural, 3 urban). The aim of this approach was to identify elements that can support changing educational practices in line with school policies, and impediments to their implementation.

In order to analyze the modes of interpretation, development and adaptation of the inter- and trans-disciplinary curriculum and which factors influence each school, we used questionnaires for teachers and students. It aims how learning experiences of students are valuated, the characteristics of creative application of inter and transdisciplinary teaching - learning - assessment practices, the links between the mechanisms and practices in the applied curriculum and student assessment, implemented of curriculum as interpreted by the main actors participating in the educational process: those who put into practice - teachers and those to whom it is addressed - students. At the same time, the research has proposed to establish a cross-case analysis to examine the extent to which inter and transdisciplinarity are present in the mechanisms and practices of curriculum development and implementation in the two groups of schools, the common aspects of the two samples and if any practice for a specific category.

The total number of subjects interviewed is 146 teachers and 360 students in the seventh and eighth grade, (of which 232 in urban and 128 rural). Subjects' selection in the sample was done in each school unit.

The research instruments taken into account in this study are the followings questionnaires-questions for the teachers (Qx) or students (Ex):
"Q1 - To what extent, when you want to run an otherwise lesson than usual you are considering the matters listed in the table below? (1) The knowledge of student needs, (2) Skills development of the student, (3) Prior knowledge of students, (4) Emotional needs of students, (5) Learning styles of students, (6) Time assigned to the lesson, (7) Materials available (8) Peculiarities of students age (9) Development of critical thinking capacity, (10) Development of problem solving capacity, (11) Capacity development collaborative (12) Relevance of taught topic in conjunction with real-life problems, (13) Correlations with what students have learned in other disciplines (14) Student group, (15) Arranging furniture, (16) A potential rejection reaction of students (17) Parental reactions, (18) Director reaction (19) Colleagues reactions."

"Q2 - What are the effects of using project-centred teaching strategies that students’ have on learning and behaviour?"

"Q3.10 - To what extent do you consider the issues listed below are important, because positively influence the learning process in the classroom? - Valorisation of learning outcomes achieved by students in other contexts than school."

"Q4 - How much references does it make to teaching - learning - assessment process to the knowledge and applications by curriculum subjects in the same area?
1. Every lesson;
2. More than half of the hours taught;
3. Less than half of the hours taught;
4. Never."

"E1 - To what extent does the issues mentioned below helps you learn in class? - Recovery of learning outcomes achieved by students in other contexts than school."

"E2 - Do the teachers ask you to make connections between information taught in various disciplines (eg, between mathematics and physics, between history and geography, etc.)?
1. Yes, most of the teachers;
2. Yes, some teachers;
3. Yes, few teachers;
4. No."

2.1. The correlations between what students have learned in other subjects, references to knowledge and applications of disciplines in the same curricular area, in teaching - learning - assessment process.

The correlations study between concepts that are learned in other subjects was done through questions Q1, Q4 and E2, applied for a sample of 146 teachers and 360 students in the seventh and eighth grade of which 232 urban and 128 rural.

In the chart based on the statistical processing of the question Q1 applied to the teachers shows that 54.11% of them make largely correlations and 38.36% to some extent, which means a total of 92.47%. It can conclude that the majority of teachers call in process of teaching - learning - assessment to knowledge acquired by students in other disciplines.
Fig 2 Correlations with what the students have learned in other subjects

From the replies to the question Q4, shows that the overwhelming majority - 97.90% of teachers resort to common concepts of several disciplines in the same curriculum area. Among them - 79.40% make such correlations in more than half of the allocated discipline, while 18.50% refer to shared experiences occasionally.

Student responses to question E2 come to certify the results of research on teachers’ responses. Thus, 94.26% of teachers require them to perform more or less the correlations between concepts learned in various subjects.

Fig 3. Teachers require students to make connections between the information taught in various subjects

If the study is conducted by areas of residence, it appears that in the city, the percentage is 91.80%, while in rural areas is 99.20%. It seems that interdisciplinary activities have a higher incidence in the countryside - 92.20%, while the percentage is lower city - 69.80%. Statistics informs that on the whole we have an average of 77.8% of teachers asking students to make links to the information gained from other disciplines.

If we make an average of correlations that arise from two questions (Q1 and Q4) applied to teachers, we obtain 95.19%. From processing student responses we obtain a value very close - 94.50%, the deviation is only 0.69%, which demonstrates honesty of responses of the two samples of key actors in the educational process.

In underperforming schools sample, most teachers said that in more than half of the hours taught, they require students to make correlations. But student's replies are divided on the request to make correlations. When it wants to conduct a different lesson than usual, all of teachers request to achieve correlations with what students have learned in other subjects, in a very large extent. (fig. 3)

When making the teaching design, teachers surveyed consider they have view to achieve correlations with what students have learned in other subjects; it makes connections between knowledge and application of the disciplines in the same curricular area, in the activities of teaching - learning - evaluation; interdisciplinarity is not considered a limiting factor in the application of the provisions of the classroom curriculum, on the contrary it is taken into account in creative curriculum application.

At good schools sample, the majority (95.43% of students) claim that references are made to get the knowledge and the applications learned in other subjects in the same curricular area, in teaching - learning - assessment activities (fig. 3).

The correlations with what students have learned in other subjects, reference to applications and knowledge from other disciplines in the same area curricular, in teaching-learning-assessment activities are considered by most teachers as very important / significant average. Teachers say that doing reference in the teaching-learning-assessment activities, to get the knowledge and the applications of the disciplines in the same curricular area in less than half the lessons taught, this opinion being expressed by about half of the respondents. Over a quarter of them claim that they make references in more than half of the hours taught, and less than a quarter to each lesson.

When asked if teachers ask them to make connections between information taught in different subjects, two-thirds of the students surveyed replied affirmatively, stating that there are some teachers who ask them make such a connection. It is noted that the rest of the opinions expressed are distributed relatively similar between the formulation of such request by most of the teachers, or few teachers or also the denial of such a request.
2.2. Valuing the learning outcomes achieved by students in other contexts than school

The valorisation of learning outcomes achieved by students in other contexts than school were analyzed through the results obtained from the answers to questions Q1.12 and Q3.10 conjunction with E1

The results show that when they carry out a lesson differently, most teachers (i.e. 93.80%) take into account relevance of the topic taught in relation to real life (largely - 66.40% certain degree - 27.40%) The valorisation of learning outcomes achieved by students in other contexts than school positively affects student learning in the classroom, both in teachers’ opinion and in the students’ opinion. In minority proportion (96.6%), teachers agree that in teaching all learning outcomes are capitalized.

Only 83.30% of students say that learning outcomes are valorised in other contexts than in school.

It is noticed a very good agreement between the views of two groups of actors of the opinion that their learning outcomes in other contexts than the school is important. For appreciation very important there is a considerable gap in favour of teachers 14.9%, while for moderate balance is 7.80% for students.

![Fig. 4 Valuing of learning outcomes achieved by students in other contexts than school. Comparative study, teachers - students](image)

At underperforming schools sample, approximately two-thirds of teachers participating in the research considers that their areas teaching are relevant to real life problems in very large extent and large extend. The responses show that teachers place school knowledge not only in relation with the formal education; but it results a networking between school knowledge and social knowledge - nonformal and informal education.

At Good Schools sample in plan of class curriculum application, their learning outcomes achieved by students in other contexts than the school has a great importance for more than three quarters of respondents teachers. This is just once linked to the phrase "creative curriculum implementation", whose process was described by teachers, according to their views expressed through the open questions. For students, their learning outcomes achieved in other contexts than to school, receives an appreciation of (very) high significance for three-quarters of respondents.

2.3. Topic relevance to real life problems; involving students in solving real problems in the school community

The tendency to nearness the school offer to real life is reflected into account by 93.8% of questioned teachers by relevance of topic taught in connexion with real-life problems (Q1.12) as one of the factors of great influence over the decisions that they take when they want to teach a different lesson than usual.

The analysis of answers to question Q2 showed that students’ attitude towards learning is reported by more than half of the teachers as being relevant through active participation in classroom activities, confidence in the success of learning, the desire to acquire and operate independently new knowledge and skills. Stimulating the interest in learning achieved through portfolio is appreciated by respondents as one of the significant results of using these didactical strategies.
On underperforming schools sample, the topics relevance taught in relation to real-life problems is seen by over three-quarters of the teachers as having high importance - 89.84% of respondents. On Good Schools sample this factor is much better highlighted 97.15% of teachers opined for high and medium importance.

3. Conclusions

School education is meant to communication and transmission the culture and civilization, to satisfy the immediate needs and interests of the individual and social needs. Every person will choose the aspect which he consider crucial and will act accordingly.

The applied research tools have allowed reflecting the school activity in the curriculum field, identifying the inter- and trans-disciplinary correlations with concepts learned in other subjects or real-life issues.

The design of a different class than usually is approached from the perspective of orientation through relevant topics for the real-life problems and capacity building required for students to integrate into the society and labour market.

The creative application of curriculum involves the harnessing by teacher-student team of the elements by flexibilities that it propose the curriculum documents used in school (combining content or suggestions methodological issues included in school curricula), but also the knowledge acquired in various way, non-formal or informal education, relating to real life skills.

In inter- and transdisciplinary paradigm, the interaction teacher - student - knowledge - social integration overrides written curriculum components.

3.1. The conclusions on the answers of teachers’ survey

- It is observed the interest of teachers to achieve the interdisciplinary connections and transdisciplinary approaches in didactical process;
- It lacks a theoretical background on inter and trans-disciplinary curriculum;
- The models from current practice are missing;
- The access to information on the impact, ways the design, implementation and evaluation of integrated curriculum through seminars, conferences, debates and training and retraining is limited;
- Interdisciplinary connections are established, especially in the same curricular areas - 97.7% of teachers agree on this;
- Connections are addressing to real life situations - 96.60%;
- Inter- and trans-disciplinary approach is performed in within the taught discipline;
- Teachers evaluate positively the impact that such a curriculum has on student development;
- it is necessary the development of cognitive transdisciplinary outcomes - investigative capacity, scientific exploration, the ability to make value judgments, critical reasoning, developing of logic arguments and reasoning, assessment capacity.
3.2. General conclusions about students’ investigation

- Students appreciate the inter and trans-disciplinary approaches;
- They are interested in the opportunity to express their ideas, to explain their vision, the development of values and attitudes;
- Students appreciate in high percentage that teachers realize connections with other disciplines and real-life issues.

3.3. Comparative analysis of teacher-student

- The comparative analysis between perceptions of teachers and students about learning outcomes show common opinions;
- it is relevant the 96.60% percentage of teachers who voiced their views on valuing learning outcomes achieved by students in other contexts than in school compared to 88.3% of students who say that the teachers resort on knowledge and skills acquired in other contexts out than school. (fig. 4.)
- The student responses concerning the fact that 94.26% of teachers demanding that to make connections between the information taught in different subjects (fig. 3) are consistent with the responses of teachers in close proportion of 92.47% who said yes (fig. 2)

Given that there is not a rigorous and consistent approach for design and implement interdisciplinary and transdisciplinary strategies are necessary for an integrated approach at disciplines level on same curricular area and between subjects belonging to different curricular area.

By doing this way, it may develop a coherent and modern educational process in accordance with the characteristics of the knowledge society and the prospect the becoming it’s in further.

The contemporary realities require the implementation of a set of functional and structural changes in the way of conceptualizing the school curriculum, on establishing the educational finalities. It requires a new vision over learning experiences taught for generating new insights on educational finalities and over the way to update the didactical process, according to the modern age in which we live, with the gains of science and the technology avalanche.

References

Bercu, Nicoleta (coordonator), (2012), Mechanism and enforcement practices and curriculum development at school level and class, Research Report, Institute of Educational Sciences, Bucharest,

Council of the European Union, 2002, Detailed work programme on the follow-up of the objectives of Education and training systems in Europe, Official Journal of the European Union, OJ C 142, 14.6.2002, p.1., http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52002XG0614(01)&from=EN

Council of the European Union, 2009, Council Conclusions of 12 May 2009 on a strategic framework for European cooperation in education and training (ET 2020), Official Journal of the European Union, OJ C 119, 28.5.2009, http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52009XG0528(01)&from=EN

European Parliament, Council of the European Union, 2006, Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning, Official Journal of the European Union OJ L 394, 30.12.2006, http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006H0962&from=EN

Manolescu, M., (2013), Curriculum design to preparatory classes, Congress of Education, 14 – 15 iunie 2013, Ministerul Educației Naționale, București, http://www.congresuleducatiei.ro/ckfinder/userfiles/files/Marin%20Manolescu.pdf, 2013, accesat pe 10.07.2013

Neacșu, I. (coord.). (2012), Study of relations between curriculum, skills, motivation, learning and educational outcomes, Editura Didactica și Pedagogică RA

Nicolescu, B., (1999), Transdisciplinarity – Manifest, Polirom Publishing, Iași

Nicolescu, B., (2002), Nous, la particule et le monde, Monaco, Editions du Rocher, Collection « Transdisciplinarité »

Oprea Crenguța – Lăcrămioara, (2008), Interactive teaching strategies, E.D.P., București

Petroman, P., (1985), Interdisciplinary teaching - learning, modernization condition, Revista de pedagogie, nr. 7

Vlăsceanu, L. (coord), (2002), School at a crossroads. Change and continuity in the curriculum of compulsory education, Iași, Polirom Publishing