AN INTERCULTURAL PERSPECTIVE
ON TECHNOLOGICAL EDUCATION

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Abstract: - The present study focuses on the intercultural education's objectives accomplished by and through technological education. This research has two premises as starting points: a) intercultural education is not a distinguished/ independent form of education, but it is integrated in education regarded as a whole process, in all of its dimensions, forms and levels; b) technological education is one of the education's dimensions with the most intercultural potential. This research emphasizes on the present limitations of the curriculum and of the methodology of the technological education from the objectives of the intercultural education's points of view. The research proposes solutions as re-thinking and re-construction of the curriculum and of improving the didactical methodology.

Key concepts: - globalization, multiculturality, intercultural education, intercultural school, technological education, technology of the intercultural education, intercultural curriculum, intercultural competences.

1. The mission of education in a multicultural world

The diversity is an intrinsic attribute of nature and social life. According to Anca Nedelcu, *the real world is certainly addressed to the open contexts and to the cultures, which have a variable geometry* [12]. We can consider this variable geometry as a coordinating system in which the culture could be expressed. This system is dynamic, because its parts are variable, they can be changed and can create a new system.

The human being is the fruit of the diversity, of the meeting between a man and a woman, but father and mother are not only themselves because they are having hereditary features from other persons and from another social environment. The variety and diversity is an universal law. It is the base of the multicultural phenomena and, nowadays, it is amplified more and more by the globalization phenomenon. This phenomenon generated the expression "opened contexts" and, nowadays, allows moving to one geographical place to another.

Beyond the various interpretative ways, this new approach about social reality implies establishing the cultural pluralism in the frame of a humanistic philosophy, which refers to all life domains and, especially, refers to educational field. The school may propose, at the deepest level, an intercultural ethics direction for the society, which could be made by developing some „intercultural competence" for its members.

From this point of view, the academically instruction has to be completed by a relational training, including opening to others and to cultural diversity.

The reconstruction of the education under the form of education for diversity represents a prerequisite for solving the problems of the contemporary society. At the same time, diversity as a society problem is considered a „guiding force for educational creativity" [16].

For a short term, the mission of an intercultural school is to provide equal educational condition for all children, taking into account their physical, cultural, national and religious diversity. The school has to educate children for the accepting and respecting diversity and, also, has to educate pupils in the spirit of developing diversity. For a long term, the role of an intercultural school is to promote the transition from a

multicultural society to an intercultural one, and accordingly this to become the vector of diversity.

One of the main purposes of the school was always to create a nation and a destiny, having a more or less accentuated cultural, national and linguistic diversity. To achieve these aims, teachers have to respect and capitalize all the cultural differences of the students. At the same time, the teachers have to support the students to develop in an intercultural spirit, to obtain abilities, knowledge, to learn values for becoming active citizens of a widened community [4].

The intercultural school isn't something given, but is a "building" in the framework of an organizational structure, which is an open environment for pupils development in all their diversity. This point of view is based on the equality chances principle and is functioning in a diversity and differences education. In a school like this, all the students, despite of gender, social, national or cultural origin, have equal opportunities to learn. This school represents a permanent process, which includes the equality idea and has preoccupations for stimulating academic achievements. Providing the conditions and equal chances for all children (taking into account their cultural diversity) means an instruction for cultural diversity that requires respect for differences but at the same time, equality.

The intercultural education is, first, a reform movement capable to generate important changes in school and in other educational institutions, having the perspective to open these institutions to community. This type of education proposes a new approach of the assets, opens new ways of diversity living and develop respect and openness attitudes. The globalization is the vector of modernity, and the modernizing process is the most important phenomenon of the interculturality, having applications at the level of the major cultural communities [2]. The European experience emphasized that the success of modernity is faster and stable if the communities are cultivated, educated according to the intercultural dimension.

The structure of population configuration is continually changing inducing the transformation of the whole national policy of a country. It is more than ever needed an advanced and modernized educational system, which may support all these changes and meet the demands of modern era [10].

2. Technological education - an essential dimension of a modern education

We are living in a reality which has an essential attribute: the acceleration of changes. It's become the general framework of the more and more innovations that happen in a short time. In this respect, the science and the technology have a very important role in the transition from an industrial society to a postmodern society, known as the information technology era or as the society of technology, knowledge and communication. Against the background of globalization, science and technology represent the ground vectors of the society development.

Contemporary education faces the challenge of diversity, and tremendous increase in cultural heterogeneity of educational settings. Within this context, teacher readiness to apply intercultural education principles seems to be strongly linked to their intercultural competence [14]. Education is a complex social phenomenon whose quest for insight has led to educational technology researchers using the interpretive research paradigm. The aim of an interpretive research is to unravel meanings that underlie a social phenomenon including the identifying the basis and sources of social reality [13].

On the strength of the society integration preparing issue (a society dominated by the informatics technology, by the effects generated by science and technology and dominated by the local and global issues occurred as a result of an irrational using of science and technology) we understand why the necessity of technological education has become greater, why the technological education plays a prominent part in the general education of a modern human being and why the aims of the technological

education have to effectively reflect the relation between the human being – technology – culture.

The technological development, the scientific progress, the transition from an industrial society to a postindustrial one, the great issues produced by the civilization call for an adequate attention to the technological education. According to M. Mircescu, our world is a mixture of remarkable promises, upsetting perspectives, desirable evolutions and uncontrollable technological innovations, but the technology is potentially ambivalent and the evolution direction depends on the human being: toward progress, order and perfection or toward self destruction – this fact has to require a different understanding of the science and technology development, a high morality and responsibility in using the immense energies and technology that a human being possess nowadays [11]. *The development of technology has made it clear that different opinions around the world may meet each other and bridge the produced gap. The ability of communicating with other members of society actuates to the reconsideration of one's thought and beliefs* [10].

An actual defining of the technological education requires the explanation of the sociological concept of technology and its pedagogical interpretation.
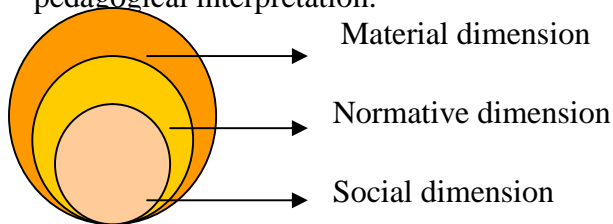

Material dimension

Normative dimension

Social dimension

Fig.1. The functional dimensions of the concept of technology

As C. Zamfir i L. Vl sceanu mention, the technology refers to the knowledge application process through some instruments, methods, resources, norms etc. used especially (but not exclusively) in the production field. Its structure includes three functional dimensions: a) a material dimensions, the technique is represented by machines, tools, instruments, equipments etc; b) a normative dimension represented by rules and by strategies for

designing and revaluating techniques; c) a social dimension represented by skills, social and individual behaviors produced by using the promoted techniques at a material and normative level. [17].

Therefore, the postmodern society culture confers on technology the quality of an applicative science. This quality compresses the global changes about understanding what has to be technology, both through supporting the relation between normative dimension of technology (the quality of the projects), material dimension (the quality of used tools) and social dimension (the quality of psychological consequences) and through diminishing the spaces between scientific discoveries and their social application.

From this point of view, the technological education represents the forming-developing activity of the personality, which is designed and made through a rational application of the scientific knowledge in different society fields (economy, politics or culture). This education comprises professional education, which aims the acquisition of specific techniques for different domains.

The consistent and effective need of technological education requires a deep analysis by referring this education to every levels of formal education and to entire life and by establishing how it become simultaneously or successively: a) a curriculum area of general culture, with important contributions to attitudinal and aptitude development of preadolescents, that could be made in the formal education and could be continued in the higher educational levels; b) a school/ university curriculum profile area, with important contributions in scientific knowledge application (exact sciences, human sciences, foreign languages, management, philology etc.); c) a school/ university curriculum specialization area, with essential contributions in practical orientation of knowledge in different professional field at medium levels (professional and vocational schools) and high levels (university and post university education). At the higher education level, we need to make a distinction between students specialized in different engineer fields and

students specialized for teaching technological education.

In the following paragraphs we will refer especially to the university technological education.

3. The objectives of technological education for training engineers and engineer teachers

The European Qualifications Framework (EQF) with significant specifications at Bergen Conference 2005, stipulates that first cycle graduates (short cycle – bachelor's degree) have to prove the following acquisitions [9]:

a) *basic factual knowledge of a field of work, which is based on secondary education;*

b) *the capacity to apply knowledge, the capacity to understanding professional context and problem solving skills in a specialized field;*

c) *collecting and explaining data skills (usually in the specialized field) in order to communicate reflections about significant issues from scientific, social or ethical field;*

d) *communication, problem solving and sharing ideas skills;*

e) *learning strategies for studies continuation with a high level of autonomy.*

In the same spirit, in the Methodology of European Qualifications Framework from Higher Education, Romania (ACPART) we can find the learning outcomes and their descriptors at the level of higher education qualifications [1]:

a) **Professional competences** represent the dynamic and unitary ensemble of knowledge and skills:

- Knowledge as cognitive dimension and as a structural component of the competence is expressed through the following descriptors:

➢ Knowing, understanding and using the specialized terminology;

➢ Explanation and interpretation;

- Skills as functional dimension and as a structural component of the competence are expressed through the following descriptors:

➢ Application , transfer and problem solving ;

➢ Critical and constructive reflection;

➢ Creativity and innovation.

b) **Transversal competences** represents attitudinal acquisitions that transcend a specific domain/ study program and could be expressed through the following descriptors**:**

➢ Autonomy and responsibility;

➢ Social interaction;
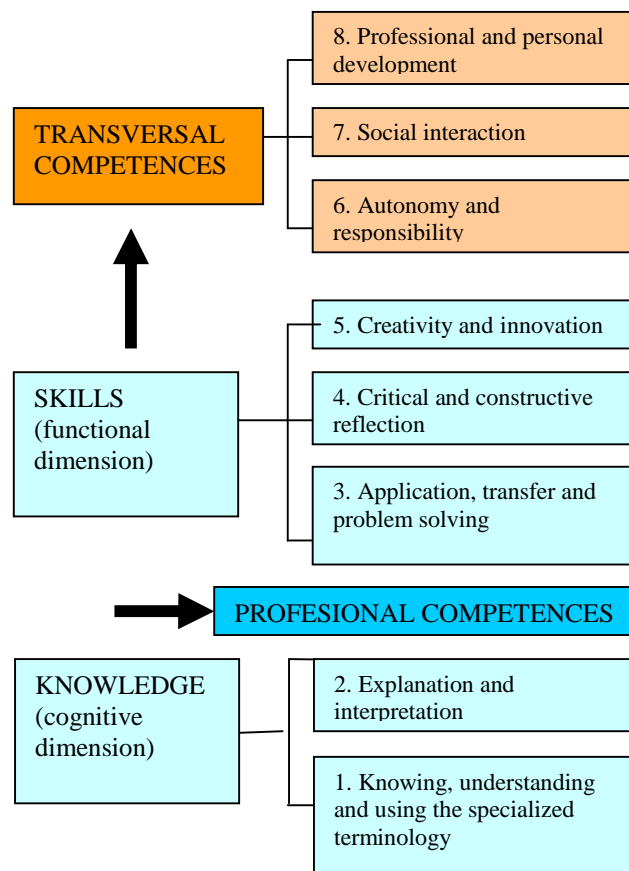
➢ Professional and personal development.

Fig. 2. The learning outcomes
for higher education (ACPART)

According to these and another educational politics documents, the objectives of the technological education (for the students from technical faculties) aim to develop professional and transversal competences. It's important to mention that these competences compress acquisitions that in which the technical dimension is linked to the other dimensions of qualification: social, normative, moral and cultural dimension.

The qualification of the technical education graduate student is expressed in technical competences and attitudes for using various techniques, in understanding what

technology means in everyday life, in understanding the research deontology, in taking responsibilities for technological creations and for technology using. Therefore, the curriculum of this study program needs to be improved from the aims perspective, in order to understand that the graduate person is not only a technical engineer, but is also an expert in the applied sciences field. The objectives of the technological education could be presented in the framework of a pedagogical model focused on technical competences development. In order to achieve this aim, we have to design and carry on the following specific objectives: a) providing the scientific basis of the practical activities, in the context of transition from the cultural model of industrial society to the cultural model of the post industrial society; b) supporting the epistemological relation between theoretical and practical culture, as well as their ethics and multicultural meanings; c) developing adequate attitudes about the main human activities – learning, work and creation – approached in their interdependency; d) stimulating the technical creation which materialize the most effective and advanced productive elements.

Nowadays, computer technology is embedded in several appliances, in equipment, process control, business and decision-making processes, etc. Computing, networking and electronics have a strong impact on all economic sectors and spheres of life. The ICT development and the pervasive use of technologies cause enormous changes in all companies and organizations world-wide, both at macro and micro levels, and raise the requirements for the skills and competences of their employees. Faced with the rapid technology changes, educational institutions need to broaden curricula and implement new teaching methodologies [8].

4. The intercultural openings of the technological education

The intercultural education is not a separate form of education. It has to be present in the general education and in all education forms and dimensions: formal, non-formal and informal education; intellectual, moral, esthetical, physical, professional, spiritual etc. education. Therefore, the technological education has to be present in all educational aims, which have to focus on developing intercultural competences and has to be present at the curriculum level which contains learning experiences designed for understanding diversity. Also, the technological education has to be present at the level of instruction and assessing strategies which have to include intercultural aims (cognitive, attitudinal and behavioral). More than that, taking into account the holistic feature of the intercultural approach that transcends the educational system, we can understand why all these educational dimensions have to be connected to the real life, with the various teaching and learning styles, according to the specific social contexts.

The technological education, as one of the essentials components of education, could have significant openings toward intercultural education or, more exactly, could play a very important role in the framework of intercultural education. This statement refers to two dimensions of the technological education: a) it contains learning experiences that could be used from the intercultural education aims; b) this educational dimension includes technical instruments and technology elements that can be used to design learning situations for intercultural communication.
Regarding to the first aspect, the intercultural openings of the technological education have to be found in its curriculum both as content elements and as learning experiences. Actually, the curriculum areas represent one of the most important places for intercultural development, regarding written messages (officially structured in order to be communicated) and "hidden", implicit messages.

In its extensive form, the intercultural curriculum it's interested not only in contents, in what they teach or learn but also in the selection of the contents and in the modalities in which the minorities specific is taken into account [12].. In this way, the technological education curriculum has to reflect the multicultural feature of the society, has to contain learning opportunities about cultures

plurality, to create for students many opportunities to express and develop at school their cultural dimension. The intercultural reframing of the technological education contents have to focus on eliminates the formal curriculum tendency to be centered to the contents that represent a majority of people. More than that, the multicultural curriculum has to focus not on a static reality of the curricular documents but on the relation between these documents and the human beings involved in the educational process. The curriculum has to be centered on student not on a subject and, therefore, the multicultural contents have to define goals expressed in terms of competences.

Referring to the principles of the multicultural curriculum promoted by at school J. A. Banks, we consider them very important for technological education because they have intercultural openings [3]: a) the curriculum have to support students to develop their self esteem and a positive attitude about their own person; b) the interdisciplinar and multidisciplinar approaches have to be used for studying the ethnical and cultural groups. These principles emphasize that the directions of the contents reframing have to be correlated with the reframing of axiological and epistemological basis of the learning technology.

Relating to the curriculum's intercultural reframing the specialists proposed some models as: the redefining curriculum model (J.A.Banks, 1997); the model of the consolidating the minority groups' position (P.H.Wakling, 1980); the program of living experiences (T. Rulcker, 1992). There are many options for the cultural reframing of the technological education curriculum, both at the formal curriculum and at the school elaborated curriculum.

The analysis of the *Science and technology* curriculum reveals its limits mainly related to its content that is specific to the European culture and loosely related to the international culture. As M.J. Reiss stated in 1993, *in the last ten years we largely accepted that the teaching content has a limited approach and limited implications* [15].

Another possible problem resides in the fact that most students wrongly believe that most scientific discoveries were made in some specific cultural places. Thus, Reiss stated that many students *do not know anything about the non occidental contributions to the culture, for example that many inventions originates in China* [15]. Starting from this idea we developed our own research. The main aim was to see whether the students can correctly identify the culture that produced certain inventions (i.e. China and other countries). If students were unable to recognize the country they should guess the answer. The N= 100 research participants were students at Teachers Training Department.

Table 1. The investigated inventions according to the county of origin

Inventions	Country of origin	If you don't know the answer what is your guess
1. Chess		
2. Mechanical watch		
3. Printing process		
4. Banknote (paper money)		
5. Endocrinology		
6. Seismograph		
7. Gunpowder		
8. The Newton's first low		
9. Mechanical clock		
10. Compasses		
11. Magnetichal induction		
12. Plough of steel		
13. The pendent bridge		
14. Paper		
15. Fishing thread		
16. Umbrella		
17. Porcelain		
18. The car		
19. The plane		
20. The phone		
21. The bicycle		
22. Radio waves		
23. Radio		
24. The barometer		
25. The computer		
26. The vaccine against cholera		
27. The insulin		

We used 27 inventions originating from China (17), Italy (3), Romania (2), England (1), France (2), Germany (1), USA (1), Canada (1). Our results are consistent with those of Reiss (fig. 3).
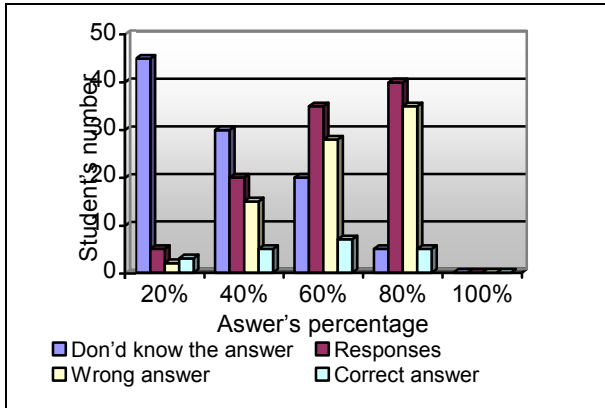

Fig.3. Participants answers regarding the origins of inventions

As figure 3 shows, the number of participants who do not know the answer decreases as we move from 0 to 6 on the X axis, revealing the lack of knowledge regarding the origin of inventions. The wrong answers have on opposite trend as the percentage increases as we move from 0 to 6 on the X axis.

The following histogram reveals that many students who do not know the country of origin for an invention tend to use European countries. The most frequently used countries are Germany, England, France, Russia, Spain and Italy. This is the effect of poor knowledge that was insufficient for students to understand the fact that scientific discoveries are possible in many cultures.
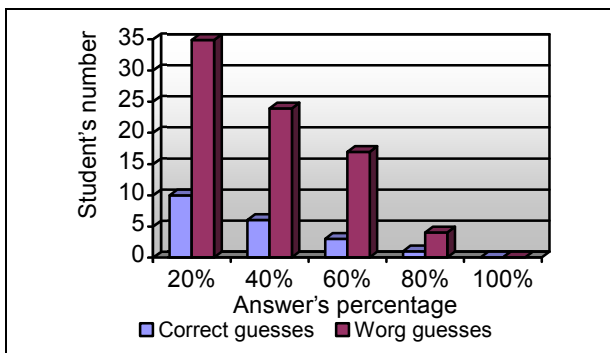

Fig.4. The tendency to attribute unknown inventions to European countries

Presenting the different technological discovery in their context represents a powerful tool for adequate learning and for an appropriate perspective about culture differences.

The technological education represents an important piece of intercultural education because it has the technological means to be used in the learning contexts. More precisely, we should refer to the multimedia technology. These became significant resources in education an especially in intercultural education. We especially mention the specific context of intercultural education that supposes interconnection, equal chances for development, for gaining new values, new perspective and new ways to express differences, to be respectful an open for diversity.

The information technology and multimedia represent important educational means the social constructivist paradigm. Collaborative learning represents another important modality of intercultural education. The quality and the efficacy of these modalities are depending more and more on the educational means which facilitate interpersonal communication and intercultural dialogues (debates, observations, investigations, reflections). At the same time, these educational means will become instruments for information searching, for using information, for interpersonal actions and constructions. The computer, the internet and the multimedia means respond very well to these needs.

The main challenge for informational and multimedia technologies is the generating of an adequate environment for learning. The new technologies are essential in the context of transition from a teacher centered environment to a student centered environment [7].

By using the new information technology, the learning process is enriched, involving transformational learning, effective teaching (adequate to students needs), effective learning, improving and diversifying the methodological repertoire. Integrating information technology and multimedia into the intercultural education is based on the

standards of this specific educational area within the social constructivism paradigm.

The intercultural education is based on information about our own culture and the culture of others, is based on communication and cooperation, on learning experience and on acknowledging and respecting the differences. To achieve all these aims it needs a diverse area of methods and technologies. That's why information technology and multimedia are frequently and successfully used for intercultural education. They are used both for providing information and for skill development.

Information technology is used for:

- identifying, processing and using cultural information;
- interpreting problematic aspects of intercultural education;
- elaborating intercultural messages;
- developing intercultural dialogues;
- experiencing intercultural contexts facilitated by mass-media;
- using multimedia for debates about intercultural issues;
- the access via the internet of various intercultural products (texts, images, sounds) that can be used to develop ideas, to express beliefs and / or to anticipate intercultural behaviors.

5. The role of intercultural education in the construction of the intercultural competence

The intercultural competence represents a continuum that usually begins with an ethnocentric conception and aims to structure complex capacities, which are important for an efficient collaboration between different cultures.

The concept of intercultural competence is defined at the intersection of two key concepts> culture and competence. The intercultural capacity facilitates the relationships between cultures and expounds them critically and constructively. The concept of multicultural competence describes the using of the transferable system of knowledge, skills and values for multicultural integration and for personal and professional development.
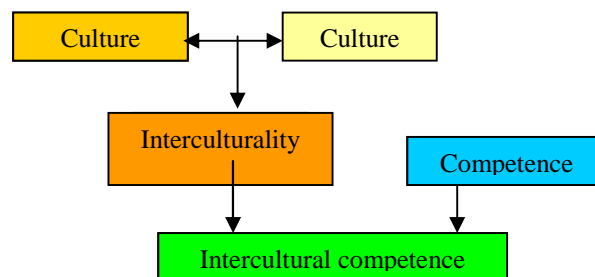

Fig. 5. The components of the intercultural competence [5].

The multicultural competence has an obvious attitudinal-value dimension. The intercultural competence is neither native nor spontaneously occurred from the multicultural environment. This competence is built according to the multicultural experience and according to the quality of the multicultural educational environment. This competence involves knowledge about other people, the interest for implication in significant actions, the ability to activate in an efficient and adequate way, the transfer capacity. The intercultural competence includes three category of components: attitudes, knowledge and skills (relational skills, reflexive and critical evaluation skills).

The technological education plays an important role in the construction of the intercultural competence. This dimension of education could provide an adequate instruction for building a technical culture. The technology has no development "boundaries", it doesn't stop at ethnical, religious or another cultural aspects.

5.1. The technological culture as an encounter and intercultural development space

The intercultural school is a school for everyone, a school for diversity. According to this perspective, the aim of education is to create and to support a cultural environment open for everybody, regardless of race, sex, deficiency or any other issue or special situation [6].

Taking into account the technological culture, this is one of the most efficient environments for intercultural encounters, which creates opportunities for everyone's development. The new intercultural perspective about culture can be recognized easily when we look at the technological culture. This culture is an operational "overculture" because makes possible the encounters of the other forms of human culture. The modern informational ways are important instruments for intercultural expression. The modern technology development (including the educational technology) represents an adequate environment for different cultures encountering. Their representative members make a creative-constructive effort to use diversity for a real development.

The modernity involves a recreation and reconfiguration of the internal and external structures of the individual. He will "survive" if will adjust himself, if he will be flexible, creative and will play multiple social and cognitive roles. The best expression for this extension is, in technical terms, „spacial-turn", involving a revolution in everyday life.

The essential element for defining the human being is the culture. The human being needs an interrelation disposition for promoting the "cultural encounters". From this point of view, a simple contact with another culture could become a real revolution in the frame of the own cultural sphere. The openness for these kinds of relations means a preparing and a disposition for diversity. This attitude is the product of the intercultural education.

This world with a "variable cultural geometry" assures the unity in diversity. The cultural oneness, identity and specificity remain unthreatened, but they are fructified. The culture is the main promoter of creativity in educationand the major promoter of interculturality. In this perspective, the development of interculturality aims to create a better world.

6. Conclusions

The intercultural education represents a significant area of our modern school that should be present in all its forms and dimensions.

By analyzing the technological education from an intercultural perspective, the present study proposes a few changes in order to extend its intercultural educative openings:

- restructuring the technological education curriculum;
- a multicultural reframing of the subjects included in Technology curriculum area;
- reframing the historical perspective on science and technology in order to promote a better understanding of the different cultures and their contribution to the progress and civilization;
- presenting the different technological discovery in their context represents a powerful tool for adequate learning and for an appropriate perspective about culture differences;
- improving the strategies of technological education by integrating the communication and multimedia technology;
- developing intercultural education competences for the educational technology teachers.

Taking into account the relation between the two dimensions of education (technological and intercultural), the technological education should be optimized both by restructuring and reorienting the curriculum towards the intercultural education and by capitalizing the educational technology within the students learning experiences.

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