3. PEDAGOGICAL USE OF ICT IN TEACHING AND LEARNING

3.1. Pedagogical Theories Supporting the Use of ICT

Objective: Introducing basic pedagogical principles for using ICT in teaching and learning process and offering pedagogical models and examples for in-service teachers for using ICT in the teaching and learning process.

Time requirements: 5 hours

This Pedagogical Toolkit is a learning material and serves to reach the overall aim of the FISTE project: to support teachers' pedagogical use of ICT in their teaching practice and to give new ideas how to organise teaching as learner-learner oriented – emphasizing social interaction, particularly cooperative and collaborative learning. We hope this toolkit will assist those teachers already in the field who wish to improve their practice and also give new ideas for those who are not so familiar with these issues yet.

This toolkit is organized into five main categories:
- Introduction;
- Pedagogical Approaches;
- The Teacher – his / her status and role;
- The Educational Environment;
- Find out more – references and further readings.

There are also tasks for the reader – with these tasks reader can reflect own ideas about teaching and learning. Thinking tasks are marked with this symbol:

A. Introduction

A.1. Society Is Changing - Do Learning and Teaching Need a Change?

The rapid changes in society and work have challenged the relationship between working life and education. Lifelong learning in general, and particularly demands for continuous development of skills and knowledge, have resulted call for new ways to organise learning. The knowledge gained in education becomes quickly outdated and looses its value for working life. The skills and knowledge needed in working life cannot all be taught during formal schooling and training. Working life requires new kinds of competencies including independent knowledge acquisition and application, problem solving, co-operative and multidimensional professional skills and abilities for continuing learning.

Furthermore, schools are serving a more ethnically, linguistically, and culturally diverse student body than ever before. From universities and research institutions, studies about education, cognitive psychology have offered new insights on how humans learn. And from the marketplace, the infusion of technology has redefined work skills and society's expectations about what it means to be an educated person.
Therefore, one of the basic requirements for education in the future is to prepare learners for participation in a networked, information society in which knowledge will be the most critical resource for social and economical development. The fast development of technology has led to a widespread use of ICT in education. However the use of ICT is still dominated by the focus on dissemination of information. In the so called Knowledge Age, it is necessary to help students to become knowledgeable as well as productive members of society, working and participating with others in different groups and communities. Therefore it is needed to view what is the pedagogical use of ICT in teaching and learning – how ICT can enhance learners’ knowledge construction and building of learning networks?

The changes synthesised above, regarding the way human learning and consequently education is viewed pose numerous challenges for the classroom educators that would raise questions such as:

- What should I teach in terms of knowledge and skills?
- What would be a theoretical framework that could inspire me in my classroom work?
- What is school learning and what is meaningful or relevant learning?
- What would the features of a learning situation be so it generates valuable learning experiences?
- What is the role of teacher, student or technological resources in the new educational settings?

**Think!**

- What kind of changes you have noticed in society? How about in your own work?
- Have you used ICT for supporting learning and teaching?

### A.2. Meaningful Learning

The requirement of providing meaningful learning through school activity is one of the common aspects for most of the contemporary psychological and pedagogical approaches to learning process as well as it is present as a descriptor of school quality assurance for many school systems in the world. Meaningful learning, or relevant learning, as it sometimes named, assumes that students already have some knowledge that is relevant to new experiences they encounter and that they are willing to do the mental work necessary to create connections. Meaningful learning is also associate with deep learning, and contrasted with surface learning. While surface learning is the length learning, the “learning of bits of everything” the type of learning that can be associated with the encyclopaedism, deep learning is learning of the essence of things, of the aspects that are not directly accessible for the eye or memory - the learning of the core of the problem, the type of learning that has development consequences for cognition and emotions, that it implies effort but offers satisfaction and accomplishment feelings to students. It challenges students for personal and group confrontations for problem solving, personal approaches, reflection and application of knowledge.

This way, meaningful learning can also be associated with higher order thinking skills: critical and creative thinking, metacognition, problem solving and decision-making.

According to Jonassen et al. (1999), meaningful learning is:

**Active.** We interact with the environment, manipulate the objects within it and observe the effects of our manipulations.
Constructive. Activity is essential but insufficient for meaningful learning. We must reflect on the activity and our observations, and interpret them in order to have a meaningful learning experience.

Intentional. Human behaviour is naturally goal-directed. When students actively try to achieve a learning goal they have articulated, they think and learn more. Articulating their own learning goals and monitoring their progress are critical components for experiencing meaningful learning.

Authentic. Thoughts and ideas rely on the contexts in which they occur in order to have meaning. Presenting facts that are stripped from their contextual clues is not compatible with knowledge from reality. Learning is meaningful, better understood and more likely to transfer to new situations when it occurs by engaging with real-life, complex problems.

Cooperative. We live, work and learn in communities, naturally seeking ideas and assistance from each other, and negotiating about problems and how to solve them. It is in this context that we learn there are numerous ways to view the world and a variety of solutions to most problems. Meaningful learning, therefore, requires conversations and group experiences.

Wiske (1998) provides another perspective about meaningful learning with a focus on subject matter content. She calls for teaching subject matter that is:

Central to the domain or discipline. Every academic discipline has elements that are regarded by those in the field as the ideas and methods of inquiry that are central and controversies that are enduring. Teaching aimed at meaningful learning encompasses these aspects.

Accessible and interesting to students. Topics must be significant from a student's perspective. Teaching about the fall of communist regimes at the end of the second millennium, for example, must enable students to make meaning from its tenets in the here and now.

Exciting for the teacher's intellectual passions. For a topic to be generative, the way it is taught is as important as the substance. The teacher's curiosity, zeal and genuine wonder are infectious and serve as a model for students to imitate.

Easily connected to other topics, whether inside or outside the discipline. Students benefit most when they can link their previous experiences and knowledge to other important ideas.

Some statements regarding teachers' tasks that will offer a general view on this topic:

Teachers ought to:

- Devise learning goals and learning experiences that build on students' prior knowledge, life experiences and interests.
- Engage students in learning experiences that integrate ideas, concepts and information across curriculum areas.
- Provide learning experiences that establish connections with the world beyond the classroom.
- Develop learning experiences that involve students in examining study, work and leisure in the future.
- Design learning experiences that foster personal initiative and enterprise.
B. Pedagogical Approaches

In the following sections you can find analyses of many currently widely recognised learning theories that provide valuable frameworks for supporting meaningful learning as we defined it above.

B.1. Theoretical Framework

B.1.1. Cognitivistic View of Learning

Cognitive theories take the perspective that students actively process information and learning takes place through the efforts of the student as they organise, store and find relationships between information, linking new to old knowledge, schema and scripts. Cognitive approaches emphasise the way information is processed. Ausubel, Bruner and Gagne, three exponents of the cognitivism add different perspectives to learning as information processing. Thus, Ausubel considers the impact of prior learning as a decisive factor in information processing. Bruner’s work on categorisation or the forming of concepts (involving three stages: enactive, iconic, symbolic) provides a possible set of answers to how the learner derives information from the environment. Bruner argued that we should teach the ‘structure’ of subjects. He advocated the introduction of the real process of a particular discipline to students. Gagné looks at the events of learning and instruction as a series of phases, using the cognitive steps of coding, storing, retrieving and transferring information. Cognitive theories emphasized the active mental processing on the part of the learner. However knowledge is still viewed as given and absolute just like in the behaviouristic school.

B.1.2. Constructivist View of Learning

Constructivism considers learning to be an individual and personal event. It argues that people construct, reconstruct and deconstruct their own understanding and knowledge of the world through experiencing things and reflecting on those experiences. For this, they must ask questions, explore and assess what they know. The following principles are based on the work of various constructivist theorists and are offered as a framework for this discussion.

- **Learners bring unique prior knowledge, experience, and beliefs to a learning situation.** Every learner has experiences that influence his or her understanding of the world. Those unique experiences are the foundation for learning; they provide opportunities for personal connections with new content.
- **Learning is internally controlled and mediated.** Learners take in information, process it to fit their personal frameworks, and build new understanding. That knowledge construction occurs internally, in the private domain of each individual.
- **Knowledge is constructed in multiple ways, through a variety of tools, resources, experiences, and contexts.** Constructivist learning theory tells us that we learn in a variety of ways. The more opportunities we have, and the more actively engaged we are, the richer our understanding. Good teachers have always used experience as a valuable instructional tool; that is why we arrange field trips and hands-on projects. It is why an internship or apprenticeship is essential to the completion of most vocations, including teaching.
- **Learning is a process of accommodation, assimilation, or rejection to construct new conceptual structures, meaningful representations, or new mental models.** Every person is surrounded by an infinite variety of images, ideas,
information, and other stimuli that provide raw material for thought and understanding. If new information matches the learner's existing understanding, it is easily assimilated. If it does not match, the learner must determine how to accommodate it, either by forming new understanding, or rejecting the information.

- **Learning is both an active and reflective process.** Learners combine experience (action) and thought (reflection) to build meaning. Both parts must be present to support the creation of new knowledge.
- **Social interaction introduces multiple perspectives through reflection, collaboration, negotiation, and shared meaning.** In many situations, learning is enhanced by verbal representation of thoughts - it helps to speak about an idea, to clarify procedures, or float a theory to an audience. The exchange of different perceptions between learners enriches an individual's insight.

**B.1.3. Socio-Cognitive View of Learning**

A major idea in social constructivism approach is that learning is affected by social interaction. Discussions, conversations, explanations, listening - all these are ways we learn by interacting with others. Encouraging social interaction among students is not common in classrooms - even classrooms of excellent teachers. If social intercourse is, indeed, an essential part of learning, our students need more opportunities for discussion to develop their understanding.

**B.1.4. Socio-Cultural View of Learning**

During the past decade there has been a growing interest towards socio-cultural approaches in learning sciences. The socio-cultural framework appears to give appropriate tools for observing and conceptualizing the emerging forms of practices and work of our times, such as collaborative work in groups, distributed expertise and networked activities. Instead of studying the mental content of individual minds, the various approaches of this framework focus on interaction, discourse and participation processes. Individuals' thinking is mediated through the cultural symbol systems and artefacts we use (Brown, Collins, & Duguid, 1989; Lave, 1988; Lave & Wenger, 1991.)

**B.2. Learning Together – Cooperative and Collaborative Learning**

The social context of learning can be very influential in the type of processing learners do. Certain perspectives of learning support this idea.

**B.2.1. Cooperative Learning**

In cooperative learning (see Johnson, 1988; Johnson & Johnson, 1994; Slavin, 1995), students work together to accomplish a learning task. Cooperation is accomplished by the division of labour among the participants; each person is responsible for a portion of the problem-solving task (Dillenbourg, Baker, Blaye, & O'Malley, 1996). The interaction required in cooperative tasks requires individuals to externalize their thinking. Students benefit from this process because it requires them to put ideas into a more concrete form and because of the feedback that is available.
B.2.2. Collaborative Learning

Collaborative learning appears to be one of the core concepts in learning sciences. In the public conversation the term “collaboration” appears to refer to any activities that a pair of individuals or a group of people, perform together. In learning sciences, the term is understood rather differently; common to the definitions within the learning sciences is that the idea of co-construction of knowledge and mutual engagement of participants.

Some examples of the definitions:
- Collaborative learning is a co-ordinated, synchronous activity that is the result of continued attempt to construct and maintain a shared conception of a problem (Rochelle & Teasley 1995).
- Collaborative learning is a process of participation in knowledge community (Brufee, 1993).
- Collaborative learning is a process, which is distributed between the learner, the environment and the activity conducted by the learners’ community (Barab & Kirchner, 2001).

One basic idea to define collaboration is to make a distinction between collaboration and cooperation, when the cooperation is accomplished by the division of labour, collaboration is a coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem (Rochelle & Teasley, 1995).

Examples of some basic assumptions behind the idea of collaborative learning:
- Learning is an active process whereby learners assimilate the information and relate this new knowledge to a framework of prior knowledge.
- Learning requires a challenge to learner to actively engage his/her peers, and to process and synthesize information rather than simply memorize it.
- Learners benefit when exposed to diverse viewpoints from people with varied backgrounds.
- Learning flourishes in a social environment where conversation between learners takes place.
- In the collaborative learning environment, the learners are challenged both socially and emotionally as they listen to different perspectives, and are required to articulate and defend their ideas. In so doing, the learners begin to create their own unique conceptual frameworks and not rely solely on an experts’ or a texts’ framework.

Pedagogical requirements for effective collaborative learning:
- Positive interdependence. Team members are obliged to rely on one another to achieve the goal. If any team members fail to do their part, everyone suffers consequences.
- Individual accountability. All students in a group are held accountable for doing their share of the work.
- Face-to-face promotive interaction. Although some of the group work may be parcelled out and done individually, some must be done interactively, with group members providing one another with feedback, challenging one another's conclusions and reasoning, and perhaps most importantly, teaching and encouraging one another.
• **Appropriate use of collaborative skills.** Students are encouraged and helped to develop and practice trust-building, leadership, decision-making, communication, and conflict management skills.

• **Group processing.** Team members set group goals, periodically assess what they are doing well as a team, and identify changes they will make to function more effectively in the future.

<table>
<thead>
<tr>
<th>Traditional Teaching</th>
<th>Collaborative Learning</th>
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<tbody>
<tr>
<td>A teacher centred environment</td>
<td>A student centred environment</td>
</tr>
<tr>
<td>Teacher is in control</td>
<td>Students are in control of their own learning</td>
</tr>
<tr>
<td>Power and responsibility are primarily teacher centred</td>
<td>Power and responsibility are primarily student centred</td>
</tr>
<tr>
<td>The teacher is the instructor and decision maker</td>
<td>The teacher is a facilitator and guide and the students are the decision makers</td>
</tr>
<tr>
<td>The learning experience is often competitive in nature</td>
<td>Students work together to reach a common goal</td>
</tr>
<tr>
<td>Series of smaller teacher defined tasks organized within separate subject disciplines</td>
<td>Authentic, interdisciplinary projects and problems</td>
</tr>
<tr>
<td>Learning takes place in the classroom</td>
<td>Learning extends beyond the classroom</td>
</tr>
<tr>
<td>The content is the most important</td>
<td>The way information is processed and used is the most important</td>
</tr>
<tr>
<td>Students master knowledge through drill and practice</td>
<td>Students master knowledge by constructing it</td>
</tr>
</tbody>
</table>

Table 1. Comparing traditional teaching and collaborative learning

**Think!**
- How knowledge sharing and working in groups with others can support learning?
- What kind of challenges can emerge during the collaborative learning?

**B.2.3. Computer Supported Collaborative Learning – CSCL**

CSCL is a Field of study centrally interested in learners’ joint activities and the ways in which those activities are mediated through designed artefacts (Koschmann, 1996). Particularly, CSCL is focused on how collaborative learning supported by technology can enhance peer interaction and work in groups, and how collaboration and technology facilitate sharing and distributing of knowledge and expertise among community members.

Collaboration can be supported with very different instructional ideas and computer applications. Crook (1994) has proposed four kinds of interaction in which computers play a part: 1) interactions at the computers, 2) interactions around computers, 3) interactions related to computer applications, and 4) interactions through computers. The first aspects are face-to-face interaction situations where meanings are mediated through spoken and nonverbal language. In these situations, computers can act as a referential anchor, and mediate the coordination of attention and collaborative actions (Crook, 1994; Järvelä, 1998; Bonk, Järvelä, Lehtinen, & Lehti, 1999; Rochelle, 1992).
Learning research has proved that technology can enhance individuals' cognitive activities and groups' collaborative work. Here are some examples:
1) Technology can work as an interaction tool to facilitate communication;
2) Technology can work as a knowledge and resource sharing tool for representing ideas, reflection and improving ideas;
3) Technology can work as a mediation tool for helping learners to focus on a shared problem;
4) Technology can work as a visualization tool for making thinking more visible by giving opportunities to reflect on thinking by writing and sharing expertise;

Collaboration through networked learning environments is still mainly based on written language, and interaction lacks of certain basic features of face-to-face collaboration: social nonverbal cues intonations of speech and rich referential field that is present in face-to-face situations.

C. The Teacher – His / Her Status and Role

In the context of the contemporary education, a clear defining of teacher's status and role is a prerequisite for the identification of some new ways to optimize the education system functioning. It is appropriate to explore teacher's status and role in contemporary school by making a concrete analysis of the educational situation. The educational situation represents the totality of the conditions, variables and relations established among them and within which the educational action takes place. If we accept that the educative situations are student-centred, then the teacher appears to be one of the factors external to situation, as the main situational factor, decisive for the educative situation creating and developing. In this context, to be a teacher means to possess and put into practice three types of specific skills:
1) the professional skill – including the specialty knowledge, the capacity of organizing and controlling the teaching process, the capacity of communicating, of establishing relations with the group of students, with the other teachers, with the environment;
2) the skill of keeping in touch with the higher representatives of the institution – illustrated by the capacity of meeting the requirements of the guiding and controlling factors – director, specialty inspector;
3) the skill of developing appropriate relationships with the users of the teaching process: students, parents, community.

The characterization of teacher's mission within the educational system has to start with his status and role delimiting, issued from his very profession.

C.1. Teacher's Status

The teacher may have the status of:
1) Specialist in the field – any teacher must have an optimum professional level; through training, examinations and experiment, status as a member of the teaching staff;
2) Coordinator of the teaching process – teacher’s actions will be focused on the selection of the most appropriated means and methods in order to support students knowledge construction to accomplish the requirements of the curriculum; teacher will establish the evaluation criteria for the students and will accept the results as being a
feed-back for teachers' own activity; teacher will create the best educational conditions in order to achieve the objectives of the teaching process (E.E. Geissler, 1981);  
3) Formative trainer – the teacher is a knowledge possessor and a knowledge transmitter; through professional, creative, adapting and readapting capacities, teacher acts upon students’ intellectual and professional training.  
4) Educator – by virtue of this status, teacher will be concerned with the providing of a professional, moral and social model for the students: this model will be teachers’ own person; at the same time, teacher will be a counsellor for the students, by helping them to solve the different problems they are confronted with and to identify their own resources during their evolution to the adult age;  
5) Partner to education – this refers to the relationships established by the teacher with the other educational factors: parents, family, local community; in the light of this status, the teacher becomes a partner to mentality and attitude changing, to the interactive action aiming at rendering aware of the adaptation and reforming, of the self-education and improvement;  
6) Member of the teaching staff – this status determines teacher’s relationships with colleagues, with the leading board members etc. To belong to an educational team means that any teacher has to accomplish some tasks and responsibilities required by the need of efficiency of the educational act.  

Having in view these characteristics, it results that the main activities of any member of the teaching staff – projecting, organizing, decision making, coordinating the teaching process, evaluating, solving the specific situations etc. – must be reinterpreted under the managerial perspective, in order to improve the whole activity efficiency.  

C.2. Teacher’s Roles  
The specialty literature describes a multitude of roles that the school teacher may exert. According to A.E. Woolfolk (1990), the teacher has the following roles:  
1) a leader of the didactic activity (expert of the teaching - learning act) – this role is exerted in order to fulfil the objectives aimed by the educational system; the role is given by the fact that the knowledge volume included in the school programs and textbooks is assimilated by the students according to the way they have been filtered and transmitted through teacher’s personality;  
2) a motivating agent – the teacher has to arouse and maintain students' interest, curiosity and desire to learn;  
3) a leader of the group of students – the teacher has to participate in students’ different school events;  
4) a counsellor – after having observed and known students and after having identified their problems, the teacher gives them support, guides and orient them;  
5) a model – through his actions and behaviour, the teacher is a positive example for his students; he settles and offers moral requirements, he transmits moral knowledge;  
6) a reflexive professional – the teacher permanently tries to understand the psycho-pedagogical phenomena he is confronted with;  
7) a manager – the teacher supervises students’ activity during the classes, he keeps in touch with students’ parents and with the representatives of the local community;  

In the specialty literature, there are many debates about the teacher’s managerial roles. The roles of the teacher-manager can be defined starting with the manager’s general tasks, expressed by the managerial functions, as well as with their turning into specific operational leadership tasks (planning, organizing, decision making,
controlling, guiding, appreciating, regulating), by providing the basic conditions (communication, the information system about the activity, students' participation in their own education process).

According to the specialists in the educational management field, the defining of the teacher-manager’s roles has to be realized from an interdisciplinary perspective, including the psychological, sociological and pedagogical domains. This is necessary because the role represents the dynamic and situational aspect of the teacher’s (educator’s) status in the applying of the formally specified rights and duties related to the educational process leading.

A distinct aspect of the teacher-manager’s roles is given by the fact that some roles are imposed, prescribed by the State or by the organization (those of planning, controlling and organizing), while others are acquired through the becoming aware of the necessity of applying the pedagogy actual requirements about students’ personality building up and educating (guidance, counselling, communication) (E. Joita, 2000).

C.3. The Teacher and the Learning Process

By referring to the teacher’s status and role, particularly as coordinator of the learning process, we can identify several ways of approaching the relationship between the teacher and the teaching contents. This relationship defines itself within pedagogical patterns, described through the comparative analysis by Lesne (1997). In the traditional transmitting-normative pattern, the autonomy appears in the field of knowledge as a result of the guided initiation. The teacher is the only possessor of knowledge and the indispensable mediator between information and student. The teacher has a tendency to use the extrinsic motivations. As for the acting predominant factor, there can be noticed the providing of a scientific content within the teaching activity focused on teacher’s action. This one is also perceived as the main source of information transmitting. Teacher’s first role will consist in information transmitting and in testing their assimilation level.

The alternatives for the previous pattern are the personal-arousing pattern and the acquisition through social insertion pattern. Within the personal-arousing pattern, the student becomes the subject of his own education. Actually, this is about passing from the student who is trained and educated to the student who educates himself. In this case, the function of knowledge transmitting is no longer the central function. The emphasis shifts towards the organizing of the framework and of the activities proper to knowledge accumulating.

Under this approach, teacher’s role is that of attitudinal and cognitive mediator between that one who is getting educated and the sources of his information, and this is an aspect requiring the use of some other educational and didactic strategies (Barthelemy, 1997). There is also an alteration of the teacher’s position as compared to the teaching contents. He may choose the most appropriate contents, depending on the aimed objectives.

This approach allows the mobilization of all students’ personality resources. The formative process is based on student’s autonomy, responsibility and learning motivation, consequently the learning process is not destined only to his intellectual development, but to the development of his whole personality. Although the value of this pattern is certain, the specialists emphasize that the teachers are firstly required to construct educative situations. Thus, the teaching act responsibility becomes greater, as well as the exigencies imposed when putting into practice his psycho-pedagogical abilities. At the same time, a special emphasis is placed on the creating of an intrinsic
motivation, determined by the pleasure of being in action and by the arousal of the spontaneous interests.
A third pedagogical pattern, the acquisition through social insertion, relies on the formative resources of the real social relations in everyday life. The student is perceived as a social influence agent and, through this, as a self-education agent. As for the acting predominant factor, there can be noticed the teacher’s role of supporting the cognitive approach to reality, through a pedagogical activity based on the current actions of those who are getting educated. The knowledge selection relies on scientific and social criteria, which aim at creating some theoretical tools that facilitate the acquisition, through personal efforts, of the real, in its concrete determinism and relationships.

Within this approach, a special emphasis will be placed on the relation between theory and practice, respectively on the connection between the knowledge assimilated by the students and their practical value. At the same time, it is to notice that evaluation is made in the context of the daily activities, the sanctions resulting from the very activity finality and quality.

In the education process, these three models are used to a large extent by the teachers whose option is based on each one’s professional knowledge and it continues with students’ age and instruction level.

To accept that the teacher constructs educative situations and is an external factor of the instruction doesn’t mean to alter teachers’ main role, that of initiator and organizer of the education process, but some aspects are however altered, in the sense that between the teacher and the student interferes the educative situation created by the specialist.

C.4. Creating an Educative Situation

Creating an educative situation involves the exertion of teacher’s coordinator role. This role involves, in its turn:
1) Analyzing the available educational resources: material resources (teaching aids);
2) Didactic projecting: formulating the instruction objectives, conceiving the system of educative situations and establishing their temporal sequence, selecting the learning process contents, settling the types of activity the students will participate;
3) Students placing in the educative situation: this is made on the basis of the projected elements, but they could be modified, depending on the momentary variables acting during the instruction process;
4) Feed-back providing: through which the evaluation is made, if the educative situation or the sequence of created educative situations correspond to the established objectives.

C.5. How Teacher Can Support Co-operative and Collaborative Learning?

Learners’ adaptation to complex collaborative learning situations, such as sharing knowledge and maintaining coordinated activity, presumes more advanced cognitive, motivational and socio-emotional regulation skills than more conventional and well-structured learning or working situations. Therefore it is not self-evident how to engage in collaborative learning situations.

Teacher play a major role in directing (on-line or face-to-face) discussions, influencing the discussion by entering new topics, sharing new material and redirecting conversational patterns. Learners are needed to feel a sense of security in order to participate to groups' activities. Forming a sense of community, where people feel they
will are being treated sympathetically by their fellows, seems to be a necessary first step for collaborative learning. Teacher can use pedagogical models, which have been developed to support and structure collaborative learning. Pedagogical models are based on theoretical framework of learning and offers practical instruction of teaching and learning process.

In the following sections three pedagogical models are introduced:
- Inquiry based learning;
- Problem based learning (PBL);
- Reciprocal teaching.

C.5.1. Inquiry Based Learning

Inquiry based learning is a pedagogical model which aims for knowledge building. Key concepts in inquiry model are: distributed expertise, collaboration, shared ideas, social practices and collective knowledge. The instructional design of the model promotes and guides students to generate their own research problems and intuitive theories and also to search for explanatory information (Hakkarainen & Sintonen, 2002).

The phases of the inquiry process are:
1. Setting up the context;
2. Presenting research problems;
3. Creating working theories;
4. Critical evaluation;
5. Searching deepening knowledge;
6. Developing deepening problem;
7. New theory.

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C.5.2. Problem Based Learning (PBL)

Problem-based approaches are based on the idea that knowledge can't be transmitted from teacher to learner, because learning is a process of interpretation and elaboration conducted by the learner (Williams & Hmelo, 1998). The PBL model was originally developed in medical education, but it has been adapted to many other areas. Essential components are: problem formulation, self-directed learning and reflection.

The phases of the problem solving process are (7 steps model) - for example, if you are using an article as an impulse for problem solving:
1. Clarification of the difficult concepts;
2. Setting up the problem and the first analysis of the problem;
3. Brainstorming;
4. Analysis of the problem;
5. Setting up the learning goals;
6. Individual work – information searching;
7. Conclusions and evaluation.

C.5.3. Reciprocal Teaching

The reciprocal teaching model (Brown & Palincsar, 1982; Palincsar & Brown, 1984) is especially developed for understanding and remembering text content. The aim of reciprocal teaching model is that expert helps novice to learn reading skills and skills for critical evaluation. The basic procedure includes that a teacher and a group of students take turns leading a discussion of a section of the text that they are jointly attempting to understand. Since a group's effort are externalised and novices can learn from the contributions of those who are more expert than they, the model provide a zone of proximal development for the students. Expert shows an example, which novice imitate.

The phases of the reciprocal teaching include:
1. Questions concerning the text;
2. Clarification of difficult concepts and the main points of the text;
3. Summary of the text;
4. Divination from the text.

Think!
• What is the teacher's role in these pedagogical models presented above?

C.6. Assessment in Co-operative and Collaborative Learning

Assessment is a part of the instructional process, and it plays a central role in supporting learning. Current debates on theories of learning have indicated the need to consider both cognitive and situated perspectives - knowledge and social interaction in computer supported collaborative learning. Traditionally the purpose of assessment has been testing and ranking of the students. Currently the focus has changed so that assessment is been viewed as a part of the instructional process and it plays a central role in supporting and enhancing students learning. There is a link between assessment methods and what learning strategies students use. For example if the test consists mainly of factual and recall questions,
students may use memorisation tactics to study to meet the task demands. On the other hand, if assessment tasks involve higher-order thinking, deep knowledge and conceptual understanding, the students are required to use deeper level learning strategies. So one way to influence students learning is to change how learning will be assessed.

Since the contemporary view of learning defines learning as a complex process of interpreting, seeking meaning and constructing new knowledge, also the assessment methods should capture the complex structure and quality of student learning and understanding. Therefore it is necessary to design challenging tasks that assess knowledge, conceptual change and higher-order thinking. It is also important to consider how assessment is conducted and how it can support learning.

Collaborative learning is about collaborating to learn, but also about learning to collaborate and therefore it is useful to assess participants’ progress in terms of the quality of the learning process, not just the outcome. It is important to realise, that learning is also a social achievement, and its traces can be seen in increased capacities of groups to collectively create knowledge and deal with problems.

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<thead>
<tr>
<th>Purpose</th>
<th>Traditional view</th>
<th>Social-constructivist view</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Summative: to rank and to select</td>
<td>Formative: to support and transform learning, to provide positive effects</td>
</tr>
<tr>
<td>Time sequence</td>
<td>Assessment usually follows instruction</td>
<td>A dynamic and ongoing process embedded in instruction</td>
</tr>
<tr>
<td>Task</td>
<td>Objective tests, achievement tests, standardised tests</td>
<td>Challenging and collaborative tasks assessing and eliciting thinking and understanding</td>
</tr>
<tr>
<td>Inquiry</td>
<td>Learning products</td>
<td>Both learning processes and products</td>
</tr>
<tr>
<td>Standard</td>
<td>Criteria not transparent</td>
<td>Expectations made clear to students with explicit criteria and rubrics to scaffold student learning and collaboration</td>
</tr>
<tr>
<td>Assessor</td>
<td>Teacher is the solo assessor</td>
<td>Students play active roles in assessing their own and peers’ work</td>
</tr>
<tr>
<td>Unit of analysis</td>
<td>Individual learning and achievements</td>
<td>Both individual and collaborative learning; collective knowledge advances</td>
</tr>
<tr>
<td>Focus</td>
<td>Assessment is separated from learning</td>
<td>Alignment of learning, assessment and collaboration</td>
</tr>
</tbody>
</table>

Table 2. Comparing traditional and social-constructivist view from the assessment point of view

C.6.1. Methods for Assessment

- **Concept map**

Concept mapping has been used as an instructional and assessment tool for assessing student learning and conceptual change. As students draw concept maps, they need to elicit their knowledge, organise the relations among concepts, and construct their understanding of the topic in question. Assessment of concept maps by examining the number of concepts, linkages and hierarchies can show the quality of knowledge.
3.1. Pedagogical Theories Supporting the Use of ICT

- **Self-generated questions**
  Students' self-generated questions can support and characterise reflection and metacognition. Assessment of problem posing and metacognition skills can identify gaps and inconsistencies in understanding.

- **Project**
  Project approach has been used as an instructional and assessment tool for assessing student ability to do a systematic and focused inquiry of a problem; focus on research and inquiry skills.

- **Presentation**
  Presentation and/or poster tasks have been used for assessing for example student ability to construct relevant presentation and present and discuss about it.

- **Learning diary**
  Learning diary has been used for assessing student reflection and metacognition; how student reflect and construct questions based on lectures, seminars and readings.

- **Case studies**
  Case study approach has been used for assessing student problem solving skills. Important aspect is authentic problems and real-life situations.

**Think!**
- What kind of assessment can support collaborative learning?

**D. The Educational Environment**

The educational environment defines the totality of conditions in which education takes place and of the influences they exert upon the persons who benefit by its effects. The composing elements of the educational environment can be represented by means of a triadic structural pattern.

**D.1. The Triadic Structural Pattern**

1. *The educative (educogene) factors* – they represent active or passive elements that organize, support and react or which indirectly determine the educative situations (V. Ionel, 2002). The educative act involves at least two factors: the teacher and the student. As active educative factors, they introduce, into the educative situations, psychological variables difficult to control, “constellations of ideas, of different, heterogeneous notions, of representations, judgments, opinions, attitudes, behaviors, that are manifest or latent, conscious or unconscious, by expressing values, meanings, desires or beliefs, habits which, if not identified, recognized and explained, they represent black zones for the future practice” (G. Bachelard, 1986). At the same time, between them there is settled a bilateral relationship, of reciprocal interdependence and conditioning.

The natural and social environments represent the passive factor, with an important role in filtering the educational influences, in their amplifying or diminishing. *The natural environment*, in its turn, can be characterized by means of the geographical conditions and of their influences upon the instruction conditions. *The social environment* includes the institutional-professional, the familial and the personal environments. Each of them, through its characteristics, determines certain effects of the educative situation actions upon the teacher and the student. For example, instruction situations are differently
projected for those who attend regular courses as compared to those who take extramural courses.
At the same time, it has been accepted the particularly important role of the family environment upon the student's way of adapting himself to the school environment requirements, which leads him to construct his own learning style.
From the presentation of the passive factors, it results that the school environment is placed at the junction between the social and the natural environments, and that it combines: the natural environmental conditions, the school space and time, the teaching aids, the learning means and methods, the inter-individual relations, the organizational culture. School environment is characterized by the educational field, respectively by the "structural and functional complex of (subjective and objective) forces, which determines man's spiritual growth and development" (M. Ștefan, 2003).

2. The educative relationships – they represent the inter-individual relations, with a formative value, settled among the educative factors.
This is the context in which the teacher shows his teaching style, it being based either on the direct transmitting of the information to be assimilated (the direct teaching method) or on the organizing of the educative situations, in such a way that the pupils should learn by discovering and restructuring their knowledge (the indirect teaching method).

According to Flanders (quoted by V. Ionel, 2002), teacher's indirect educative influence is exerted when:
• he accepts and classifies students' feelings;
• he praises or encourages students' behavior;
• he accepts, uses, clarifies, develops the ideas suggested by students;
• he asks questions to the pupils.

Teacher's direct educative influence is exerted when:
• he gives lectures, presents facts, opinions, personal ideas;
• he gives indications, orders, justifications;
• he criticizes or justifies himself in an authoritarian way.
It is not to neglect students’ influence, who can provide, through their answers, the feedback for the information transmitted by the teacher or who have themselves the initiative of intervening. The conclusion expressed by the author emphasizes that the teachers who use the direct influence have a dominating attitude, create an authoritarian climate and are rigid, inflexible, while the indirect influencing (through the organizing of the educational environment) corresponds to the integrated behavior, which means that the teacher accepts, clarifies and supports students’ ideas and feelings, praises, encourages and stimulates their participation in decision making.

3. The educative influences – they refer to the exchange of information that occurs within the educative relationships. Depending on the analyzing perspective, these influences may be:
- intentional (explicit) or non-intentional (implicit);
- continuous (through systematic participation in the instruction activity) or discontinuous (determined by the transfer to another school, by the environment changing - rural or urban, by the relational changing - teachers, colleagues);
- positive (by the transmission of some models representing positive social values) or negative (determined by some undesirable influences, the entourage, for instance);
- convergent (when the educative influences meet students’ expectations) or divergent (when these ones don’t correspond to students’ expectations, having as effect school failure or abandon).

Through the previously mentioned variables, we define a certain configuration, specific to the educational environment, but its momentary state is characteristic to a certain educational field. Its main feature is dynamism. The interrelation among factors is continuously changing, in the sense that new factors appear, while other factors modify or change their action. The receiving of a new education curriculum, the coming of a new teacher or colleague, the forming of a new opinion trend among students, all these are alterations that reconfigure the educative force of the respective field.

D.2. Communication in the Educational Environment

Communication is a fundamental modality of psychosocial interaction, a continuous exchange of different messages between the interlocutor who means to build a long-lasting inter-human relationship, in order to influence the maintenance or the alteration of the individual or group behaviour.

Communication is realized by means of the verbal and nonverbal languages, through which messages are exchanged in order to influence (to a certain direction), especially in terms of quality, the other’s behavior. As a process, communication consists in the exchange of messages among the interlocutors, it being an essential modality of informational interaction, through which a person or a group transmits and receive information in a certain context. For the communication between teacher and student be efficient, a series of conditions have to be met by the emitting source and by the receiver. The transmitting source – the teacher. It is characterized by the following aspects:
- credibility – it refers to teacher’s value, prestige, authority, consideration and reliability, determined by the veracity of the expressed message. Credibility depends on competence and attractiveness.
- competence – it refers to the transmitter’s capacity of being well informed, to his ability of communicating and expressing information in a clear, coherent, intelligible, accessible and empathetic way.
3.1. Pedagogical Theories Supporting the Use of ICT

- **reliability** – the source has to transmit the information in a sincere, natural, authentic, accurate and impartial way.
- **attractiveness** – it refers to the way in which the source presents itself to the receivers (students, teachers): clothes, behaviors (N. Stanton, 1995, Byrne, 1971, Brock, 1965).
- **value of the message arguments** – it refers to the message relevance for the listeners' life; when information condition the performance level, students are more attentive to their recepting.

The receiver – the student. The quantity and the quality of the received information also depend on the receptor's individual characteristics. There are individual differences among the receptors' personality, affectivity, expectancy, motivation, thinking, need for knowledge. The subjects with a higher level of cognitive motivation are willing to solve difficult and complex messages, to search solutions to problems, to analyze informational situations and to make clear distinctions among its significant elements.

### D.3. Message Form and Contents

The message represents the fundamental unit of the communication process, that is made up of words, signs, sounds, images, data etc. To render possible the communication process between the source and the receiver, both of them have to previously know the code, respectively the group of signs, signals and symbols, as structural significant units of the message. This code enables the receiver to understand and assimilate the information. The message can be analyzed from different points of view:
- **statistically** – through the transmitted information quantity;
- **semantically** – through the information quality, contents and meaning for the receiver;
- **pragmatically** – through the value of the information for the receiver.

Starting from these aspects, we emphasize that between the transmitter and the receiver there is an exchange of verbal and nonverbal messages, of words, images and signs, but most of all an exchange of meanings, senses, ideas, notions, principles etc., that have to be learned, understood, processed in an active and creative way. An important characteristic of the message is given by its intelligibility, which depends on its length, originality, difficulty, but also on the receiver's cognitive comprehension capacity and on his expectancy attitude. The more a message is redundant and complicated, containing too many unpredictable and original elements, the more its understanding diminishes and the communication process becomes less efficient. If someone wants to transmit a large original and difficult amount of information, this one have to be correctly distributed and related to the receivers’ level of intelligibility, knowledge and understanding. Messages must be structured and argued, without containing contradictory information.

In a communication, the sequence of information transmitting is also important, respectively the first transmitted information must be correlated with the final or with the latest ones that have to be received, learned and retransmitted. Researches have proved that the first message of the source has a strong impact upon the receiver but, in time, it is forgotten and its impact diminishes. In the teaching process, the exchange of messages between the transmitter and the receiver relies not only on rational arguments, but also on positive or negative emotional elements.
D.4. Psychosocial Variables of the Communication

Within the didactic discourse, it is necessary to analyze not only the contents and the form of the transmitted message, but also their relationships with the communication psychosocial and situational elements. It is considered that, when analyzing the didactic communication process, we can’t eliminate the mediated variables (G. Dumitriu, C. Dumitriu, 1997), represented by the personal, psychosocial and situational characteristics which mediate the interaction among the communication factors. These ones indirectly influence the communication process, the exchange of messages between the teacher and the student (the group), the students’ results, the participants’ activity and behavior. Consequently, between the mediated variables, as regulating elements of students’ behavior, and the structural components of the communication process there can exist an interactive positive or negative relationship. This relationship results can be grouped into:

- **cognitive**: acquisitions of knowledge, ideas and methods, changes of opinions, conceptions and mentalities, the forming of scientific notions, the development of the capacity of perceiving, elaborating, explaining, understanding, expressing the informational contents etc.;
- **affective**: changes in the dynamics of emotional and motivational states, changes of moods, attitudes, beliefs, desires, interests and affinities, the development of feelings and passions, the diminishing of frustration and anxiety, the raising of satisfaction level in the education subjects, the forming of expectations, of interpersonal appreciation, valorization and acceptance modalities;
- **behavioral**: the learning of new adaptive reactions and ways of responding, skill development, the effective involvement in cooperation, collaboration and competition, individual and group potential actualization and achievement.

The previously mentioned aspects are presented in the following scheme:

<table>
<thead>
<tr>
<th>A. THE COMMUNICATION PROCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Transmitting and receiving sources</td>
</tr>
<tr>
<td>b. Used code (verbal, nonverbal, paraverbal)</td>
</tr>
<tr>
<td>c. Message transmission channel (auditory, visual etc.)</td>
</tr>
<tr>
<td>d. Message contents and form</td>
</tr>
<tr>
<td>e. Retroactions (feedback and feedforward)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. MEDIATED VARIABLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Personal characteristics (attitudes, aptitudes, beliefs, age etc.)</td>
</tr>
<tr>
<td>b. Psychosocial characteristics (status, role, skills, interactions, relationships etc.)</td>
</tr>
<tr>
<td>c. Situational characteristics (spatial-temporal conditions, influences, requirements, norms, social pressures etc.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. CHANGES IN STUDENTS’ PERSONALITY AND RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Cognitive (perceiving, learning, understanding, memorization, notion and judgment forming etc.)</td>
</tr>
<tr>
<td>b. Affective (affinities, feelings, emotions, expectations, satisfactions etc.)</td>
</tr>
<tr>
<td>c. Behavioral (specific response reactions, cooperation and competition, acts etc.)</td>
</tr>
</tbody>
</table>
E. Task

Every student will give 2-3 examples from his / her teaching experience which illustrate the use of new pedagogical approaches discussed in this subunit. They share their ideas with the tutor and their colleagues by entering into the discussion Pedagogical Approaches opened by the tutor.

F. References


3.1. Pedagogical Theories Supporting the Use of ICT
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