

## USE OF CREATIVITY IN INFORMATION TECHNOLOGY

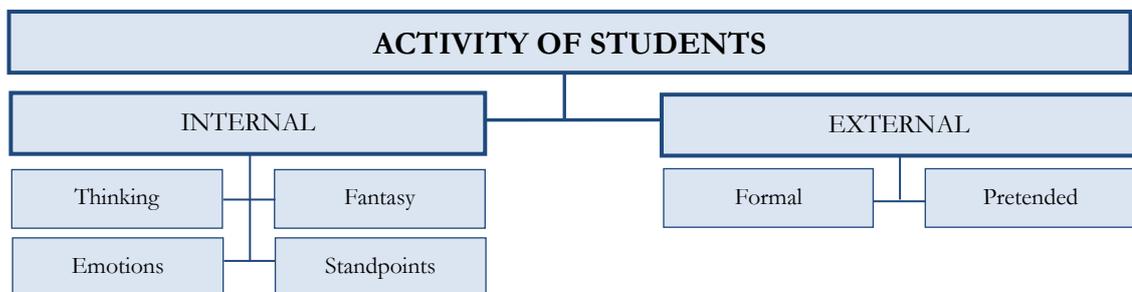
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**Abstract:** Creativity is one of the most essential manifestations of the human's life. That is why it is possible to approach creatively any question. Creative thinking is also certain prerequisite for original ideas, where fantasy is included, we disregard the binding reality and we try to find new views of the actual problems, as well as technical and scientific problems. We can say that creativity is extreme manifestation of life. Every solution of the problem is then creative process. This article asks the question how to use this human feature for teaching.

**Key words:** Creativity, teaching, human, fantasy, creative process, creative school, creative teacher, creative student

### 1 Introduction

If we base our assumption on the thesis that every man is creative, we must also accept the fact that this creativity can be successfully used in teaching process. But it is necessary to have lot of courage and to be aware of the ways how to develop this creativity in human or student, or how to use the creativity during the lessons in a suitable way. Ask yourself and consider how many times did you, in your professional life as teachers, use creativity in teaching or tried to seek and develop creativity of student? We think that there are not many people with such experience. But Jan Amos Komensky used creativity in his works and suggest creativity hundreds of years ago. Being creative means to cope with different aspects, possibilities of the present and also future days of an individual. It means to be opened to everything new, not to be concerned only about the things we are used to. We should ask the question: "why does a man create?" It is based on his need of activity, knowledge, recognition and also on his need for self-actualization. Creative person develops science, technology, solves problems. Creative people are often active, susceptible, their thinking is elastic and original. Original ideas of these people are then connected to the desire to implement them into practice. Creativity can be trained and developed, stimulated. In general, creativity is connected to the courage to start doing something unusual. This keeps us active, gives us suggestions to try something and to do it. The requirement of present education is to increase the number of educated people, to teach them new information and to lead them to solving unexpected situations and tasks. Students can be mobilized to internal activity or external activity (see Pic. 1). Active participation of the students in lectures is the basis of the modern teaching concepts and methods and so it is also basis for creativity.



**Fig. 1:** Distribution of students' activity (Source: own)

Creative work – requires unconventional approach of students, approach that applies in solving problems using unconventional methods to reach the given goals. Creative students are best in new ideas, original solutions and unusual creations. The task of the

pedagogue is “to create favourable environment for all the students, to provide number of varied suggestions and opportunities for different talents and to continuously seek optimal methods of educational work” (Manak, J. 2001, p.10).

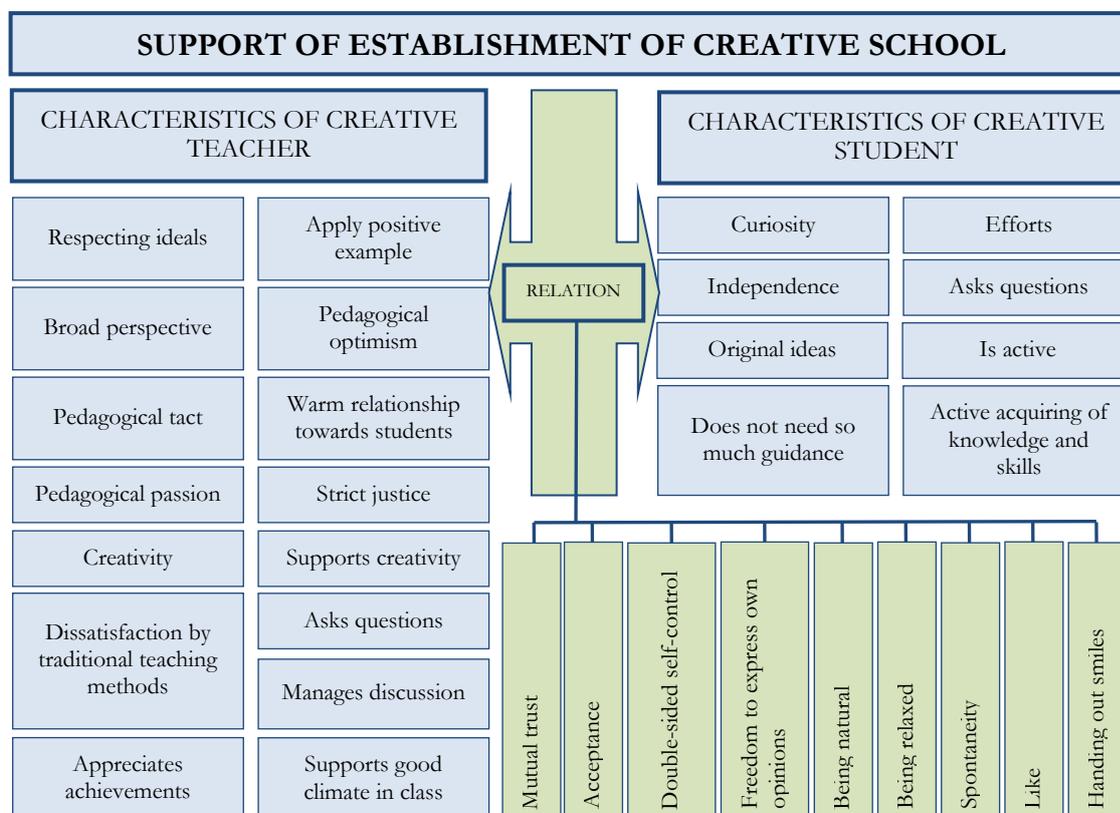


Fig. 2: Distribution of students' activity (Source: Own)

We can fundamentally divide the creativity factors into following:

- Biological factors – they cannot be influence directly in any way
- Psychological and social factors – they are targeted by intentional interventions
- Educational factors – they are object of pedagogical interest and it is possible to influence these factors through pedagogue (Maňák, J. 2001, p.11)

According to J. Manak, the schools have the largest deficit (2001, page 12) “in developing the divergent thinking, i.e. in seeking number of possible solutions of the given tasks or problems and in using imagination and fantasy “.

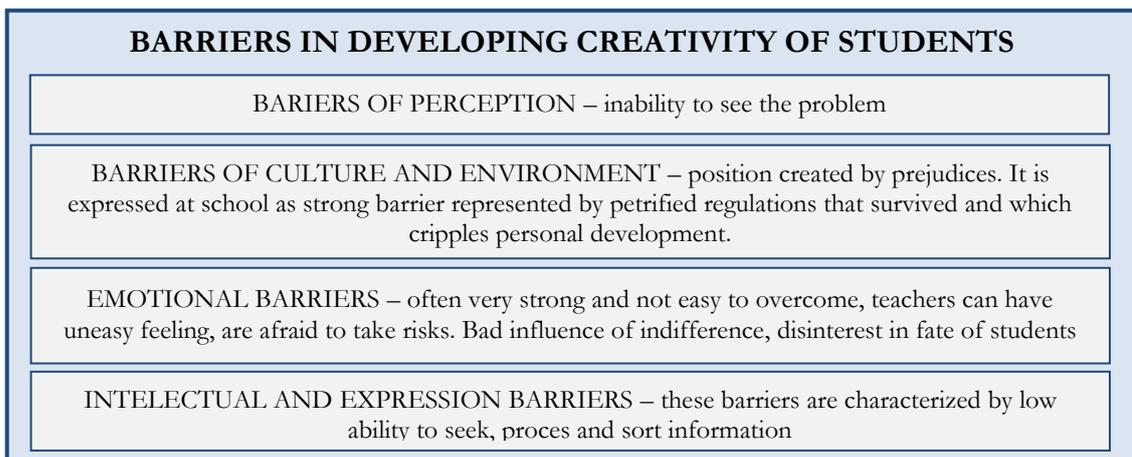
## 2 Evaluation of information technologies teaching and barriers influencing creativity of students

We did small research for our article in secondary schools in Uherske Hradiste region, asking students about their evaluation of information technologies lessons in their school.

Question	Certainly not	Rather not	Not certain	Rather yes	Certainly yes
Are you satisfied with environment of your classroom and school?	1%	2%	29%	59%	9%
Are you proud of your school?	4%	12%	29%	27%	28%
How often do teachers try to liven up lessons?	0%	11%	45%	37%	7%
How many of your teachers are interested in behaviour of students towards you?	1%	12%	29%	37%	21%
How many teachers humiliate you?	48%	51%	1%	0%	0%
How many teachers regularly prepare for the lessons?	2%	4%	19%	34%	41%

**Tab. 1:** Research of internet technologies teaching in secondary schools (Source: own)

Teachers who do not tolerate failures can cause students to fear failure, to be stressed and afraid to make mistake. Even work under time pressure can cause nervousness, stress and does not allow student to think about the problem. If there is no order and restraint, students start to distrust, necessary work habits are not created and process is slow and full of conflicts. Yet another problem is caused by barriers of creativity of the students themselves that can happen to overly ambitious students, pressed by their parents to have only good grades. On the other hand average students do not want to be different from the given norms and they behave in such way. Sometimes teachers themselves refuse students, who often ask questions, as not always teacher knows the answer. There is opinion in society that work and game are two different things, even though there are many educational situations where such connection can be well used. Many textbooks give convergent exercises because divergent exercises are generally more demanding and require much more time to do them. If teaching of the teacher is monotonous, teacher does not encourage all the senses of student and that is why he cannot fully use their intelligence. If motivation to students' activity is not properly used, they lose interest and joy of learning. We will now concentrate on barriers that obstruct developing of creativity. Following picture is based on the barriers of creativity according to J. Manak.



**Fig. 3:** Barriers in developing creativity of students (Source: Maňák, J. 2001, p.24 – own)

### 3 Examples of using the creativity exercises within information technologies lessons

It is possible to successfully develop creativity of students during lessons of different subjects. Development of creative thinking can be used especially in cross-curricular links. We would like to show such examples in our article.

**Example 1:** One of the tasks was the cross-curricular link between information technologies, statistics and mathematics. We will name our example Table optics. The numbers continuously say something different – depending on the context. Statistic data are never clear and it is always matter of the point of view and their interpretation. The task for students is:

1. To create following table (using of information technologies, with use of spreadsheet)

Sex	Age	Number of citizens
Men	Under 15	7207
	15 – 20	2444
	20 – 30	3967
	30 – 40	4375
	40 – 50	3412
	50 – 60	2729
	60 – 65	1592
	Over 65	2990
Women	Under 15	6864
	15 – 20	2331
	20 – 30	3678
	30 – 40	4049
	40 – 50	4216
	50 – 60	3755
	60 – 65	2094
	Over 65	4760

2. To combine and create new tables, seek connections between the individual data, or use mathematics apparatus (statistics, mathematics)

**Example 2:** Another use of creativity in information technologies is the area of graphs using table editor MS Excel. Students not only learn to create and understand graphs, but adding some controls it is possible to simulate the process of mathematical and physical functions. This can stimulate creativity of students, their imagination and again interconnect the information of different subjects. It is possible to implement further questions into the work of students and to “provoke” them for their own search for information. Picture 4 shows input table of the values of modelled graph and the result graph.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1		čas t	souřadnice x	souřadnice y	VZORCE TEORETICKY:													
2		0	0	7	$x = v_0 \cdot t$													
3		0,1	0,9	6,95	$y = h_0 - 5t^2$													
4		0,2	1,8	6,8														
5		0,3	2,7	6,55														
6		0,4	3,6	6,2														
7		0,5	4,5	5,75														
8		0,6	5,4	5,2														

Tab. 2: Input data for graph shown in Picture 4 – horizontal throw (Source: own)

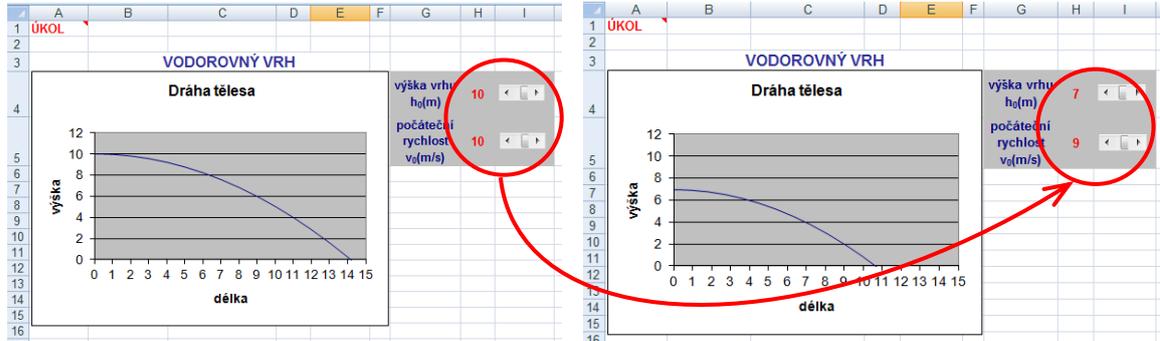


Fig. 4: Example of using table editor Excel for modelling of function – horizontal throw (Source: own)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1		čas t	souřadnice x	souřadnice y	VZORCE TEORETICKY:									
2		0	0,00	0,00	$x = v_0 \cdot t \cdot \cos(\alpha)$									
3		0,1	0,71	0,66	$y = v_0 \cdot t \cdot \sin(\alpha) - 5t^2$									
4		0,2	1,41	1,21										
5		0,3	2,12	1,67										
6		0,4	2,83	2,03										

Tab. 3: Input data for graph in Picture 5 – oblique throw (Source: own)

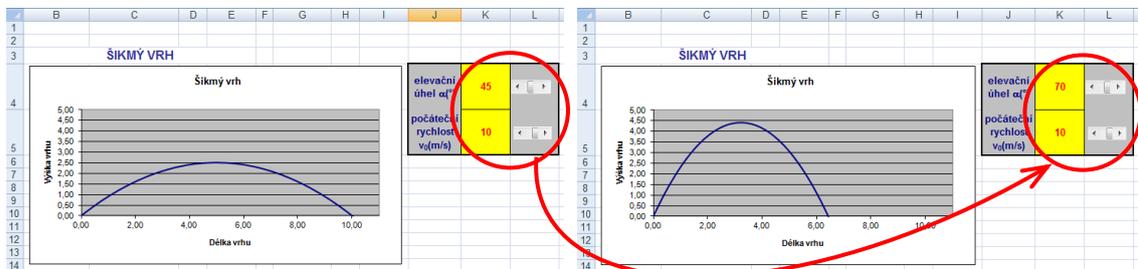


Fig. 5: Example of using table editor Excel for modelling of function – oblique throw (Source: own)

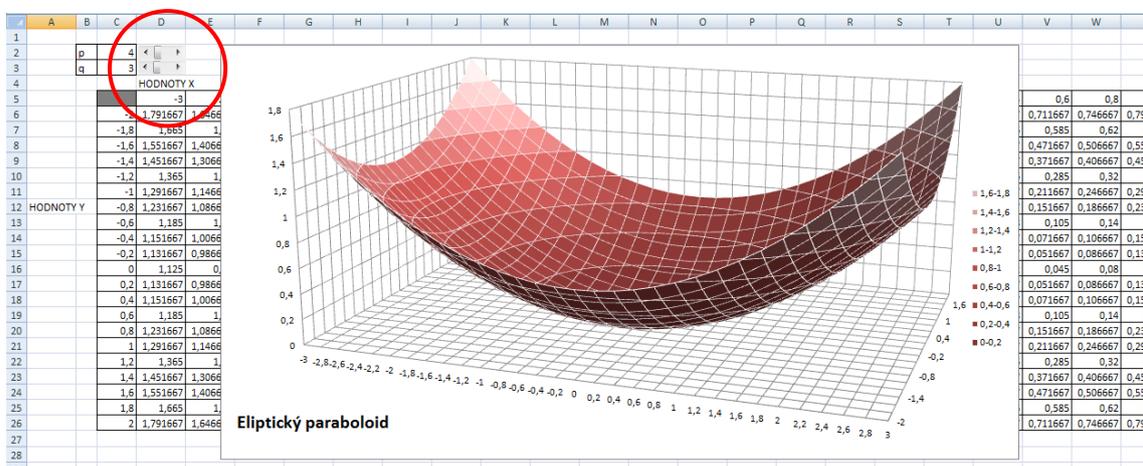


Fig. 6: Example of using table editor Excel for modelling of function – elliptic paraboloid (Source: own)

## Conclusion

Creativity is traditionally perceived as competence connected to the working in so called creative and cultural industries and as competence directly connected to the future job and human life. In connection to the societal changes in 21<sup>st</sup> century and directly connected to the uncertainty caused by the economic crisis, creativity is often considered one of the most important “skills of 21<sup>st</sup> century”. Teaching skills to seek possible connection of information technologies to the building and managing own career should, in addition to providing the basic information about information technologies, be the main content of education in schools. The main goal is to provide the student such knowledge and competences that will help him to optimally use his personal and professional features to succeed in labour market and for building and managing his own professional career. ICT often clings on traditional approach towards education, which is computer symbolizing mainly information provider. The term “digital technology” (which does not include the word information) covers not only information, but mainly constructivist possibilities offered by technologies in education. Computers save our time and make our work easier, but they should not be the main concern of the education. B. Brdicka said: "It is unfortunate that teachers will always have more work with computer. But without computers they will have no work at all." Informatics as branch of science exists for more than fifty years and the same time there have been efforts to use ICT in education. There is no reason to wait, waiting will only increase the difference between using ICT in lives of young people and their using at schools.

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