

# Networked Virtual School - beyond OER and MOOC

Andrzej Żyławski

Warsaw School of Computer Science/Warszawska Wyższa Szkoła Informatyki, Poland, 00-169  
Warszawa, ul. Lewartowskiego 17, e-mail: azylawski@wwsi.edu.pl

## Keywords

innovation, IT education- secondary level, OER, MOOC, Networked Virtual School

"The invention of the automobile and the airplane did not come from a detailed study of how their predecessors, such as horse-drawn carriages, worked or did not work. yet, this is the model for contemporary educational research. the standard paradigms for education research take the existing classroom or extracurricular culture as the primary object of study, but the real question, one might say, is whether we can invent the - educational automobile ".  
Seymour Papert.

## ABSTRACT

In the article there are presented basic assumptions and pedagogical results of IT School Program run from November 2012 by Warsaw School of Computer Science. Starting from a group of distinguished academic computer science lecturers and scientists from 15 best Polish universities who developed and implemented the idea of Polish Open Computer Science Online Academia - Open Educational Resource (OER) for Polish computer science university students, then launching (non virtual) MOOC "Informatics Plus" program for secondary school students in which took part over 20000 secondary schools' students from 5 Polish Voivodships, finally basing on experience gained in previous two projects Networked Virtual (IT) School Program (supported by personalized IT learning system - PITLS) for secondary school students and teachers from over 500 schools in Poland was designed and implemented.

The author explains the aims of the Program, its pedagogical key layouts such as usefulness, partnership, networked learning environment, diversified and high professional level of materials, Interactivity mechanisms, personalization, built-in incentive mechanisms (individual and team), and automation of selected elements of the educational process and system data analysis. The virtual educational tools and techniques used within the Program are listed. Great emphasis is put to presenting the pedagogical and statistical results of the project based on author's own surveys done within three years on population of students and teachers taking part in IT School Program and big data analysis generated by PITLS. Finally the main future directions of IT School Program development are shortly discussed.

In conclusions author will among others try to answer the question what is the reason of the phenomena that over 60 000 students registered in the Program within 2,5 years since its starting and till now have performed altogether almost 400 000 online courses confirmed by IT School Program course certificates.

The openness of the program places it among OER initiatives, massive number of participants involved and number of courses performed resembles MOOCs, but primarily it has a kind of networked virtual organization (NVO) structure, thus it is called Networked Virtual School (NVS), which seems to have characteristics going beyond what is described today as OER or MOOC.

## 1. INTRODUCTION - ICT AND CHANGING EDUCATIONAL PARADIGMS

Nigel Willetts in his article "Computers in classrooms" (Willetts, N. *Computers in classrooms*, 2012 ) linked information technology to the technology of building roads: "when you come face to face with a rolling road technology you must decide to take the operator role or become part of the road!" ICT has become undoubtedly a kind of rolling machine serving the construction and development of modern societies. Education is also taking part in this process and ICT is playing the role of a machine enhancing children's development while learning, when used properly. Therefore, using ICT in education especially of children and youth, one must take caution and prudence that they will become aware technology operators knowing how to make best of it and how to avoid the risks and threats that they can bring.

ICT is the powerful tool that changes business, industry, communication, healthcare and many others including education, so many scientists indicate the necessity to define new objectives of modern education of children and youth and to change the paradigms of education, which is the result of disruptive technological change. Anthony Duisburg, in the article "Online learning - the future of education"( Doesburg, A. (2012). *Online Learning – the Future of Education?* ) described the process of changing educational purposes as a transition from literacy and numeracy (three "R") to learning critical thinking, communication, collaboration and creativity (four C). There are attempts of a new interpretation of Bloom's taxonomy of educational objectives in the era of digitalization of the learning process (Churches, A. *Blooms Digital taxonomy*, 2009).

Everybody agrees that ICT plays a very important role in changing traditional educational systems from proving performance oriented classrooms into personalized (networked) learning environments oriented on improving learning as described in table 1 by Chris Watkins (Watkins, C. (2010). *Learning, Performance and Improvement* ).

**Table 1**  
**Proving Performance vs. ImProving Learning**

<b>Traditional Classroom (Proving - Performance Orientation)</b>	<b>Personalized Learning Environment (Improving - Learning Orientation)</b>
Teacher-centered	Learner-centered
Learners follow instructions	Learners actively participate in learning
Goal is correct answer	Goal is for deeper understanding
Whole class lesson with learners working alone	Learning happens individually, in pairs, in threes and in groups
Teacher gives time to answer questions	Message is on improvement with a focus on effort
Learners focus on tests and grades	Performance linked to effort and progress

Source:<http://www.personalizelearning.com/search?updated-min=2014-01-01T00:00:00-08:00&updated-max=2015-01-01T00:00:00-08:00&max-results=24>.

Also other authors appreciate the important role of ICT in changing of educational landscape. Barbara Bray and Kathleen McClaskey (Bray B., McClaskey K. (2015). *Make learning personal*) developing the idea of personalized learning which according to them "is a controversial term that means different things to different people depending on where and how it is referenced. Some educators believe it is the alternative to "one size fits all" instruction where others promote programs or tools that personalize learning for you and others emphasize that learning starts with the learner", also stress that "technology is moving the idea of "personalized" forward everywhere we look".

The very important factor which can accelerate changing the educational systems into personalized ones apart technology itself, is young peoples' attitude to new technologies. Tamar Lewin headlined her article in the New York Times (Lewin, T. (2010). *If your kids are awake are probably online*) - after discussing the results of the report - Generation M2: Media in the Lives of 8 - to 18-Year-Olds (A Kaiser Foundation Family Study. 2010): "If your kids are awake they are probably online". When we look at the results of the report it looks as new media consume most of children's free time. Sometimes they balance on the borders of addiction as the research shows. In the past children used blackboard chalk for playing hopscotch, nowadays they use computers for plenty of different activities, not only for playing one game, among them for learning.

Many reports concerning the importance of the new media in the lives of children and young people when they are online, show significant role they play in shaping perceptions of all aspects of the world around them, also on education. Results presented in table 2 show the frequency of chosen activities done in internet by IT School students, giving an idea of time they take in their life but also of their priorities in using internet.

Table 2  
How you spend your time on the Internet - specify the frequency

Activity	Very often		Often		Not very often		Never	
	2013 %	2014 %	2013 %	2014 %	2013 %	2014 %	2013 %	2014 %
I browse social networking Sites	51,46	48,44	29,61	32,87	11,29	11,42	7,04	7,27
Checking e-mails	38,71	23,88	42,11	32,22	18,20	39,45	0,36	3,46
Talking with friends	51,70	31,83	31,19	33,91	14,32	28,03	1,70	6,23
I play games	17,60	29,41	20,63	21,45	42,48	35,99	17,48	13,15
Look at online stores, Auctions	11,29	13,49	37,38	32,18	42,96	42,21	6,43	12,11
I learn using educational recourses in the net	8,37	28,72	25,36	47,06	50,73	21,45	13,35	2,77
Using the resources of the portal IT School	4,25	11,07	22,45	34,26	47,94	43,25	22,69	11,42
I'm looking for entertainment content, music	52,91	51,90	36,41	38,75	6,92	8,30	1,09	1,04
Browse news	24,15	32,53	41,63	42,21	27,18	21,45	4,37	3,81

Source: IT School survey, Warsaw School of Computer Science, 2013, 2014. Number of respondents who answered this question: 824, 289.

The indexes of over 80 % very often and often for all students are assigned to: looking on social networking sites (81,07%), checking e-mails (80,82%), talking with friends (82,89%), and looking for entertainment content, music (89,32%). In two consecutive surveys there are two distinctive trends one is raise of percentage of students who very often play games (by 11,8%) and of students who very often and often use educational recourses in Internet while learning (42,9%)! Internet becomes whether we want it or not every day educational children's educational assistant as much or even more important in some ways then teacher. The above values correspond to Cisco Report (*Cisco Connected World Technology Report, 2011*) results of more general nature according to which for 78

% of students the primary way of getting information and news are laptop, computer, smart phone and tablet, 81 % of students consider the internet as important or almost as important to their life as water, food, air, and shelter and most important technology in daily life for 83% of students are laptop, computer, smart phone and tablet.

ICT technology because of its flexibility, mobility, capacity, versatility of possible usage, networking nature and most of all because of very positive students' attitude to them seems to be a long awaited holy grail for personalized education, understood as unlimited source enabling to improve learning process enormously.

## 2. GENESIS OF IT SCHOOL PROGRAM

The way to IT School Program was probably similar to those experienced by many other universities in the world. "For us OER have to be part of the Universities' social mission. Universities are not isolated islands, or, at least, they shouldn't be. They are part of a big framework and this framework is the one that has to benefit from using OER. Universities have to commit themselves to provide support to the society, and the best way to achieve this is by making the access to a good education easier for everybody" (Martinez, S. (2014). *OCW (OpenCourseWare) and MOOC (Open Course Where?)*). Similarly IT School Program activities are part of the strategy and mission of Warsaw School of Computer Science that relate to the dissemination of ICT knowledge and competences beyond the traditional academic community using modern ICT technologies, often described as outreach.

The very initial idea of the Program was born when over ten years ago Warsaw School of Computer Science (WCS) launched Polish Open Computer Science Online Academia (POCSOA) ([www.pwi.edu.pl](http://www.pwi.edu.pl)), with the support of 15 best Polish Universities. In result over 30 excellent Computer Science video lectures were produced for open public, mostly addressed to computer science students and academic lecturers. Watched by thousands of viewers it was (and still is) a form internet open TV, having very limited possibilities of interaction (viewers can evaluate lectures, giving the opinion on their quality).

Some time (2009) before MOOCs were shown by American consortia, Informatics Plus project supported by EU funds was launched and run for four years by Warsaw School of Computer Science, serving over 20 000 students and teachers from 300 Polish secondary schools. The program results among others were the preparation and realization of full 150 - 20 hrs courses and 100 - 1,5 hrs lectures authorized by 100 distinguished academic professors from top 10 Polish universities. This program we can call first Massive Open Course type, not online, the biggest of such in Poland. It used internet only incidentally via Frontera Platform, being mostly a face to face program. Also over hundred of written (electronic) materials were produced and video recordings as well, among them a Homo Informaticus, a set of essays written by academic lecturers for secondary schools' students and teachers. But from the point of view of IT School Program the most important was research made among the secondary school teachers before starting the Informatics Plus program, trying to find out what are the most missing areas (subjects) to be covered by the program, not represented sufficiently in the nationwide computer science curricula. To identify areas of computer science, which are represented in the curriculum insufficiently, in the opinion of the teachers they were asked: 'What subjects and areas represented in the framework of national curriculum would you like to provide students more broadly, especially in the context of extracurricular forms of education? ". The teachers' for and against were: algorithmic and programming: -155 YES, NO - 69, databases: YES - 132, NO - 92, multimedia, graphics, web technologies: YES - 170, NO - 54, Computer Networks: YES - 138, NO - 86, trends in the development of computer science and its applications: Yes - 70 No - 154. As indicated the results of survey, each (except the last one) has been the subject considered by the vast majority of teachers not sufficiently represented in the curriculum, which pointed to the need to broaden their (teachers and students) knowledge in the field of these areas. The most needed support expected by teachers were found in the areas: "Multimedia, Graphics, Internet technologies", followed by "Algorithms and programming" ( *Final report, Informatics Plus Project, 2012*). Especially the second one caused many doubts, how students can learn informatics properly not having sufficient recourses to learn fundamental concepts of computer science.

### 3. IT School Program aims, organization and main assumptions

Basing on experience gained in previous projects, IT School Program was launched in November 2012, as neither OER nor MOOC or blended learning, it went beyond these three ideas trying to construct Networked Virtual School which is in a different context similar to "Networked Common School" introduced by Leonard J. Walks "(Walks , L. J. (2004). *The Concept of a 'Networked Common School*)."

The main objective of the Program was and still is to increase the level of ICT competences (e-skills) of all secondary schools' students registered in the program. Other aims are: popularize basic knowledge of computer technology to those who are not interested in ICT, encourage and prepare young people to study in the field of Information Technologies and thus facilitate the study of the core courses in Universities, give the teachers tools for individualized learning with ICT talented students. The Program is addressed also to these (secondary and non secondary school users) who want to improve their labor market "attractiveness" by obtaining WSCS accreditation of ICT skills or simply for self studies.

From the organizational point of view IT School resembles "the regional network of secondary schools which may also be defined in a larger sense as a networked School of schools or common networked school, a virtual counterpart of a multi-campus state university. The regional network as a virtual organization has its own organizational identity but also provides a larger organizational context for local school 'branch campuses' with identities of their own" (Walks , L. J. (2004). *The Concept of a 'Networked Common School*). The IT School organizational structure is a very flat one consisting of teachers (called coordinators of the program) and their students representing the secondary schools registered in the Program. Warsaw School's of Computer Science role is integrating one, mostly from content and technical point of view. But surely IT School has its own organizational identity visualized in IT School brand mark and represented by huge students and teachers community.

Leaving aside discussions on contemporary educational theories connected with IT technologies such as constructionism, connectivism, cognitive apprenticeship, learning in collaboration, learning in partnership and learning in a situation (Attwell, G., Hughes, J., (2010). *Pedagogic Approaches to Using Technology for Learning*, Pedagogika web 2.0) , in this paper I will concentrate on presenting pragmatic approach to the learning taking as the basis of IT School educational concept such ideas as usefulness, partnership, networked learning environment, diversified and high professional level of materials (content), built into the system interactivity mechanisms, personalization of education, built-in incentive mechanisms (individual and team), and automatization of selected elements of the educational process, management and system analysis (big data).

The usefulness of the program was assured on the very initial stage by a survey asking the teachers among other questions, what they and their students need most to support computer science teaching/learning (*Final report, Informatics Plus Project, 2012*), having in mind that IT School Program was not to replace but to support weak points of national computer science curriculum. Prepared in close cooperation with teachers and students no wonder that two surveys gave results as below. The question addressed to teachers in surveys from 2013 and 2014 was whether the content offered by the IT School portal is useful for students?

**Table 3**  
Is content offered to the students by IT School Program useful?

Answer	Number of answers		%	
	2013	2014	2013	2014
Definitely yes	81	61	59.12	72,62
Yes	55	23	40.15	27,38
Rather not	1	-	0.73	-
Definitely not	-	-	-	-

Source: IT School survey, Warsaw School of Computer Science, 2013, number of respondents who answered this question: 2013 - 137, 2014 - 84.

The results obtained were obvious and confirmed very well performed consultancy stage, in the first part of the project. Participation of teachers and students in establishing the areas and materials gave excellent starting point for further activities.

To confirm ex post usefulness of the program in a survey from 2015 the teachers were asked about the frequency of using IT School resources during classroom lessons:

**Table 4**  
**How often do you use educational resources of IT School Program in classes with your students?**

Answer	%	Number of answers
More than 3-4 times per month	26,61	33
About 3-4 times per month	17,74	22
About 1-2 times per month	34,68	43
Less than once a month	20,97	26

Source: IT School survey, Warsaw School of Computer Science, 2015. The number of respondents who answered this question: 124.

The above results show that over 50% of teachers use the resources almost on every computer science lesson each month, giving a clear evidence that IT School Program is very useful for teachers and students. The usefulness of the program is also expressed by massive participation in the program and its different activities, by the students and teachers (table 5). IT School Program is not obligatory, so usefulness is one of the main reasons that makes the program so popular in the secondary schools students and teachers community.

**Table 5**  
**IT School - chosen statistics**

IT School data	2012/2013	2013/2014	2014/2015	2012-2015
Number of registered Schools	385	73	66	524
Number of registered users	24173	20190	21153	65516
Number of registered Coordinators	672	386	275	1333
Number of courses performed	66902	193498	159940	420340
Number of tests performed	138164	408582	232989	779735
Number of competitions participants	538	2600	3419	6557
Number of page views*	3 030 565	7 049 921	7 978 799	18 058 709
Number of unique users*	115 302	160 757	291 422	550 533

Source: IT School data, Warsaw School of Computer Science and Google analytics data\*, as on 21.04.2015.

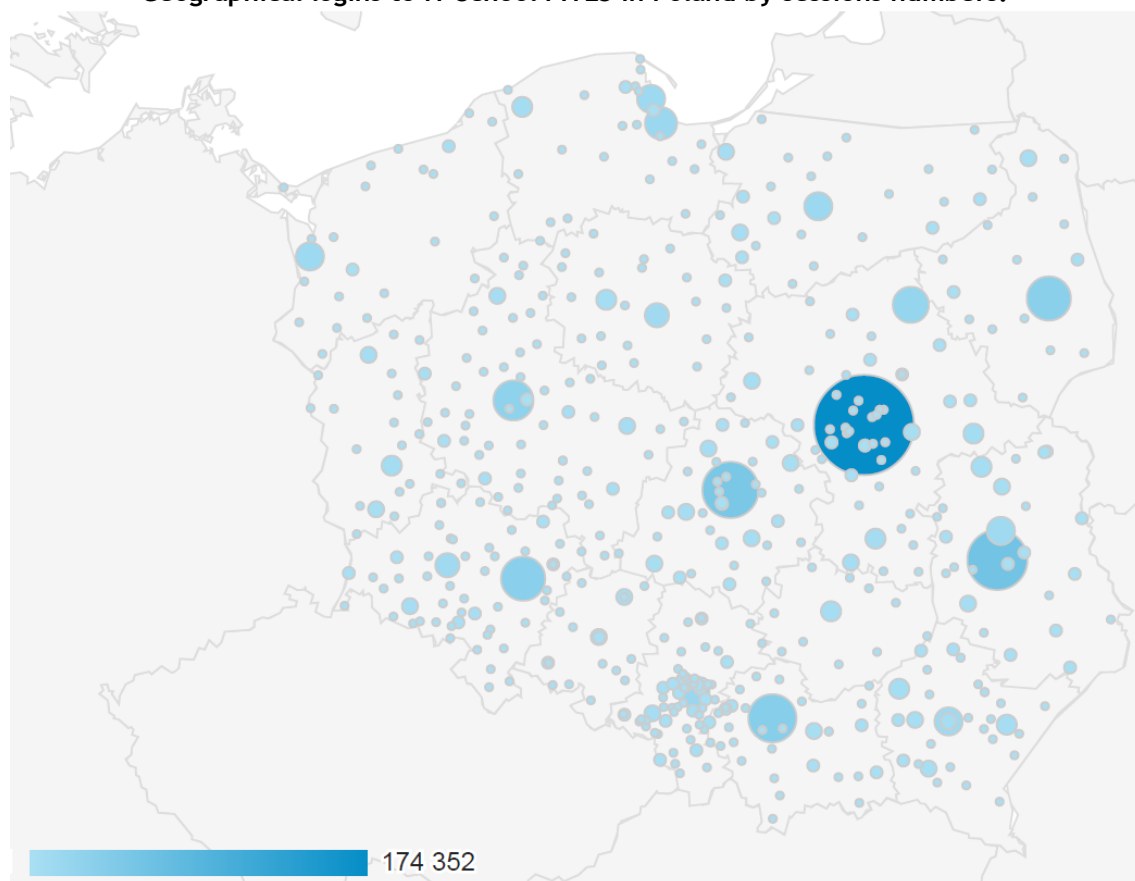
Usefulness of the program may be described in quantitative data as above, but also in quality terms such as increase of ICT competences, preparation for labor market or for further studies which will be shown while presenting pedagogical results of the program.

Partnership is next important principle of the Program. It's the community of secondary school computer science teachers and students that took part in the preparatory (research) part of the program, then in preparing and consulting the didactic materials together with academic lecturers and scientists, and finally in implementing the Program and evaluating it. Partnership was and still is realized on different levels university-university, secondary school - secondary school and secondary school - university. The idea of partnership is also applied to students who are surveyed often on different aspects becoming in that way also active partners in improving the Program results, which is especially important for personalization of learning. The forums for students (facebook) and teachers (LinkedIn) are open to express opinions on IT School Program activities and development.

It would be difficult to talk about personalized learning not having data on every student progress accessed in close partnership with teachers and students via online and face to face discussions, surveys performed after each school year and information gathered by PITLS.

Networked learning environment was natural for the Program which is being implemented in over 500 secondary school all over Poland. For the purpose of the Program a dedicated web platform was projected and implemented by WSCS, with functionalities supporting achieving the aims of the program. It among others enables forming interschool groups working together on different projects and delivering lectures from distant localizations like USA or Japan

**Picture 1**  
**Geographical logins to IT School PITLS in Poland by sessions numbers.**



Source: Google analytics data 22.10.2012 - 30.04.2015.

The users of IT School Program logged in from 619 localizations in Poland and 3 444 in the world.

Diversified and high professional level of materials was and still is one of the most important principle of the Program. Quality of the content is the thing that makes the Program so well accepted both by students and teachers. The results presenting level of students and teachers acceptance of chosen Program content is shown in table 6.

**Table 6**  
**Which of the Program resources are most useful for students ?**

IT School chosen content	Teachers		Students	
	Number of answers	%	Number of answers	%
Video lectures	97	71.32	221	29,39
E-scripts	98	72.06	229	30,45
Presentations	107	78.68	292	38,83
Tests	85	62.50	352	46,81
Scientific distance groups	31	22.79	65	8,64
All are useful	2	1.47	223	29,65

Source: IT School survey, Warsaw School of Computer Science, 2013. Number of respondents who answered this question: students - 752, teachers - 136.

5 out of 6 chosen resources are useful for 30 % or more of students. Almost 30 % have the opinion that all materials are useful to them. Teachers evaluation on quality and usefulness of the content are approximately twice higher than students ones'. It explains why the program is so widely used by teachers for learning purposes As it was mentioned earlier for developing the Program such pedagogical forms and tools are used as courses, lectures (traditional and online), competitions, games, visits to IT firms, online academic scientific groups for secondary school students run by academics, participation in professional IT courses and many others. In cooperation with some universities open computer science lectures conducted in Polish academic centers take place. Lecture topics include the most interesting subjects concerning the theory and applications of computer science and information technology. Lectures are an opportunity to meet with academics at the premises of universities and get acquainted with the unique atmosphere of this traditional academic form of knowledge transfer. Online computer science lectures given by the best Polish academic teachers, among others from Warsaw University, Jagiellonian University, University of Wroclaw, Warsaw University of Technology, Military University of Technology and many other renowned Polish universities. E-learning computer science courses for secondary school students, allow to acquire the knowledge and ICT skills and to obtain IT School certificates. The important tool are also nationwide knowledge and skills competitions such as using computer graphics to make posters, algorithmic contest, Grand IT test and many others.

High marks given by teachers to chosen recourses (table 6) bring immediately the question in what way the teachers use the materials. The answer are presented in the next table 7.

**Table 7**  
**In what way do you use IT School Program resources with your students?**

Answer	%	Number of answers
I use IT School materials in computer science classes	70,97%	88
I recomend studying IT School materials as homework	52,42%	65
I use IT School materials in additional classes (e.g. special interest groups)	40,32%	50
I recommend studying IT School resources to most talented students to broaden their standard curriculum knowledge	72,58%	90

Source: IT School survey, Warsaw School of Computer Science, 2015. The number of respondents (teachers) who answered this question: 124.

As shown IT School Program is used in different ways, what is especially satisfying is the use of



the program in additional classes and for work with most talented students, which are one of the important aims of the program.

Interactivity and automating mechanisms such as immediate information about the test results or number and kind of activities done by the student available to them in real time are built in the information system. Also the teachers have at their disposal a special panel which enables them monitoring their students activities and progress in learning. Automatization of selected elements of the educational process, management and system analysis are developed to monitor students performance and to help teachers to personalize students learning. There are special sub programs enabling collecting and processing big data in real time and on that basis formulating further proceedings.

Personalization of learning is at the moment expressed in possibility of choosing by student any courses to be performed to make a specialized set of skills and knowledge ie. in computer networks, in computer graphics or in databases. Also the online contests are the form of involving students according to their personal interests like computer graphics, algorithms, databases, programming etc. Each student can plan his/her own activities in the program for school year, and after registering to the system to monitor progress he/she has done (by getting points for each activity). Each student's activity is also assigned to his/her school enabling each month and school year to rank all registered schools by their students' activities.

Built-in incentive mechanisms (individual and team), they are mechanisms which make the students more interested in Program's activities like competitions or public voting on best in their opinions works. Also the final competition for the title of most active schools of the Program nationwide and regional (Voivodships) rankings release a lot of students' engagement. The students are especially engaged in "Magic of Christmas" (December) and the Best IT School of the Year. The number of competitions' participants raises every year (see table 5). In the table the numbers concerning students' participation in Best IT School competition (ranking) are not shown, because it's all IT almost 70 000 School population is involved.

#### 4. PEDAGOGICAL EFFECTS OF IT SCHOOL PROGRAM

The most important question to evaluate the results of the program is to what extent the contribution in IT School Program raised the ICT competences of students?" It was asked to teachers and students.

Table 8

To what extent the contribution in IT School Program improved the IT competences of students in the opinion of teachers and students?

	Teachers		Students	
	Number of answers	%	Number of answers	%
To a very large extent	17	20,24	34	11,76
To a large extent	51	60,71	84	29,07
Moderate	16	19,05	119	41,18
To a very small extant	0	0	25	8,65
Not at all	0	0	27	9,34

Source: IT School Survey 2014, Number of respondents (teachers) who answered this question: teachers - 84, students - 289.

81 % of teachers and 41 % of students think that participation in IT School Program raised students ICT competences to a very high or high extant. The teachers' opinion is much better about students' progress in raising IT competences than student themselves see their progress. One of the measures on which such opinions are formulated apart from surveys are test results, performed by students after each course.

**Table 9**  
**Average students' test results generated by PITLS**

Test results according to attempt	2012/2013	2013/2014	2014/2015
Average result of the tests during first attempt	72,5	78,1	82,8
Average results of the tests	64,7	58,9	77,6
Average results of the tests during successful attempt	89,3	93,5	94,7

Source: IT School PITLS, 2015 as on 21st of April. Scale: 1-100, Successful result > 70.

Test results and answers (table 8 and 9) show that participation in the program brings conviction about raising students' ICT competences shared both by students and teachers, confirmed by test results generated by PITLS. As it was signaled earlier an important issue is teachers role in learning process. The teachers are called IT School Program coordinators to stress their supportive and advisory role in learning. To learn how they support students in learning they were asked in what ways they monitor students' work while using IT School Platform.

**Table 10**  
**What is the way you monitor students' work while using the IT School platform?**

Answer	%	Number of answers
I use the teacher's panel monitoring the activity of students registered in IT School Program	59,68%	74
I verify students knowledge using test results available on the platform	41,13%	51
I include the educational content from IT School materials to exams, tests and tasks checking students' progress	45,97%	57
I motivate students for additional activities in the program, like taking part in competitions, taking individual additional courses from outside the standard class syllabus.	67,74%	84
I take the student activity in IT School program into consideration in final computer science class assessment	54,03%	67

Source: IT School Survey 2015. Number of respondents (teachers) who answered this question: 124.

The range of ways used by teachers to monitor students' work and progress is far wider than those listed in table 10. All of them stress coordinating and supporting role of teachers in learning rather than traditional teacher centered position as content deliverer and supervisor.

In next question of the last IT school teachers' survey I wanted to learn to what extent including IT School Program resources to teaching resulted in improving students involvement in studying the IT subject

**Table 11**

**Please assess to what extent having IT School Program included to teaching computer science has improved the students involvement in studying the subject; as well as their interest in IT:**

Answer	%	Number of answers
To a very large extent	8,06	10
To a large extent	41,94	52
Moderately	39,52	49
To small extent	6,45	8
I do not see connection	4,03	5

Source: IT School Survey 2015. Number of respondents (teachers) who answered this question: 124

For half of the teachers' surveyed including IT School program in obligatory curriculum is a decisive motivator to increase the students' involvement in learning and interest in IT. Only 4% of teachers can see no influence of IT School Program on learning IT improvement.

Teachers were also asked to assess the results from table 11 in deeper details by indicating the impact of IT School Program on particular effects of education in different thematic and "life" connected areas.

**Table 12**

**Please assess in percentage how big is the impact of your students' participation in IT School on particular effects of education:**

Answer	% and number of answers		
	Largely	Moderately	Poorly
Growth of basic computer skills, including: searching, analyzing, processing information	42,24% (49)	42,24% (49)	2,59% (3)
Growth of poorly represented in general paths of education skills, such as: computer graphics, multimedia, Internet technologies, computer networks, databases	53,45% (62)	32,76% (38)	3,45% (4)
Growth of awareness on IT use in everyday life and work (except for studying)	37,93% (44)	43,10% (50)	4,31% (5)
Growth of proficiency in using ICT for studying	37,93% (44)	44,83% (52)	5,17% (6)
Better understanding of the role of security and proficiency in use of ICT; as well as improved competences in these areas	37,07% (43)	42,24% (49)	7,76% (9)

Source: IT School Survey 2015. Number of respondents (teachers) who answered this question: 124

In teachers' opinion the important growth (from 37 to over 50%) can be observed in all categories. The above results confirm that massive participation in the Program is the effect of its holistic approach putting the learner in the centre of the system.

## 5. CONCLUSIONS

IT School evolved from OER through MOOC fazes reaching the new quality of Networked Virtual School which is innovative combination of both previous, with special stress put on partnership in different aspects among academic and secondary levels educational organizations, making it academic outreach program for secondary schools students and teachers. As a Program designed to accompany regular school curriculum "It avoids some restrictions of a fixed curriculum, by freeing educators to think outside of the old curricular box to experiment with learning designs more in keeping with new patterns of rational action emerging in the network era. On the other hand it does not reject, but offers a means for enlivening, curricular learning, as students bring relevant real-world experience into curricular situations and take curriculum-based knowledge back out into real world problem settings for application" (Martinez, S. (2014). *OCW (OpenCourseWare) and MOOC (Open Course Where?)* . The networked virtual school is a model not of replacing but supporting ICT education in secondary schools. It is an open, massive online educational virtual organization serving precisely identified and constantly evaluated users' needs, established in close cooperation with them. Usefulness, understood as customizing the level, quality and organization of IT School to students and teachers expectations is the answer to the question why in 2 and a half years it become the biggest such program in Poland. Still there are a lot of new concepts and ideas to be introduced in future especially in the personalization of tutoring and further automatization the big data analysis gathered by the system to the benefit of the users.

Most of the teachers agree with the statements shown in table 13, which make the essence of personalized learning paradigms such as new learning culture, open learning environment, deeper learning and partnership in learning (Bray B., McClaskey K. (2015). *Make learning personal*).

**Table 13**

**Below you can find few statements concerning the IT School Program - please tick those you agree with:**

Answer	% and number of answers		
	I agree	Hard to say	I disagree
Participation in IT School Program develops students' responsibility for their own education	69,83% (81)	28,45% (33)	1,72% (2)
The possibility to choose the courses encourages students consciousness on their own predispositions and interests	87,93% (102)	12,07% (14)	0,00% (0)
The educational resources available at the platform are useful for working with IT talented students	88,79% (103)	11,21% (13)	0,00% (0)
The platform delivers educational resources supporting the individualization of education	81,90% (95)	17,24% (20)	0,86% (1)
It is possible to notice the growth of interest in technical studies among the students using IT School Program	42,24% (49)	54,31% (63)	3,45% (4)

Source: IT School Survey 2015. Number of respondents (teachers) who answered this question: 124

Finally it's worth learning what benefits of participating in IT School Program can students see. The answers show that some personalized learning values as possibility of improvement of students' own IT skills and knowledge and access to content customized to their needs and level of knowledge are crucial in perception of the Program.

**Table 14**  
**What benefits can you see from using IT School Platform :**

Answer	%	Number
Possibility of IMPROVEMENT my own IT skills and knowledge	70,93	205
Possibility of using the knowledge and skills acquired in future work or while studying in university	31,49	91
Access to content customized to my needs and level of knowledge	29,07	84
Possibility of personal learning at home, after school	37,72	109

Source: IT School survey, Warsaw School of Computer Science, 2014. Number of respondents who answered this question: 289.

Warsaw School of Computer Science is not listed amongst the best polish computer science universities/faculties, but all of us have deep understanding that outreach in the form of partnership with secondary schools community can bring benefits to both sides. That's why we put special attention to making the IT School better in that way improving our own skills and knowledge. There are many papers presenting benefits coming from OER and MOOC ideas, which surely they have, but none of them is a result of such a close cooperation between all actors of educational scene as Networked Virtual School, where learner is in the centre, with all system elements supporting him in his knowledge and skills improvement.

## REFERENCES

- A Kaiser Foundation Family Study. (2010). *Generation M2: Media in the Lives of 8 - to 18-Year-Olds*. A Kaiser Foundation Family Study.
- Attwell, G., Hughes, J., (2010). *Pedagogic Approaches to Using Technology for Learning Literature Review*, Lifelong learning UK, 2010
- Bray B., McClaskey K. (2015). *Make learning personal*, Corvin.
- Cisco Systems Inc. *Cisco Connected World Technology Report*, 2011, from <http://www.cisco.com/>.
- Doesburg, A. (2012). *Online Learning – the Future of Education?*. New Zealand Listener.
- Educational Origami (2009). Churches, A. *Blooms Digital taxonomy*, 2009, from: <http://edorigami.wikispaces.com/>.
- Final report, Informatics Plus Project*, 2012. Warsaw School of Computer Science.
- ICT in Education (2012). Willetts, N. *Computers in classrooms*, 2012, from: <http://www.ictineducation.org/>.
- IT School Platform , - [www.it-szkola.edu.pl](http://www.it-szkola.edu.pl).
- IT School teachers and students surveys, 2013, 2014, 2015.
- Lewin, T. (2010). *If your kids are awake are probably online*. The New York Times.
- Martinez, S. (2014). *OCW (OpenCourseWare) and MOOC (Open Course Where?)*. In Proceedings of OpenCourseWare Consortium Global 2014: Open Education for a Multicultural World.,
- Pedagogika web 2.0, European Resource Center, from: <http://www.slideshare.net/kalalala2/pedagogy20-pl>, 2010.
- Polish Open Computer Science Online Academia, [www.pwi.edu.pl](http://www.pwi.edu.pl).

Walks , L. J. (2004). *The Concept of a 'Networked Common School*. Temple University, Philadelphia, USA E-Learning, Volume 1, Number 2, 2004.

Watkins, C. (2010). *Learning, Performance and Improvement*, Research Matters. Institute of Education - University of London.

## AUTHOR'S BIOGRAPHIE



Andrzej Żyławski most of his professional life has been managing educational institutions preparing computer science specialists. 1991-2000 director of Mila College, 2000-2012 rector of Warsaw School of Computer Science. Presently president of Warsaw School of Computer Science. From 2007 chairman of the audit committee of Polish Scientific Association of Internet Education. In 2009 received a New@Poland award for Polish Open Internet Informatics Academia Project from Polish Association of Private ICT Employers. In 2013 received award from Informatics Europe for Best Education Practices in recognition of the outstanding educational initiatives. Research areas involve IT usage in pre and university education, education management and university - business relationships.

Warsaw School of Computer Science/Warszawska Wyższa Szkoła Informatyki, Poland, 00-169 Warszawa, ul. Lewartowskiego 17, e-mail: [azylawski@wwsi.edu.pl](mailto:azylawski@wwsi.edu.pl)

Linked in profile: <https://www.linkedin.com/profile/preview?vpa=pub&locale=>