New Approaches of Teaching ICT to Meet Educational Needs of Net Students Generation

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Abstract. The paper describes the educational needs of modern students as generation Net representatives, highlights the contradiction between their characteristics and traditional ways of teaching ICT disciplines. The paper reports teaching experience and poll results for three years at Kherson State University, Ukraine. The purpose of the paper is to offer new teaching approaches to cope with a generation gap and way to improve the quality of ICT teaching.

Keywords. Generation gap, Generation Net, teaching approaches, ICT discipline

Key terms. ICTTool, TeachingPattern, TeachingMethodology, Capability

1 Introduction

The UNESCO report on Information Technology in Education [1] informs that Ukraine is on the way of "the rapid advancement (progress) of ICT in education that leads to the constant updating of the educational content and the quality of ICT training". However, there is a great amount of problems. Primary it is connected with the fact that educational institutions and teachers in particular are not ready to the transition to the information society: "increased demands for flexibility, mobility and adaptability to the education management system, educational institutions and teachers in the context of rapid changes make it difficult to maintain and improve the quality of educational services."

2 Related Work

Using our teaching experience we identified the common trend of learning styles among the students. Further research is required to investigate digital competence formation among future teachers. Our attempt to find out an unknown factor that has a significant impact on the pedagogical process and to understand the nature of this phenomenon was based on the considering modern students as the representatives of the new generation.

To date, about 40 books and scores of articles and papers have been written on this generation that report the results of international surveys and other research and describe their characteristics. Their impact on education at all levels has been of major interest to researchers and educators. There are about 10 terms to describe the current generation of students [2]: Millennials (Howe and Strauss), Generation Y or Gen Y (Nader), Echo Boomers (Tapscott), Net Generation (Tapscott), Digital Aboriginals (Tarlow and Tarlow), Digital Natives (Prensky), Nexters (Raines and Filipczak), Dot Com Generation (Stein and Craig).

The representatives of this generation were born in 1982-2003. Today's students and post-graduates are aged from 10 to 30. It means that all teachers and institutions that are involved in the education of the students who have grown up in the world of new digital, mobile and high-tech, digital technologies.

The technology itself has had a profound effect on this new generation, unlike on any previous one. In the classroom, students can chat on Skype or write SMS to their friends, take notes on ipad, surf the Internet and read a book on the ReadBook. This behavior can not be fully appreciated by their teachers: it's considered that electronic instruments and digital devices distract students from the "real" study [2]. Majority of today's teachers are representatives of the previous generations. They are using learning models fitted for the teachers themselves but not for the new generation of students.

It was found that representatives of the new generation inherent a wide range of characteristics that are defined a predisposition for becoming a successful educator. Realizing their significance for the education and considering themselves to be an instrument of world changes, they will be strongly motivated to improve the quality of life of the society. Some research study and develop strategies for a retention them in definite professional sphere including education.

Moreover, the representatives of Net generation have solid moral values connected with a family and our society. They are highly motivated to create an open and tolerant society. It's important for new gens' educators to consolidate and maintain youths' system of values. [15].

The results of the 3rd year students' polling showed the low level of professional awareness (Preschool and Elementary School faculty). Only 50% of students have an intention to become teachers [16]. The lack of professional focus among students sets a hard task for educators to make teaching a valuable and desired profession.

Among the characteristics of generation should be noted that Gen Y workers are usually educationally focused and attribute their success to their educational capabilities. They want to have successful careers. They do not like the dress code, demand ICT equipped workplaces and want have a flexible work schedule.

Ronald A. Berk synthesized pertinent research evidence based on ten national and international surveys: EDUCAUSE [4], College Students' Perceptions of Libraries and Information Resources Survey, Greenberg Millennials Study [5], Education Research Institute (UCLA) [3] American Freshman Survey [11], National Center for Education Statistics [9], Net Generation Survey [8],The Net Generation: A Strategic Investigation [13], Nielsen Net View Audience Measurement Survey [2, 10], Pew Internet and American Life Project [6, 7] и Technological preparedness among enter-

ing freshman [12]. The research results from the surveys and aforementioned books has yielded twenty learner characteristics typical for most Net Geners: technology savvy, relies on search engines for information, interest in multimedia, create Internet content, operate at ─twitch speed, learn by inductive discovery, learns by trial and error, multitask on everything, short attention span, communicate visually, crave social face-to face interaction, emotionally open: Embrace diversity and multiculturalism, prefers teamwork and collaboration, strive for lifestyle fit, feels pressure to succeed, constantly seeks feedback, thrives on instant gratification, respond quickly and expect rapid responses in return, prefers typing to handwriting. The research results from the surveys and aforementioned books have yielded twenty learner characteristics typical for the most Net Geners.

Fig. 1. Improvement discipline background

We have identified some teaching approaches that are contradictory to the contemporary students' needs. This gap is especially obvious in teaching computer related disciplines. Complete comprehensive step-by-step instructions and exclusively individual learning are no longer efficient. This context led educators to a revision of present teaching strategies.

3 Setting up the Pedagogical Experiment

The only discipline - "New Information Technologies and Technical Facilities of Education" – that concerns the formation of ICT skills is taught for the future teachers of all specialties at Kherson State University. This year the discipline was renamed in "Information Technology" in most curricula.

The teaching experience of teaching the discipline "New Information Technologies and Technical Facilities of Education" in 2011 (109 students) and in 2012 (112 students) at Faculty of Pre-School and Elementary Education (FPEE) allowed us to identify problems that are mainly related to the mentioned contradictions [17].

Table 1. The contradictions of the present ICT teaching approaches to the generation Net characteristics

ICT teaching approach	Generation Net characteristic	Poll results
ICT teaching "from scratch": disregard (neglect) the actual level of the student's ICT skills. As a result, school ICT discipline assignments are duplicated, lab manuals are detailed and tend to be comprehensive.	Tech savvy	84% of respondents have started to use the computer for learning 7 years ago or earlier
Teaching materials are not interactive and update	Relying on search engines for information	About 26% of the students classified (attributed, mentioned, placed, noted) search engines to (as) the most frequently used sites on the Internet
Weak level of visualization of teaching materials, lack of interactivity including hypertext	Interest in multimedia, "visual" communication	Movies and computer games have the second position among the purposes of using computer ranked by students
Step-by-step manuals that presuppose learning by copying the sample, the absence of the original product as a result of the students' work.	Creation of Internet content	Social nets, wiki-sites and forums have the third position among the most frequently visited sites on the Internet. All of them are a platform for a creation of their own content, express their opinion, share things made by themselves. 13% of respondents mentioned the creative activity as a major purpose for using the computer
Students are constrained by one plotline (storyline) in learning, the absence of immersion, problem-solving and decision-making tasks and enough freedom for actions in realization students' learning trajectory.	Multitasks on everything	The sum of hours for different everyday life activities informed by student are about 28 hours a-day.
Weakly realized person-centered approach	Emotionaly open	Social nets were ranked as the second position by students
Individual fulfillment and performance of learning results	Teamwork and cooperation	Using computer for communication among students is placed on the third position after learning and entertainment purposes by students

We interviewed students of Faculty of Pre-School and Elementary Education in 2012-2013 academic year. The results confirm last year statistics that quality of teaching materials on KsuOnline was highly appreciated by students, average score was 9.29 in 2011 and 9.16 in 2012 out of 10.

The results of the entrance poll of other faculties in 2011-2013 academic years showed the following trends:

- In 2011, 89% of the respondents owned a computer or a laptop. This academic year, 100% of students are the owners of a computer or a similar device regardless of the discipline.
- 70% (2011), 68% (2012) and 69% (2013) students have an access to the Internet outside of the university – thereby, this rate stays the same.
- However, a number of students who recognize themselves addicted to the Internet has grown from 24% in 2011 to 32% in 2013.
- An interesting result was found by visiting University website by students from different disciplines. 17% of the third year students said they had never visited the university website at the departments where teachers hardly use ICT in teaching. On the other hand the rate was 0 (since 2011 to date) at the departments where most of the teachers regularly use ICT.

The number of students who have a positive attitude towards the use of ICT in education (inter alia, at lectures) has increased (see Fig. 2).
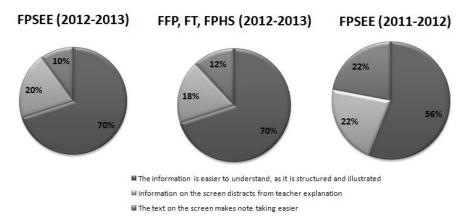
FPSEE (2012-2013)   **FFP, FT, FPHS (2012-2013)**   **FPSEE (2011-2012)**

- The information is easier to understand, as it is structured and illustrated
- Information on the screen distracts from teacher explanation
- The text on the screen makes note taking easier

Fig. 2. Students Attitude Towards the Use ICT During Lectures

The purposes of using the computer by students have almost the same rating, regardless of year and the faculty (see Fig. 3).
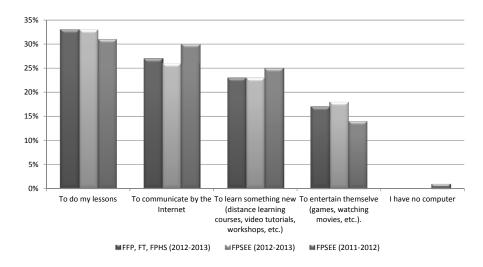
Fig. 3. The Purpose for Using a Computer and Internet by Students

Social net is becoming more popular among services for communication (see Figure), IME and email are also frequently used.
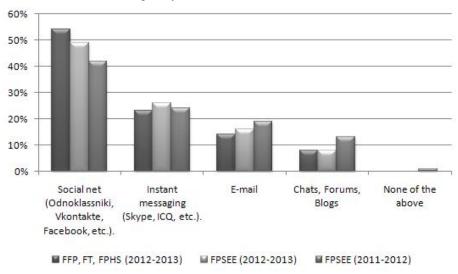

Fig. 4. Student Communication Services

Modern students overestimate their skills for online searching according to Berk. The results of our research have confirmed this fact. The results of entrance poll and test in Informatics are contradictory. The majority of students estimated their level of ICT proficiency as excellent and good. The rate is depicted below.
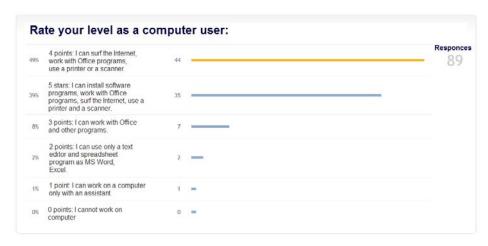
Rate your level as a computer user:

			Responces
49%	4 points: I can surf the Internet, work with Office programs, use a printer or a scanner.	44	89
39%	5 stars: I can install software programs, work with Office programs, surf the Internet, use a printer and a scanner.	35	
8%	3 points: I can work with Office and other programs.	7	
2%	2 points: I can use only a text editor and spreadsheet program as MS Word, Excel.	2	
1%	1 point: I can work on a computer only with an assistant.	1	
0%	0 points: I cannot work on computer	0	

Fig. 5. Results of self-appraisal a computer user by students (FFP, FT FPHS, 2013)

The entrance test contains 45 comprehension questions and is designed by analogy with ECDL test. The aim of testing is to check residual knowledge of school computer discipline. The results showed that only 3.28% of students had a score higher than 4.5, 82% had a score higher than 3 but less than 4,42 points, 62% had from 2 to 3 points and 1.64% scored less than 2 points.

During the recitations, the following problems were identified that are related to organizational issues and students attitudes:

− Students have no skills to manage their time and work efficiently without strict teacher control, regardless deadlines. Only few students uploaded their works in time.
− Not all students use email regularly. Many of them chronically forget their email user names and passwords. Students are confused by various browsers or other version applications. As a result, the login process to email or distance learning system regularly takes up to 7 minutes.
− There is no clear understanding of terms among students. Being able to work with some programs, often they cannot deal with similar ones.
− It is necessary for a teacher to consider different speed of students work while planning lessons. Some students do not regularly use computers. Thus, typing, mouse control, and searching for a command causes a delay.
− Plagiarism. Some students prefer not "to waste" their time to do lessons. They easily copy their colleagues' results or download similar ones from the net. It is important at the first lesson to highlight the value of students own creative work and punish the students who attempt to copy someone else work. Under strict control, the number of plagiarisms decreases, but does not disappear. In fact, we notice that plagiarism is growing with task level. The reason is that the students desire to get a mark, not knowledge.
− The students do not like reading long instructions. Usually they prefer to ask a teacher or colleagues than to read step-by-step manual. It is also associated with different systems prevailing perception among students. The feature of the course

is that the most of the teaching materials are stored in digital form (in digital form). Creating e-learning course does not require additional financial costs, as opposed to hard copy, faster and easier to edit and update. However, reading from the screen does not give effective results. Perceived only about 40% of the information.

− Lack of collaborative activities: in pairs, groups and teams, social assessment, problem-solving and decision-making tasks. A student presents results of an individual work only to one person–his teacher, and feels subordinated under such conditions. In addition, it is the reason of the absent of the critical view on his own work. This results in frustration and dissatisfaction of the student to any criticism. The teacher comments are perceived in a negative or indifferent way.

− Educators should pay special attention to students feedback about effectiveness of teaching activities and the level of their satisfaction. For example, monitoring and evaluation allow a teacher to obtain an information about teaching incomes and quality, that would improve his work. It should reflect the level the students knowledge. It's vice versa in practice: evaluations become a sign of knowledge / ignorance of the material, the student rating of the group.

The presented requirements to discipline designed in previous work on digital literacy formation [17] have been adapted to Berk's pedagogical strategies. As a result, we have formulated new approaches considering educational needs of the Net students' generation (see Table 2).

Table 2. The approaches of teaching ICT discipline to meet educational needs of generation Net students

The teaching element	Requirements (Description)
Discipline content	A discipline content should reflect current research and encourages students to use new approaches and technologies, highlights current trends in ICT development. Tasks presuppose creative activity, form skills of self-learning and further development. Examples are inspiriting. Task execution result is useful, valuable and applicable product in professional practice. All elements of the discipline are focused on future professional activities.
Students motivation	All elements of the course (assignments, surveys, etc.) help students to see themselves in their future profession, particularly in teaching profession. It is important to emphasize interest to the students' opinion, to make possible to their contribution in doing collective projects, for example, to create a bank of teacher's materials; Student wants to get a feedback from his colleagues about his work. Any result of creative task should pass following stages: creation, publication and social assessment with definite criteria. Student wants to evaluate teacher's work too, so a teacher should organize the ways to impact on the discipline development for students, to express their wishes.

The teaching element	Requirements (Description)
Organizational issues	Tasks presuppose collaboration, facilitate communication and interaction to develop personal aspect of student and help to realize his individuality. Clear structure, planning, to do list and deadline system. Active use of formative assessment techniques. Ice-breaking, team-building and communicative exercises at the beginning and at the end of the lesson to form communicative skills, values, relationship. Use no more than two new environments at the lesson. Teacher should consider in the selection of services to work at the lesson: registration absence or its simplicity, functionality easiness, necessity to install additional software opportunities to use in profession.

The main aim of updating the discipline was to help future teachers to create and organize their own learning space in the Internet. Therefore online interactive services that can be used for communication and teaching pupils were included (creating word clouds, mind map, open online documents, site, etc.). We also considered Berk's strategies while designing the discipline. The updated version of "Information Technology" discipline was taught at the Faculty of Foreign Philology (FFP) - 104 students, Faculty of Translation (FT) – 61 students, Faculty of Psychology, History and Sociology (FPHS) – 28 students.

Table 3. The implementation of Berk's teaching strategies in the course "Information Technology"

Characteristic of Net Generation	The implementation of educational strategy
Tech savvy	The virtual discipline environment was created with the system of distance learning ksuonline.ksu.ks.ua located on a MOODLE platform. This system allows developing a course with such elements as glossaries, wikis, multimedia clips, presentations, tests, blogs, forums, etc.
Teamwork and cooperation	Some tasks are complex and presuppose collaboration, while their execution the cognitive interpersonal communication and interaction of all participants progress. An important stage is to prepare a group of students to work together. To ensure about students' readiness for cooperation teacher should arrange Ice braking, team-building and communicative exercise (up to 5 minutes) at the beginning and at the end of lesson. Teacher, who works in the computer classroom, usually recognizes his students primarily "from the back." Therefore, such exercise facilitates personal contact with the group, which is especially important while teaching short disciplines.
Interested in multime-	The discipline content was developed and designed considering

Characteristic of Net Generation	The implementation of educational strategy
dia, "visual" communication	students' interest in "visual communication" and multimedia. Video-clips and presentations were added to each theme. The tasks and manuals contain minimum of text information and maximum of graphics and illustrations. Teachers included such elements as blogs and forums.
Rely on search engines. Multitasks on everything	In adding to use search engines during the course students active work with Google services as Google.Drive, Google.sites, etc. This satisfies the interest in creating online content and allows simultaneously work with several documents. It's also an efficient tool of collective activity organization.
Retention in the profession	Organization of students' activity is a process of consistent modeling of professional activity of specialists under learning conditions. The students of teaching specialties create educational games, tests, documents, tables that are useful in their professional practice. The results of the work are evaluated not only technical element, but also educational one. Also such task as creating a presentation "My choice" (students aimed to describe situation of their professional choice, analyze their present achievements and capacities, goals and dreams, ways to attain them) and collective writing of mind map "Modern teacher" were added.
Emotionally open	Tasks are person-centered and presuppose creation unique results that will describe student's own lifestyle, attitude and etc. This approach helps decrease the quantity of plagiarisms and contributes to the development of their creative abilities. Each student's work passes through formative assessment: self-appraisal, social assessment, teacher's assessment.

Such tasks as making clouds of words, mind maps, playing learning games are relevant to professional and educational discipline orientation. In addition, they presuppose creative activity and can be easily adapted to a group work.

Poll Results of 2012-2013 academic year at Faculty of Pre-School and Elementary Education are comparable with poll results published one year earlier. The quality of teaching materials on KsuOnline highly appreciated by students, average score was 9.29 in 2011 and 9.16 in 2012-2013 out of 10. The novelty of lectures was assessed as 7.59 in 2011 and 6.84 in 2012-2013, the novelty of practical tasks had 7.64 and 7.39 respectively.

The students' preferences about the most interesting and useful for future professional tasks have changed. In both of these categories the task "Creating didactic game" leads. Making a poster "It's interesting to know," creation of "Site Class" and creation of online poll follow in the rating. These tasks we preserved in the updated version of the discipline "Information Technology". As a result, new version of "Information Technology" discipline has the following structure:

Lesson 1. Registration on KSUOnline, taking an entrance poll and test. Presentation "My choice" with the following structure:

1. My strengths and weaknesses (academic, creative, personal, individual aspects).

2. My goals, objectives and deadlines (to 2020 year).

3. My completed tasks.

4. A letter from You yourself in 2020.

Lesson 2. Creating a class site on Google Sites (Students add, delete pages, edit them and insert pictures and text, change site's design). Taking a poll "NET Gener profile Scale".

Lesson 3. Creating a poll on Google Drive and inserting it to the site.

Lesson 4. Creating a cloud of words (Tagxedo service), publishing pictures with a cloud of words and writing an assignment for the pupils on the "Homework" site page. Changing assignments with the word clouds and its execution.

Lesson 5. Creation educational games with triggers or hyperlinks in MS PowerPoint.

Lesson 6. Social expertise of the games (organized with Google Drive – a spreadsheet). Watching the movie "The image of the modern student" by Michael Wesch (Kansas State University, 2007). Creating a collective essay "How I like to learn" in online document on Google drive.

Lesson 7. Co-creation of mind map "Modern teacher." Taking final poll and test.

Making a poster "It's interesting to know" and contributing to wiki page "Communication in the network" are for independent work.

Returning to the problem of assessment, it should be noted that in presentation "My Choice" 68 students described their school successes and achievements considering them as the next step in their professional development, but some students evaluate these achievements as formal, not real:

"*To the moment of leaving school I had about 60 letters of honor in my* "*collection*". *But I understand they only have formed my ability to learn and now mean nothing*".

It's necessary to change assessment system shifting the emphasis from control to formative function for strengthen the motivation. In addition it's necessary to vary teacher's assessment with self-assessment and social assessment due to teacher's criteria. Students can determine the quality of the work due to criteria and assess technical realization, structure, relevance to age of pupils, subject, design, quality of illustrations, literacy, etc. This forced students to think about the quality of their work while creation it.

Social expertise has stimulating, diagnostic and formational functions. A wish to get social appreciation motivates to create high-quality bright individual works. Such way of assessment forms critical perception of the information. A student with low self-esteem at first is afraid that his group mates will assess not his work but his person, but it has never happen, all students are aimed to be objective and independent judges.

The social aspect is a priority for a new generation. They tend to have a relationship regardless of the field of interaction. Education is not an exception. If the teacher does not build the relationship consciously, it usually takes the worst form. A teacher should know that a grade is no longer a sufficient motivation for the positive attitude of the student to the discipline, especially in the pass-fail system. It is clear that students often associate the discipline with teacher's personality. The high quality

executed tasks show not only an attempt to get a high grade but sympathy to a teacher. In computer disciplines social aspect is often nearly absent or poorly developed: most of the time students work individually on the computers.
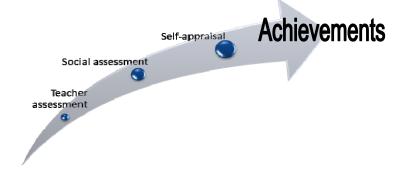

Fig. 6. Increasing students' achievements by the method of formative assessment

The times of detached teacher have passed. Today's successful teacher can easily contact with the audience in a short time, acts as a partner, friend and a leader.

During the course, we found that the most third-year students have lack of communication. For example, at first lesson after the game "Introduction", we asked all students to tell us about their three small victories. Such "victories" were often met with utter surprise of the group. It was uncovered that the students' ability to learn is directly connected with their sense of self-confidence and positive mood.

Obviously, a success of training approach strongly depends on a teacher personality and his skills in training and teambuilding. Therefore, the authors of this paper have selected games and exercises that do not require special teacher's skills and knowledge or any additional devices.

Training elements in students' groups of different teachers' specialties and years of study had different reaction. Some students expressed stunning and rejection: "Why should I do that? It is not serious." despite the fact that they had finished Innovative Teaching Methods and Technologies discipline, training exercise was an extraordinary situation. One of the teachers said describing her experience: "Third-year students look so serious, that sometimes I feel scared to come to the classroom, as if teachers and students have switched their roles...". We find it particularly important to use the elements of training and communicative techniques working with students of teaching specialties. Present students are future teachers who are taught traditionally. In several years, they'll copy one of teaching styles they have seen. It is important to implement innovative techniques and give to students a chance to test them in practice.

Another important improvement in the organization of the discipline was using of open online document on GoogleDrive among teachers. Each of the teachers contributed to planning, selection of training exercise and other notes. After each lesson, teachers made a record in "a discipline online diary" to describe in free form results of the lesson, such as the most common student mistakes, teaching and

technical problems, positive situations, questions from the students, etc. Keeping a discipline diary had a great success. Teaching has become more effective and convenient, the level of awareness and collaboration among teachers has risen, so now teachers create and use it in other disciplines.

4   Results and Discussion

Developed approaches allowed us to improve a range of disciplines including "Information Technology", which is taught for students of all teacher specialties. We also applied them to following disciplines: "Introduction to Information Technology" (for future teachers of elementary school and Computer Science, the 1st year of studiy), "Fundamentals of Computer Science and Applied Linguistics" (translators, the 2nd year of study), and "Office Computer Technology" (programmers, the 1st year of studies).

Students expressed their positive attitude verbally in the classroom and several students sent e-mails with gratitude after finishing the discipline.

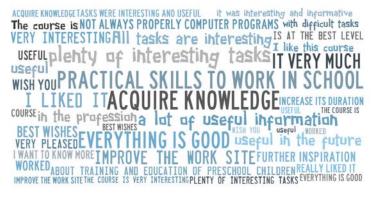The results of the final poll confirmed their appreciation.

Fig. 7. Word cloud composed of students' comments about IT discipline

5   Conclusions and Outlook

Thus we have obtained the following results:
1. Discussed and analyzed characteristics of generation Net students;
2. Highlighted the contradiction between the characteristic of today's students and traditional ways of ICT teaching;
3. The approaches to resolve these contradictions are found and implemented in teaching practice.

In the future we plan to expand the list of pedagogical specialties to which the up-dated version of the course "Information Technology" will be taught and improve other disciplines according to the proposed approaches.

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