







# The Evolution of the Information and Educational Environment in the Context of the Theory of Generational Development

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**Abstract:** The article is devoted to reviewing system-organizing and personalized approaches to the modern learning environment. It is explored following modern society's requirements and technology. We suggested 6 stages in the development of the learning environment, stages of e-learning development, visualized the interdisciplinary approach to EdTech and comparative characteristics of traditional and e-learning. E-learning is understood as an umbrella term that covers web-based instruction, online learning, networked learning, computer-assisted learning and computer-mediated learning. We consider a model of the modern learning environment taking into account the characteristics of its subjects belonging to different generations. Generation theory is reviewed providing recommendations for the best possible educational content for Baby Boomers, Generations X, Millennials or Generation Y and Generation Z suitable to their adaptive style and values.

## 1 INTRODUCTION

The educational process is changing due to the evolution of society all the time. Now we are witnesses of higher education transformation and adaption of student's workplace for various forms of using traditional and ICT learning tools. The advances of digital multitools provide wide access to various kinds of information sources, widening the walls of the educational institution.


According to the 2030 Agenda for Sustainable Development announced in 2015 Sustainable Development Goal 4, known as Education 2030, is a single global goal for quality education, which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Technology is a fundamental driver of that vision to create equitable, dynamic, accountable and sustainable learner-centred digital learning ecosystems that are relevant for the XXI. Rapid advances in technol-


ogy are revolutionizing how teaching and learning are conceptualized, designed, and implemented in higher education. These developments play a key role in delivering quality education for all (Ping and Libing, 2017).


In today's world of dynamic society development, scientific and technological progress, approaches to the learning environment are changing. This is due to many factors, including the change of generations that respond differently to information appeals and the technology of their delivery.


In 1991 Strauss and Howe (Strauss and Howe, 1991) presented the theory of generations. According to it, people of the same age group are united by common features formed by their live conditions. As a result, Strauss and Howe (Strauss and Howe, 1991) had 6 generations in the XX and XXI centuries. The last four generations of the XX century, and those which make up most of the current learners' population, can be seen (in bold) in table 1. Some slight variation exists in the span of years used for each group (Jones et al., 2007).


Focusing on generation theory can help to develop more robust theories of flexibility in the contemporary learning environment, as well as to provide the best possible educational content for Baby Boomers, Generations X, Millennials or Generation Y and Gen-

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Table 1: Demographics by generation.

Cohort	Year of Birth
G.I Generation	1900 to 1921/1924
The Silent Generation	1922/1925 to 1943/1946
The Baby Boomers	1944/1947 to 1960/1963
Generation-X	1961/1964 to 1978/1980
Millennial / Generation-Y	1980/1982 to 2000/present day
New Silent Generation / Generation Z	2000/2003 to 2020 /?

eration Z suitable to their adaptive style and values.

The majority of today's students fall into the generational group, Millennials. However, modern educational environment participants are mixed of 4 generations. To provide the best possible educational environment for Baby Boomers, generations X, Y and Z we should be implementing appropriate educational technology.

EdTech or EduTech, being a shortened form for Educational technology, is a wide field. Therefore, one can find many definitions, some of which are conflicting. We consider EdTech as the practice of introducing technologies and non-standard solutions to education for better learning. In 2017, investments in the EdTech market in the world grew to a record \$ 9.5 billion. And it is forecasted that by 2020 this mark will cross \$ 252 billion (Himyak, 2018).

What started as an experiment in education delivery is now being transformed by a new breed of technology entrepreneurs. Moreover, EdTech is about applying digital technology to deliver a new form of learning architecture. An architecture that harnesses the social reach of the internet delivers personalized learning and training that can automatically adjust to an individual's learning competence and that uses big data analysis to understand the most effective ways for learners to progress. In changing the traditional architecture of education, EdTech has the power to create efficiencies, cut costs and enable new levels of standardization and democratized access. It is set to transform the future of how education is resourced, taught, consumed and, ultimately, the results that it can then yield – both for the individual and for society as a whole as we continue to build the knowledge economy (Vedrenne-Cloquet, 2018).

That's why today teachers are allowed to create an interactive learning environment. Attention should be paid to modelling systems in education following ICT evolution from a learning tool to educational technology. Such development can be easily explained within the triangle Student – Teacher – Learning Environment.

The teachers and students can be the same or different generations. From the point of view of mod-

ern education and its promotion through EdTech, the greatest interest is made of four numerical and active generations: Baby Boomers (BB), Generation-X (Gen-X), Millennials / Generation-Y (Gen-Y) and Generation-Z (Gen-Z) who are the main consumers today. Understanding the generational differences in education, their behaviour features and basic values, educators change approaches to educational technology.

## 2 DEVELOPMENT OF LEARNING ENVIRONMENT

The informational and educational environment is a systemically organized set of data transmission means, information resources, interaction protocols, hardware-software and organizational-methodical support, focused on meeting the needs of users for information services and educational resources.

Developing a total learning environment for students in a particular course or program is probably the most creative part of teaching. While there is a tendency to focus on either physical institutional learning environments (such as classrooms, lecture theatres and labs), or on the technologies used to create online personal learning environments (PLEs), learning environments are broader than just these physical components. It also includes:

- the characteristics of the learners;
- the goals for teaching and learning;
- the activities that will best support learning;
- the assessment strategies that will best measure and drive learning;
- the culture that infuses the learning environment.

Individual learning styles are influenced by generational differences in a learning environment. There is no one-size-fits-all solution to accommodate the learning preferences of all generations. Thus, some approaches work well for learners from one generation but aren't well received by those from other gen-

erations. The key is to include a diversity of methods, modalities, and techniques to address a diversity of preferences (see table 2) (Levonius, 2015).

As we can see modern learning environment is more generationally diverse than ever before, and each generation has its unique perspectives and preferences regarding learning. To accommodate all of those preferences can be possible by employing sound instructional methodologies, a variety of modalities, and solid facilitation techniques thus overcoming fundamental generational differences and providing learning experiences that engage and benefit everyone (Levonius, 2015).

The learning environment is used to be concerned with information technology, as the technology for people to work with information. According to this approach, there are 6 stages of learning environment development.

It can be noticed the correspondence of 6 stages of information technology development to a certain generation of its users (table 3).

Thus, pedagogical technology reflects the tactics of the implementation of educational technologies and is based on the knowledge of the regularities of the functioning of the system 'Teacher – Environment – Student' in certain study conditions (individual, group, collective, mass, etc.), it shares the common features and regularities of the educational process independently from a particular educational subject.

D. Charrisony and S. Nipper first used the term 'generation' to refer to three stages of e-learning development, "historically related to the development of production, transport and communication technologies" (Nipper, 1989). Table 4 presents a brief description of three generations of e-learning.

According to table 4, each direction of pedagogy of distance education is characterized by certain features of the social, cognitive component in the process of distance learning.

The first generation – 'cognitive behaviourism' – emphasizes the need to use the model of distance learning, the goals of which are clearly defined, formulated and exist separately from the students and the content of learning. The training material should be constructed in such a way as to maximize the effectiveness of the mental activity. This generation is characterized by the absence of a 'social' in the process of learning. The study is considered an individual process. A similar emphasis on individualized learning improves students' autonomy. Preferably such technologies as radio, television, postal correspondence [periods] are used. The presence of a teacher in the learning process is extremely limited.

The role of the teacher is mainly in the preparation of printed material. Later, students could see and hear the teacher through audio, video, multimedia technology.

Instead, 'constructivism' as the next generation comes, the main principles of which are the following features:

- new knowledge is built based on prior knowledge;
- distance learning is considered as an active rather than a passive process;
- language and other social tools play a role in building knowledge;
- the purpose of cognition and evaluation is a means of developing students' abilities to self-assess knowledge;
- the student is the core of the learning environment;
- the knowledge acquired in the process of distance learning must be subjected to discussion by the community, verification and real use (Nipper, 1989).

The teacher in this case is a mentor, assistant and partner, and the content of the teaching material becomes secondary to the learning process. The teacher and his experience are still the main sources of knowledge.

The next generation of pedagogy of distance education – 'connectivism' – involves unlimited access to network technologies. According to this approach, the role of the student is not to remember all the information, but to be able to find information and apply knowledge where necessary. For training with the use of distance learning technologies, students need to have a high level of information and communication competence, therefore, the primary task is to prepare students for learning with the use of special learning technologies. Teachers and students can collaborate in content development, offer ideas for improving teaching technology. The entire distance learning process is carried out based on cooperation. However, this direction is characterized by the lack of pedagogical control, the structuring of educational content.

Anderson and Dron (Anderson and Dron, 2011) believe that each of the generations has its advantages and disadvantages. The future generation of distance learning, according to scientists, will be more subject-oriented, characterized by an increase in student activity in the learning process, learning virtualization.

Generally, e-learning has been used to describe learning that is supported by technologies through various types of delivery modes.

Table 2: Generational differences in the classroom (Levonius, 2015).

Generation	Learning characteristics	What to provide for the group
The Silent Generation	They prefer to work in the background, synthesize the ideas of others, and build consensus rather than speaking up, advancing their agendas, or engaging in debates. They respect authority, do what is asked of them, and remain on task until the job is done.	instructor-directed lectures, structure and predict-ability (no surprises), independent skill practice time
Baby Boomers	They are internally focused yet extrinsically motivated. With a strong self-efficacy, they expect themselves to easily achieve mastery. They prefer democratically run classrooms and enjoy working collectively, provided their group has an achievable mission and a spirit of cooperation. Although they enjoy interacting with others, they prefer to experiment with new skills independently and can be very sensitive to criticism.	inclusive decision-making, group interactions and discussions, chances to try new skills independently
Generation X	Gen Xers are intrinsic learners who view learning as an independent, self-directed activity. They are the only generation in which fewer of them went to college than their parents. In the classroom, they are self-motivated, provided they see the learning as relevant and place greater value on work-life balance and fun than did their workaholic parents. They can be somewhat impulsive and impatient in group learning environments and prefer to be given lots of discretion, yet they often crave lots of individual attention and feedback.	fun activities, relevance, and understanding of WIIFM (what's in it for me?), discretion to complete tasks their way
Millennials	They prefer participatory, activity-based group work, although they are accustomed to being evaluated and graded on an individual level. They will strive to earn high marks for themselves and their teams and may even bend the rules when necessary to do so. They are the first generation to have used technology their entire lives, so they expect to use it everywhere they go, including the classroom	lots of activity-based group work, individualized feedback and mentoring, technology-enabled learning and use of their own devices during class

Since 2002, e-learning has become an umbrella term that covers web-based instruction, online learning, networked learning, computer-assisted learning and computer-mediated learning (Littlejohn and Peller, 2007). All of these terms refer to the use of information and communications technologies in learning. The relationship between e-learning, Information Technology (IT) and Information and Communication Technologies (ICT) is identified in the eclipse diagram (figure 1 shows that e-learning is based on Information Communications Technologies, which is derived from Information Technologies, to offer to learn).

E-learning often refers to technology or designs used in distance teaching, but it also is used to describe any sort of technology use in education. As of 2019, e-learning has been replaced by the word 'digital learning' or sometimes EdTech (edutech-wiki.unige.ch, 2021). We prefer to continue using 'educational technology', although the term 'digital

learning' is more open to the idea that technology has become a general omnipresent tool, i.e. encompasses any sort of technology use in education.

To understand how corporate web-based learning can be optimized to address the learning style preferences of today's generationally diverse workforce, it is important to understand the existing literature, which falls into three categories. Figure 2 depicts the conceptual framework (Kriegel, 2013).

There is a logical progression to the three streams. First, it is important to understand what the empirical research reveals about generational differences in learning preferences as it pertains to learning styles and also learning activities. Second, what the current and emerging practices in web-based learning are. Third, in what manner the resultant data can be used to inform instructional design best practices. That is, specific recommendations can be made to optimize the instructional design for web-based learning delivered to the 21st century, generationally diverse

Table 3: Correspondence of 6 stages of information technology development to a generation of users.

Generation	Stage of information technology development
G.I Generation	The 1st stage (up to the second half of the XIX century) was 'Hand' information technology, its tools were pen, inkpot, book. Communications were carried out handily by sending information with mailing lists, packages, dispatches. The main aim of information technology was to provide information in the necessary form.
The Silent Generation	The 2nd stage (since the end of the XIX century) was 'Mechanical' technology; its tools for delivering information were typewriters, telephone, and voice recorder. The main aim of information technology was to provide information in a necessary form in the most convenient way.
Baby Boomers	The 3rd stage (40–60s of XX century) was 'Electric' technology; its tools were developed to electric typewriters, Xeroxes, portable Dictaphones. The emphasis of information technology started to move from the form of information presentation to making its content.
Generation X	The 4th stage (since the beginning of the 1970s) was 'Electronic' technology, its tools were ECM and created on their basis automated control systems (ACS) and information retrieval systems, equipped with a wide range of basic and specialized software complexes.
Millennials / Generation y	The 5th stage (from the middle of the 1980s) was 'Computer' (New) technology, the main tool of which is a personal computer with a wide range of standard software products for various purposes. At this stage, there was the process of personalization of the ACS, which manifests itself in the creation of decision support systems by certain specialists.
New Silent Generation / Generation Z	The 6th stage (now developing) is 'Network' technology (sometimes it is considered as a part of computer technology). Global and local computer networks are beginning to be widely used in various industries.

workforce (Kriegel, 2013).

Educational technology can be considered as a design science and as such, it has developed some specific research methodology like 'Design-based research'. However, since it addresses also all fundamental issues of learning, teaching and social organization, educational technology makes use of the full range of modern social science and life sciences methodology.

### 3 THE REFERENCES FOR LEARNING TECHNOLOGIES AND LEARNING ACTIVITIES BY DIFFERENT GENERATIONS

It is known that within the ICPS during the preparation and implementation of training each student has the opportunity to choose the goals, content, method, place and time of training, and in educational organizations – the opportunity to go in different ways in the provision of educational services that meet the requirements of the labour market and social needs. Table 5 shows the comparative characteristics of tradi-

tional and e-learning (Spivakovsky et al., 2019).

Kriegel (Kriegel, 2013) found little variance in learning activity preferences across the generational cohorts. To a surprising degree, each generation liked and disliked the same learning activities presented in the survey. Table 6 presents a summary of the top five, most frequently selected learning activities and the bottom five, least selected learning activities for all participants, organized by generation.

The most frequently selected favourite learning activities were selected with the same frequency regardless of generation. These included reviewing information in graphic format, using search engines for online research, using various online simulations, and reviewing FAQs. Likewise, the least favourite learning activities were also selected with the same frequency, regardless of generation. These were using Twitter communities, desktop sharing, online discussion boards, completing surveys, and online brainstorming canthers (Kriegel, 2013).

It is expected that the type of technologies for learning and the way they will be used will change the future of education. Nowadays, the common online tool used in blended learning is called Web 1.0. In Web 1.0, information is delivered to users while in Web 2.0 information is created and edited by users.

Table 4: Generations (stages) of e-learning development.

Learning theory	Generation	Student's activities	Learning mode	Training content	Teacher's role
Cognitive behaviourism	Television, radio, print, face-to-face communications	Reading and reviewing materials	Individual training	Developed 'from scratch'	Creator of the content
Constructivism	Audio, video and web conferencing	Discussion, development, design	Learning in groups	Constructed and developed by a teacher	Head of the discussion
Connectivism	Web 2.0: social networking, an association of users	Research, connection, creation, evaluation	Network learning	Autonomic	A friend that critically evaluates

Web 1.0 is a read-only environment, while Web 2.0 is a read and write environment which facilitates social activities. Blogs, Wikis, Twitter, YouTube, Facebook, and Flickr are examples of the most common Web 2.0 tools. Globally, the number of users of Web 2.0 has increased dramatically (Alebaikan and Troudi, 1).

At the same time, e-learning 2.0 promotes collaboration in knowledge construction. The rapid innovations in e-learning urge for research about the impact of these innovations on blended learning. Recently, research has started to explore the effectiveness of using Web 2.0 in blended learning. With the continuous development of the use of web-based applications and 3D virtual worlds like Second Life, which can be called e-learning 3.0 (figure 3), there are even more opportunities to create a better engagement blend. The future development of technology will change the delivery modes used, the costeffectiveness and the acceptance and recognition of the new educational environment (Alebaikan and Troudi, 1).

Web 1.0 is a linear model 'site to user', one-dimensional interaction. The owner of a site is the source of information; the readers are its users. There is no feedback between the site and the users as if you can write a letter to the editor or call (like the readers of a newspaper).

Web 2.0 is a social web of two-dimensional interaction. The owner of a site manages the information provided by users following their own rules. Users themselves make publications, write comments, and communicate with each other (social networks). Feedback between the site and users is also absent because users do not formulate rules. Unlike Web 1.0 the owners do not have to fill the site with information as the users do it.

Web 3.0 is a social space, three-dimensional self-organization. The higher level of the Web is a con-

dition where the users of a site are its owners and themselves fill in their information according to their own rules. To manage this information resource they knowingly and voluntarily choose the authorities and, if necessary, update them promptly. The defining features of Web 3.0 are self-financing, self-organization and self-control. Additional features of the third Web are mobility (can be used with Smartphone), scalability (easy expansion) and gamification (elements of gaming competition). Social 3D networks, formed on the model Web 3.0, acquire features of the collective mind, so they are also called social neural networks, or ecological networks. As users can communicate with each other, they have an illusion that these conversations have an impact on the website.

Table 7 defines each learning activity in Kriegel (Kriegel, 2013) study as Web 1.0, Web 2.0, or Web 3.0 technology. Some learning activities can be classified into all three categories. For example, practising real-world interactions in online simulations can be a Web 1.0 technology if the program is fairly simple and the individual is interacting with a computer. If the simulation involves multiple users, an element of social collaboration may define the simulation as a Web 2.0 technology. If the simulation is highly advanced and creates a virtual reality, this is an immersive technology and would be considered Web 3.0. As such, some learning activities fall into more than one category.

The most popular Web 2.0 (or collaborative) learning activity was "interacting with peers in a social media forum" and appeared 14th on the list of 22 among all generations. No social media learning activities appeared in any generation's top 10 list. Therefore, all generational groups expressed the same disinterest in this type of learning. This may be since the group is not currently engaged in social media learning in the workplace, or if they are, perhaps the

IT	Information Technology	The computer infrastructure, hardware and software used to process data and deliver information.
ICT	Information and communication technologies	The combination of computing and communication technologies (including computer networks and telephone systems) that connect and enable some of today's most exciting systems, e.g. the Internet.
E-learning	Electronic learning	E-learning is learning supported or enhanced through the application of information and communications technology.
ILT*	Information and learning technologies*	This was used in further education colleges, to refer to the use of information and communication technologies to support the core business of colleges: the delivery and management of learning.

\* The current term is e-learning and technology.

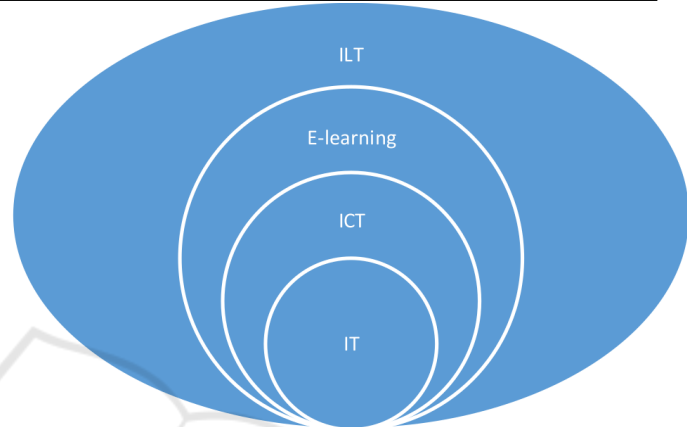


Figure 1: The eclipse diagram and the definitions used in the (dera.ioe.ac.uk, 2004, p. 8).

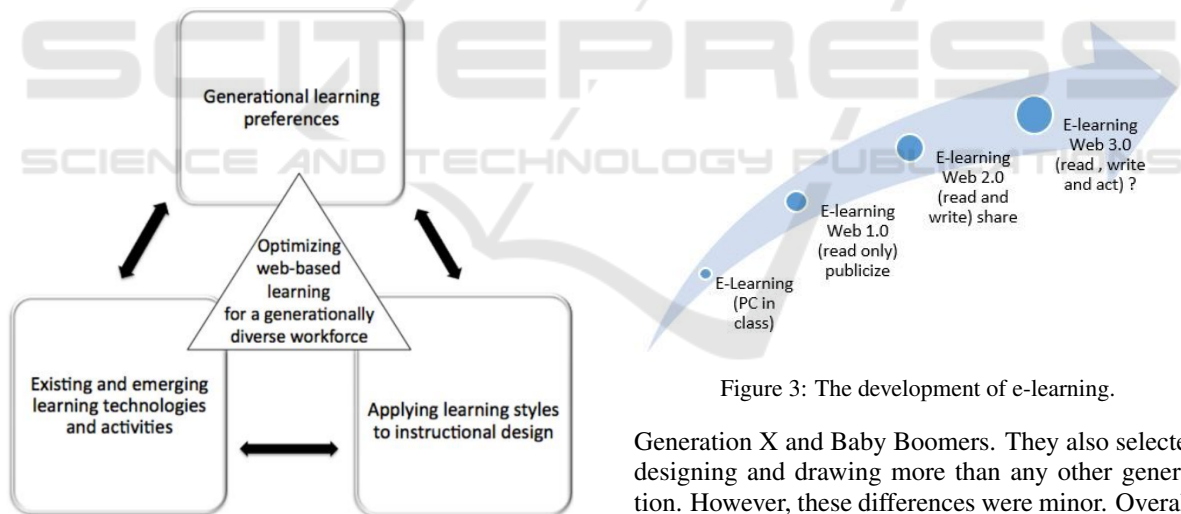


Figure 2: Conceptual framework (Kriegel, 2013).

experience has been poor (Kriegel, 2013).

Besides, the learning activity preferences among generations were also strikingly similar. This particular group was not fond of Web 2.0 activities, such as collaboration and social media in learning. Nor were they interested in using mobile applications or Twitter-like environments to learn. Also, the stereotype of the technologically advanced Millennial generation was not supported in this research. Millennials selected computer simulations less often than

Figure 3: The development of e-learning.

Generation X and Baby Boomers. They also selected designing and drawing more than any other generation. However, these differences were minor. Overall, the three generations enjoy the same learning activities and dislike the same learning activities with little variation. This homogeneity could be because all employees work in the same corporate environment. Therefore, the results, while relevant and useful for the participating company, cannot be generalized to the generational cohorts across all industries and professions. Replicating this study at other organizations and in different corporate settings will be important to understand if generational differences exist in other contexts (Kriegel, 2013).

The research study showed insignificant differ-

Table 5: Comparative characteristics of traditional and e-learning.

Traditional learning	E-learning
Training begins and ends on established dates	The student decides when to begin and complete the study program
The student faces a restriction on the freedom of access to the learning and teaching process	The student has greater access to programming
The student must attend classes at school or in the workplace	The student decides for himself where to study
The objectives and content of the programs are determined by the institution	The student, after consulting with the tutors (teacher-consultant), determines the goals and content of training per his needs and interests
The sequence of training is determined by the program or teacher-consultant (tutor)	The student, together with the tutors develops a work plan and schedule of classes
The speed of learning is dictated by the program, teacher and group of studies	The student, together with the tutor, agrees at his own pace
The teacher provides support mainly through lectures	The tutors and the learner agree on a form of support that can be provided in the form of fulltime study or remotely
The student learns by attending lectures and seminars or studying the scientific and methodological literature	Training is carried out with the help of educational materials, which necessarily include: goals, the actual content, methods of self-assessment and other information for independent work

ences in learning style preferences of the different generations. Besides, there were insignificant differences in learning activity preferences. The results also showed learning styles corresponded closely with learning activity preferences. Surprisingly, there was a lack of interest in learning with Web 2.0 technologies, such as social media forums or Twitter-like environments. This was particularly unexpected as it pertains to Millennials, who are typically known as the techno-generation (Kriegel, 2013).

#### 4 OPTIMIZATION OF WEB-BASED LEARNING TO ADDRESS THE LEARNING STYLE PREFERENCES OF FOUR GENERATIONS

Developing a learning environment also means taking into consideration the differences between generations and find ways to turn generational differences into opportunities. The main goal is to learn, recognize, and understand the differences, then to find ways to recruiting, retaining the students of different generations and supervise the teaching staff generations to make a more productive learning environment.

Thus, we research the ratio of four generations to Kherson State University teaching staff (figure 4). It should be mentioned that Kherson State University is a classical university that is a middle ranged (62th) in Ukraine University rating Top 200. Thus, we consider it can be representative of a common ratio of teaching staff generations with some slight variation exists in the span of percentage used for each group.

According to the results, the main part of the teaching staff is Gen-X (48%), compared with 28% of Baby Boomers, 21% Millennials/Gen-Y and 3% of the Silent Generation. So, the main part of the teaching staff is made of Gen-X, who were born between 1965 and 1980. They are described as flexible, adaptive, techno literate, information savvy, independent, entrepreneurial, self-confident and in perfect sync with the new just-in-time workplace. They also depend on themselves for security and success. Generation X, as employees, are looking for employers that offer:

- flexible schedule;
- performance-based compensation;
- flexible location;
- marketable skills;
- access to decision-makers;
- credit for results achieved;
- a clear area or responsibilities;
- a chance for creative expression.

Modern students are Gen-Z and late Millennials who can be thought to be the main users of digital technology as well as social media. However, according to a new analysis of a Pew Research Center survey of U.S. adults conducted in early 2019 (figure 5) more than nine in ten Millennials (93% of those who turn ages 23 to 38 this year) own smartphones, compared with 90% of Gen Xers (those ages 39 to 54 this year),



Table 6: Summary of the most and the least selected learning activity preferences for all generations.

Learning activity	Baby Boomers		Gen-X		Millennials		All generations	
	%	n	%	n	%	n	%	n
<i>Most selected</i>								
Reviewing information in graphic format (tables, charts, graphs)	52.4	11	54.2	65	68.8	57	58.1	133
Using search engines for online research	47.6	10	45.8	55	44.3	39	45.2	104
Interacting with computer simulations	61.9	13	49.2	59	34.1	30	44.3	102
Practising real-world interactions in online simulations			45.0	54	37.5	33	40.6	93
Reviewing quick reference guides such as FAQs	42.9	9	30.8	37			32.6	75
Reading text (theories, concepts, non-fiction)	47.6	10			36.4	32		
<i>Least selected</i>								
Engaging in live short (one-hour) webinars					11.4	10		
Using mobile apps to engage in learning via smartphone devices	4.8	1						
Playing multiplayer online games within virtual worlds	4.8	1						
Participating in multiuser online brainstorming centres	4.8	1	8.3	10			9.1	21
Completing questionnaires and/or surveys			10.0	12	6.8	6	9.1	21
Participating in online discussion boards			8.3	10	8.0	7	8.3	19
Observing people online (desktop-sharing)	4.8	1	8.3	10	5.7	5	7.0	16
Sharing snippets of info online in Twitter-like communities	0.0	0	1.7	2	3.4	3	2.2	5

68% of Baby Boomers (ages 55 to 73) and 40% of the Silent Generation (74 to 91) (Vogels, 2019).

Similarly, the vast majority of Millennials (86%) say they use social media, compared with smaller shares among older generations. While the share of Millennials who say they use social media has remained largely unchanged since 2012, the shares of Gen Xers, Boomers and Silents who use social media all have increased by at least 10% points during this period. Unlike smartphones and social media, tablet ownership is now comparable across most generations. Today, 55% of Gen Xers, 53% of Millennials and 52% of Boomers say they own tablets. A smaller share of Silents (33%) reports owning tablets (Vogels, 2019).

According to Cox (Cox, 2019), social media was once associated with only the younger generations, but now, more than 80% of four generations use social media at least once per day for various reasons such as:

- staying in touch with friends and family;
- finding a sense of community;
- searching for solutions to problems or information;
- looking for ideas or inspiration;

- entertainment;
- promoting professional endeavours;
- expanding professional network (Cox, 2019).

As can be noticed all four generations can use social media for education either searching for solutions to problems and information or promoting professional endeavours. That's why understanding the generations' behaviour as the users of learning content allows providing the adequate attraction of learning content for each age group of learners.

If we consider Baby Boomers as a group of learners, they are characterized by the following deep values. This is a generation of experts who need proves and detailed examples. They like to be informed. The purpose of the learning process for them is the knowledge itself and skills. Accordingly, the learning content should be informative in terms of the knowledge, its practical usage, and form in learners' minds a high status as the knowledge itself, its practice, and increase a person's self-esteem from managing the skills. One of the most effective attractive messages for them is the problem and its solution by knowledge and skills. This generation reads the press, watches TV, listens to the radio, so educational content in the media such as newspapers, magazines, television, ra-

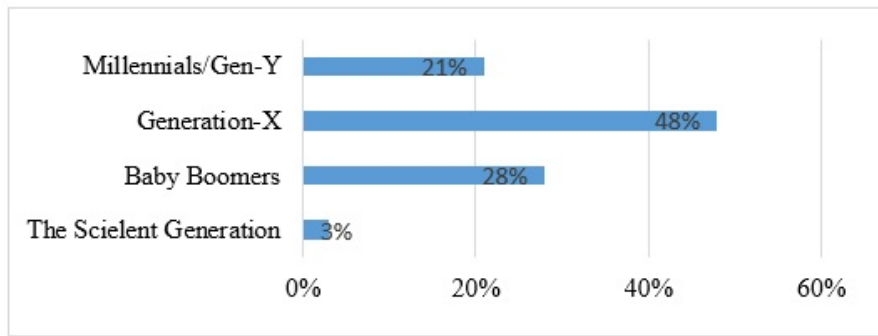


Figure 4: The ratio of four generations to Kherson State University teaching staff.

% of U.S. adults in each generation who say they ...

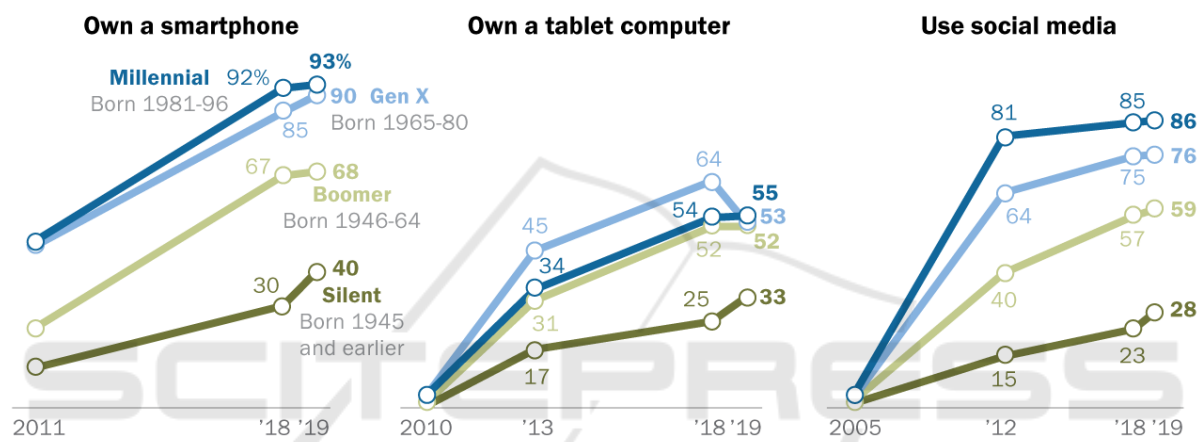


Figure 5: Millennials lead on some technology adoption measures, but Boomers and Gen Xers are also heavy adopters (Vogels, 2019).

dio is the most effective. The Baby Boomer generation is less likely to study online, due to the small proportion of Internet users. Thus, according to the InMind agency, in Ukraine, 10.7% of Internet users are in the age category of 50-59 years, 2.6% – 60–69 years. Therefore, for generation, online learning technologies are less effective, but they should not be underestimated.

Users of this age are often ignored, although they have time on social media and a fairly stable financial resource in the form of pensions and benefits from children and grandchildren. These users want to feel important and monitor the activity of their younger family members. That’s why they come to social networks. Family is the main value for Baby Boomers. Their success is directly correlated with the successful marriage and well-being of children and grandchildren. They also value youth, because, at the age of their adulthood, young people were associated with progress, a happy future, and strong opportunities. Baby Boomers subscribe to learning content, including favourites, less than other generations. However,

these people are the most loyal learners. If they have already appreciated the learning content, they will always use it.

For Generation X, the convenience of learning, which saves time, as well as the ability to study many different fields of knowledge in one place are important. Individual learning is also important for this generation, they do not tolerate imposition and pressure, and they make their own learning decisions. They look for something unique in the learning content and decide according to the slogan “surprise me and I’ll learn it”. Accordingly, for this generation, the learning technology should be based on the uniqueness of its presentation. Generation X is an active Internet user. The convenience of online learning is important for them; they are active users of social media, so learning content in them is very effective. Also, they are active television viewers, radio listeners, and readers of the press, so learning content in these media is relevant to them.

Today, generation X tries to make up for lost money by getting competencies that help emphasize

Table 7: Defining learning activities as Web 1.0, Web 2.0, or Web 3.0 technologies.

Activity	WebTech
Reviewing information in graphic format	Web 1.0
Using search engines for online research	Web 1.0
Interacting with peers in social media forums	Web 2.0
Practising real-world interactions in online simulations	Web 1.0, 2.0, or 3.0
Reviewing quick reference guides such as FAQs	Web 1.0
Reading text (theories, concepts, non-fiction)	Web 1.0
Engaging in live short (one-hour) webinars	Web 2.0
Using mobile apps to engage in learning via smartphone	Web 3.0
Playing multiplayer online games within virtual worlds	Web 3.0
Participating in multiuser online brainstorming centres	Web 2.0 or 3.0
Completing questionnaires and/or surveys	Web 1.0
Participating in online discussion boards	Web 2.0
Observing people online (desktop-sharing)	Web 2.0
Sharing snippets of info online in Twitter-like communities	Web 2.0

their uniqueness. At the same time, it is very important for them to feel the possibility of choice. Such people are actively interested in politics, does not like too far-fetched content with a lot of slang, primitive humour irritates them. Clarity, conciseness, detailed instruction are very important for this generation. Therefore, they enjoy popular 'how-to' content, concise informative posts, life hacks and recipes. They also like to be nostalgic. Content that makes them nostalgic is popular. But before chose learning content they watch video reviews, read reviews, and research the site or web pages for a long time. It is important to note that such people are very loyal learners.

For Millennials / Generation Y, a learning environment is becoming a place not only for studying but also for entertainment. They value inner comfort, so do not make quick decisions. They like the variety of choices, the opportunity to try. This is the generation that watches little TV; reads books electronically. Generation Y today shapes social development trends and influences learning needs. They pay attention to

learning content as a means of information, as well as emphasizes the value of communication. They live in a race mode – the success of their peers forces them to constantly learn something new.

Millennials value every minute of life. They often flip through the news feed on social networks, looking at friends' photo reports, interested in business content. For content to interest a millennial, it must be concise or at least give an idea of how long it will take to process it. Often the determining factor is the picture: the image of a special algorithm is likely to lead to a conversion than a few paragraphs of professional and literate text. Millennials are affected by content that contains real user reviews, previews, tips from friends, etc. But if the learning content is already liked by the millennial, he will subscribe to his page. Of all generations, millennials are the most 'digitized': in addition to smartphones, they actively use tablets and laptops. This generation is most often demanding service. If something doesn't work out, the millennial will share a sad experience on social media, tarnishing the learning technology reputation. It's the same if one of the friends of Generation Y told him about the bad service: a typical representative of the generation will abandon the learning technology, not going into who is right and who is not.

Generation Z spends a lot of time on the Internet and social media, and 27% say they feel uncomfortable if they do not have access to the Internet for more than an hour (the InMind agency in Ukraine). But they are interested in the Internet as entertainment – 60% go online for fun, and the focus is about 8 seconds (the InMind agency in Ukraine). Gen-Z prefers Instagram and YouTube – in other words, visual content is everything to them. The coolness of learning content or technology is a significant factor. They pay attention to what allows them to be stylish, fashionable, popular. Research shows that Generation Z responds well to pages that their friends already like, as well as to content that is tailored to their unique needs. Authority for this generation is given by bloggers and influencers. They teach Gen-Z about innovations in the field in which they are interested. The younger generation is not interested in politics. The only way to convey something serious to them is memes, infographics, illustrations and other content in the form of game entertainment.

Summarising the above generational differences in education, there are recommendations on how to attract the attention of each age group on learning content (table 8).

Understanding the particular needs of the learner at any given organization will help curriculum designers optimize web-based learning for the genera-

Table 8: The recommendations on how to attract the attention of each age group on learning content.

Generation	Recommendations on how to attract the attention on learning content
Baby boomers	hold interesting actions; simplify the content as much as possible, keeping it informative; there is no need to treat them as weak and helpless; let them feel their significance; appeal to family traditions.
Generation X	create the most informative content; make a how-to video and offer a list of life hacks; play on nostalgia, for instance, turn on the background music of the 70-80-s, depict popular stars of the time, use their quotes; allow feeling their uniqueness and superiority.
Generation Y	use quality photos and video content; add real feedback; think about personal time, note how long it takes to read content, how long the event will last; provide these people with impeccable service 24/7.
Generation Z	create up-to-date memes, infographics, images and other gamified content; seek and meet leaders of local Gen-Z people; take care of the environment and promote this idea in content strategy.

tionally diverse workforce, requiring flexibility and adaptability to create effective learning. The responsibility falls on the purveyors of information to be flexible. We no longer live in a top-down education system but must respond to student’s needs and preferences with a variety of skills and a repertoire of learning strategies (Kriegel, 2013).

Thus, today it is no longer enough to use classic educational technologies. Achieving a significant effect requires a personalized approach that takes into account the values of different generations of learners.

## 5 CONCLUSIONS

We try to discuss the problem of learning environment development in the context of its technological evolution and educational influence. The principal difference between today learning environment and the previous one is its ability to react to student’s learning activities and needs providing a personalized local learning environment. The proliferation of virtual forms for education is a natural stage in education evolution. It covers the whole system from the chalkboard to smartboard, from a usual library to an electronic one, from small training groups to virtual classrooms of any scale, etc. Virtual and traditional forms of education should not be perceived as mutually exclusive. A good education today is a synthesis of various forms of acquiring knowledge and modern technologies, the optimal combination of which only the

student himself can determine for himself. The hybrid learning environment entered the XXI century as the most promising, synthetic and integral part of education. But the precise issue that the article addresses is a personalized approach to better understand the characteristics of users belonging to different generations. Using statistical analysis, we identify that there are users of four generations in the modern learning environment of an average university. Thus, the main part of university teaching staff can be made of Gen-X, Baby Boomers, Millennials/Gen-X and Silent Generation. Researches prove that Millennials stand out for their technology use, but older generations also embrace digital life. That’s why understanding the generations’ behaviour as the users of learning content allows providing the adequate attraction of EduTech for each age group of learners. The recommendations on how to attract the attention of each of the four generations (Baby Boomers, Gen- X, Gen-Y, Gen-Z) on learning content are made under the generational differences in education analysis.

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