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From Socratic Behaviourism to Digital Constructivism

Abstract

The paper presents a synopsis of the evolution of methods and techniques up to the digital age and characterises the main aspects of behaviourist and constructivist models in order to study the development of new advanced pedagogical tools and methods in education science in constructivist environment. For the purpose of the study, an analysis of the technological evolution during the last decades and its impact on education science was made, with a special focus on virtual teaching and learning. The practical outcome of the study was a series of online seminars and workshops, prepared by the international team of the IRNet project. The keynotes and workshops were held during *DLCC2017* Conference (*Theoretical and Practical Aspects of Distance Learning*, subtitle: *Effective Development of Teachers' Skills in the Area of ICT and E-learning*) at the University of Silesia in Katowice, Poland. Video presentations and an automatic translation are available at: https://areis-en-constructivism.blogspot.pt.

K e y w o r d s: behaviourism, constructivism, e-learning, blended learning, digital environment, IRNet

Introduction

From Socrates and Aristotle to the end of the 19th century, methods and technology in education science environment did not change much. John Watson (1878–1958) defined the bases of a behaviourist model. The education model was based on the teacher and the teaching institution.

The technological evolution during the last seven decades has transferred a "room computer" Mark I (1943) weighting several tons into a tiny laptop, weighting less than one kilo and a thousand times more powerful than its "great grandfather." This technological revolution was followed by enormous changes in the learning methodology: didactic tools were adjusted and the ways of their implementation altered. Nowadays, we witness information, communication, interactive, and mobile society, where civilisations are connected in real-time across the planet. This results in enormous sociologic changes in all scientific areas, particularly in education.

The social profile of our students has also changed. The average age has increased; 4 years of university basic education are just an introduction to 40 years of lifelong learning (Lima & Capituo, 2003). There is no doubt that students today are building their own knowledge. Students demand more interactivity, more multimedia content. Together with that, they are more Web dependent, surface learners, who are demanding more mobility and didactic communication in presence and distance learning. This is because they are digital constructivist, multi intelligent (Gardner, 1983), emotional behaviourist (Goleman, 1999), interactive learners (Silva, Josselyn, & Kida, 2004), and they are collaborative social virtual learners (Siemens, 2005).

All of the above results in a new way of teaching and learning, with new technologies and new methodologies. Although in the last decades a large amount of investment has been made in new technologies and methodologies, teacher skills are still short in fulfilling all educational requirements.

The questions that arise today are:

- Are we, teachers, prepared to teach in the 21st century?
- Do we have the right skills?
- What are the best technologic tools and the best methodologies?
- Is e-learning a solution? Do we need learning to be used in both presence and virtual environments?

An enormous amount of training, research, and reflections is required to answer the questions.

Synthetic Analysis of the Technological Evolution during the Last Decades and Its Impact on Education Science

Distance Learning Stages

We can find references to distance learning since the 18th century (Verduin & Clark, 1991), although in practice it was not used regularly until the middle of the 20th century in the USA and some European countries. The Second World War forced an important increase in distance learning because many young people incorporated in the war needed to go to the front and simultaneously many of them had to be replaced in their civil jobs with no trainers or tutors available. Moreover, when the war was finished, all the young people had to be integrated back in the professional civil activities.

In this scenario in the mid-forties Skinner started to talk about the "teaching machine" (Skinner, 1961), but in that period he did not realise what type of Pandora's box he was opening. For the development of educational programmes, it was necessary to analyse didactic tasks and objectives. In 1956, Bloom published the conclusions of his research on "the taxonomy of educational objectives."

On the one hand, distance learning has evolved (Moore & Kearsley, 1996) following the development of computers, multimedia, and Internet. On the other hand, technologies developed gradually in variety, complexity, and potential, offering new models of distance teaching and learning (Chute, Thompson, & Hancock, 1999).

We can name several stages of distance learning.

The first distance learning stage (until 1970): courses content delivered by "regular means." At the beginning, the content and all learning materials were delivered by regular mail. Later, training courses were presented on the radio (1930) and television (1954). The pedagogic approach for this stage and the two subsequent stages was totally behaviourist.

The second stage (1970–1980): open universities. Although Skinner and Bloom developed their ideas in the fifties, it was only in the seventies that the theoretical bases for distance learning started to flourish, particularly as the result of the *World Conference for Distance Learning*, coordinated by Wedemeyer in 1972. Michael Moore (1973) suggested that some resources had to be developed to define the research areas, identify different types of distance learning, and build up theoretical methods. In 1969, the UK Open University was founded, and Bloom was one of the consulting advisers of this project. The UK Open University is known as one of the most relevant projects in this area and a model for many other experiences that took place all over the world during the seventies and eighties (Goleman, 1999).

The third stage (1980–1990): video cassettes and TV schools. The rise of video players, satellite, and cable communications enhanced the importance of TV and video communication in distance learning. The audio and image quality of the contents was very fair, and video players were offering the possibility of students to attend lessons "anytime, anywhere" and as many times as needed. Since 1985, different sets of courses were offered with a remarkable success.

The fourth stage (1990–2000): computers, multimedia, interactivity, e-learning. The technological evolution of digital equipment and software showed new possibilities of interactivity and improved the quality of distance learning. CD-ROMs and the Internet (1990) were two important innovative tools, offering flexible learning, allowing anyone to use virtual learning environments regardless of places or time zones. In addition, new communication systems based on the Internet started to offer the potential of interaction among students, teachers, and specialists across the world. This period marks the beginning of multimedia contents production, communication, and distribution through LMSs (Learning Management Systems). One of the most important aspects was the evidence of a need for new methodologies together with new technologies.

Some proposals in this area were presented in the early nineties:

a) Moore and Kearsley (1996) considered the "curriculum" as a "structural" area and the constructivist "dialogue" as a need; and
b) the "student autonomy" was highlighted as important and a "transactional distance theory" was introduced, from Dewey's concept of "transaction," which was later developed by Boyd and Apps.

There was a debate about the definition of distance learning. The focus was the physical separation of students and a teacher during the learning process. One of the most popular distance learning definitions produced by Moore and Kearsley (1996, p. 2) states: "planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as organizational and administrative arrangements." However, it is also important to point out that the learning process is based on new methodologies that become effective. The use of an expanded interactivity, multimedia, graphic animation, audio, and video (stream video has been available since 1997), hypertext, communication over email, chat within "focus groups" – all these opportunities were the dream of many authors and course coordinators in that period, although they were very difficult to implement. Students started to be seen as active partners who use different technologies.

In fact, the use of this format was very limited until the middle of the first decade of the 21st century, mainly due to a short bandwidth available and its high cost. Moreover, even available technologies were often used without being supported by adequate new methodologies, and that could have turned distance learning activities into a "technological noise." There is a final question: what is e-learning today?

Online Learning Environment

In 2000, we talked about distance learning, not e-learning. However, when we talk about online learning today, are we exclusively talking about distance learning? Not necessarily! Today we can talk about distance learning supported by presence activities or presence learning supported by distance / online activities. In fact, we are in the process of constant evolution. The increasing use of online tools in presence teaching makes online tutoring a daily support tool with excellent results to improve the learning quality. What are the changes that justify that? We could see that the nineties were a critical period for a qualitative change in distance learning. Important technological evolutions, software development, and communication facilities occurred during this period. For example, very fast computers appeared, allowing video and audio editing. Moreover, hard discs, with very high capacity and rotations above 7200 rpm, were able to capture video. "Stream video" has developed since 1997 and diffused over the Internet (1990) / WWW (1991). Video projectors became available together with the software to produce audio and video contents and presentations. However, only after the Internet became available with a sufficient bandwidth and an affordable price (in the first decade of the 21st century), it was possible to start using it for education purposes. After 2000, video conference tools were available in acceptable quality and prices for education "one-to-one" or "many to many" in the format of virtual classrooms. In addition, open source LMS platforms that could be used at different education levels became available only after 2004.

E-learning Evolution

Education nowadays not only covers the life period from kindergarten to postgraduate degrees, but also is understood as lifelong learning. The reasons for this are the political pressure over school results, the use of ICTs, the challenges brought by the Bologna methodology, and the common use of computers, social networks, and 3D environments. The learning theories of the digital era emphasise the importance of asynchronous interactivity, related to Web 2.0 (O'Reilly, 2005), as well as synchronous interactivity and collaborative work, inducing connectivism (Siemens, 2005). Mobility, collaborative, and informal learning are now understood as the evolution of learning processes based on technologies. In his "emotional intelligence theory," Goleman (1999) suggests the use of pedagogic games and other emotional intelligence activities to increase the learning quality. This emotional-oriented approach opens an opportunity to the use of 3D environments as eligible and valid tools for the education proposes. The experience of using Second Life and Active Worlds has shown a good potential, but revealed some didactic limitations in MUVE platforms when used in some education environments.

According to the needs of a student's profile, teachers should update their technological and methodological skills. This requires permanent training in the following areas:

- new collaborative learning methodologies;
- online tutoring, use of virtual classrooms, video conference tools, and virtual group work;
- tools to produce contents in the multimedia format, pedagogic games, use of interactive synchronous and asynchronous tools;
- use of online platforms for managing contents (LMSs) and other supporting interactive animations like 3D and MUVES; and
- formative evaluation.

Rosenberg (2001) emphasised that teaching today comprises different forms and formats: presence teaching, online teaching, virtual teaching, blended teaching, and so on. Thus, there is no sense in trying to develop the opposite terminology and make the "black and white game." It is much more important to integrate the differences, but mainly to improve teacher skills. An interesting study ordered by the US government about online education states important rules and methodologies. Means et al. (2009) suggest that online learning is closely connected with either total or partial use of the Internet. This definition excludes printable documents and the use of TV or radio. This definition is not consistent. Some other authors use a broader definition accepting a large use of various electronic equipment – more or less what is usually called "online learning" or "e-learning" today. The e-learning definition has changed over the years and included different contents, but it has always expressed a relation between learning and the use of computers.

The first most frequent used concept was CBI (*Computer-Based Instruction*), CBT (*Computer-Based Training*), or just CBL (*Computer-Based Learning*). During the nineties, e-learning was referred to as distance learning. In 2001, Rosenberg reflected on the separation between distance learning and e-learning (2001). Rosenberg wanted to "separate waters": on one side, distance learning supported by documents sent by post or other traditional means – not being e-learning; and on the other side, teaching and learning supported by electronic equipment and tools. Today, there is the consensus that e-learning incorporates online tools and techniques, with contents distributed in a multi-model format (printable, videos, audios, documents, etc.), and with the use of interactivity in asynchronous or synchronous modes (virtual classrooms, or in presence or distance teaching). In this regard, we can say that, due to the revolution introduced by e-learning, learning will never be as it was in the nineties, even in presence classrooms. In the beginning of the 21st century, e-learning evolved into a blended format comprising presence and distance learning, broadly called b-learning. The evolution of teaching and learning through the last decades is presented in Figures 1 and 2.

Figure 1. Evolution, part I – from Socrates behaviourism to digital constructivism.

S o u r c e : António dos Reis.

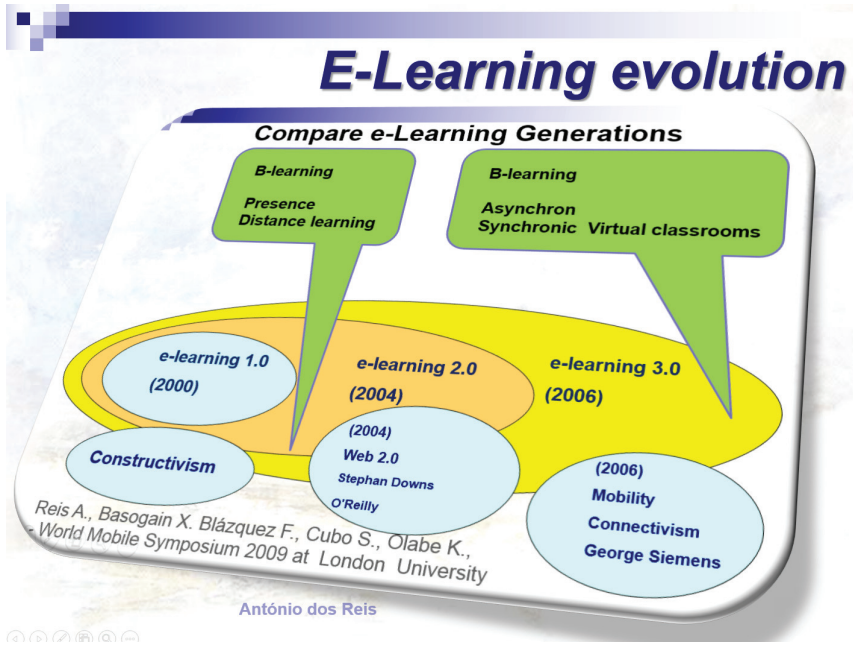

Figure 2. Evolution, part I – e-learning evolution.

S o u r c e : António dos Reis.

We can say that this was the end of distance learning in its pure format. For long duration courses, from a pedagogical point of view, it is convenient that learning is completed in a blended format: presence and distance learning. Nevertheless, in a short period, with technological improvement, particularly over increased bandwidth availability, communication and video conference software, and better teaching skills, the possibility of using virtual classrooms and synchronous activities can arise as a full alternative to presence learning. We have today contents distributed asynchronously and tutoring in presence or virtual format. This approach corresponds to Web 2.0 recommendations.

E-learning Stages – From E-learning 1.0 to E-learning 3.0

During the last decade, the concept of e-learning has been changing and altering. E-learning stages can be typified in three different phases, which can be distinguished by the level of interactivity, the existence of multimedia contents, and the existence of synchronous and asynchronous online support. Today, the evolution of technology, pedagogic methodology, and teachers' skills allow us to use all the abovementioned approaches.

The first e-learning stage – e-learning 1.0 (2000). Courses were structured in a self-learning format and only lectured virtually (distance learning). Contents were distributed in pdf or Word prints, and no interactivity existed. At the end of the course, students normally had final presence examinations. Very quickly, students and teachers realised the limitations of this approach and a mixed solution of presence and distance learning was recommended – usually called "blended learning" or "b-learning."

The second e-learning stage – e-learning 2.0 (2004). In 2004, Downes and O'Reilly started presenting their ideas about Web 2.0. Downes and O'Reilly called for a more dynamic Web and stressed the importance of interactivity with important repercussions in education environment. A major important topic was the interactivity and multimedia content in an asynchronous format: teacher–student, student–contents, and student–student. Tools available for synchronous activities like virtual classrooms or video conferences were few and very expensive, and they required quite a high bandwidth. The content was mainly distributed with the use of the following tools: forums, chats, wikis, and blogs. All of them were in an asynchronous format, and could be either integrated into LMS or not (Downes 2005, 2007; O'Reilly, 2005).

The third e-learning stage – e-learning 3.0 (2006–). The technological evolution, mainly related to communication tools, was a relevant factor for the third stage. Video conference and synchronous virtual classroom software started to be offered at much lower prices and required much less bandwidth. ISP (Integrated Service Provider) suppliers offer sizeable bandwidth at fair prices. Simultaneously, LMS platforms are being offered at "open source," like Moodle, Joomla, and others. From a technological point of view, distance learning requirements are

now fulfilled in good conditions. This means that there are available asynchronous distribution and a need of communication tools for synchronous online tutoring.

Now, we are facing a new quality challenge on distance learning. It does not matter if it is called CBL, ICT, e-learning, online learning, or any other thing, technical tools are available to work with quality at any education level. Every day, better and better tools are being offered to facilitate teachers' job and students' learning. However, learning and teaching tools require more skills from teachers and students, and new methodologies. In 2007, Downes presented a new view over Web 3.0 (2007a). He claimed that web should be more effective over browsing and searching in terms of semantic and obtained results, yet the relation between his "future view" and education science was short. In 2006, we could again say that we were facing a new phase of e-learning – e-learning 3.0, which emerged from connectivism based on Siemens's approach, which includes mobility, multimedia contents, and online synchronous interactivity.

The main aspects used in this environment are:

- the use of new technologies supported by new methodologies;
- the use of LMS to distribute contents asynchronously and manage courses, in distance and presence learning;
- online synchronous tutoring support using audio, video, white boards, and other tools in virtual classrooms;
- continuous formative evaluation supported by online activities;
- the blended learning concept, which has changed from a mix of presence and distance learning into asynchronous and synchronous activities, using virtual classrooms in presence and virtual format.

The main synchronous virtual tools were virtual classrooms, e-round table, Webcast, video diffusion, e-workshop, conference call. Downes (2005) identified three stages of e-learning and associated them with Web 1.0, Web 2.0, and Web 3.0. In fact, he could establish a relation between Web phases and e-learning phases. B-learning evolves from presence and distance formats, to asynchronous on demand and synchronous in presence and online (using synchronous virtual classrooms). The formulation of e-learning 3.0 by Reis (Reis et al., 2009) is different from Downes, because he introduces a pedagogic environment and new e-learning stages, and includes several didactic tools also used in presence and distance learning.

In this way, the concept of b-learning developed on the basis of face-to-face and virtual communication, supported by asynchronous learning platforms (Moodle, Blackboard, and so on) and synchronous virtual or presence formats. All are strongly supported by multimedia content, interactivity in online tutoring, synchronous virtual classroom activities, and formative assessment.

A relevant aspect that should be pointed out is that the change from phase one into the next did not eliminate the didactics of the previous; it only introduced new didactic tools, new methodologies, and thus built a richer learning environment.

The focus is more than just technologies; it is an introduction of new methodologies and new skills to frame the educational process, to respond to a set of new needs of our students in online learning. The solution includes a set of virtual classrooms, techniques, and processes that characterise what we call "new ICT."

Synthesis and Comparison of Learning Theories of Behaviourism and Cognitivism

The theories of learning are projected in the context of the affirmation of psychology as a science in the late 19th century, the most relevant being behaviourism, cognitivism, and constructivism (Wilhelmsen, Asmul, & Meist Ad, 1999).

Behaviourism has its roots in the ideas of John B. Watson from 1913. Watson based his studies on Pavlov's work from the nineteenth century and conditioned reflex. The work of Watson was later taken up by Skinner in the 1930s and is based on the study of the individual's reactions to environmental stimuli where mental processes are ignored. According to Schuman (1996), new behavioural models could be accepted by repeating new types of behaviour until they become automatic. At the Funderstanding website (1998), we find a similar reading of behaviourism in stating that "it is an animal and human learning theory that focuses on observable behaviours and ignores mental activities. Behaviourist theorists define learning as the acquisition of a new behaviour." In the behaviourist model, cognitive processes are not referred to by Briner (1999a).

Cognitivists believed that learning took place when a learner processed information and what went on inside it. This is therefore a substantially different approach from that of behaviourists, who considered a reactive and mechanical response to the stimulus. Jean Piaget began to develop this concept in the twenties, and developed most of the cognitivist theories by observing the behaviour of children.

Although the behaviourist and cognitivist approaches are distinct in terms of the process itself, both consider knowledge as an absolute and learning as the process that creates the symbolic representation of outer reality (Wilhelmsen, Asmul, & Meist Ad, 1999).

Constructivism, according to Schuman (1996), is based on the premise that we all construct our own knowledge and personal perspective of the world through our personal experience and the mental structure that we have, which is in permanent evolution.

According to Lima and Capituo (2003), there are many definitions of constructivism, but all encompass the following aspects:

- in the constructivist perspective, knowledge is actively constructed by a student and not transmitted;
- learning is both an active and a reflective process;
- a student's interpretation of the new experience is influenced by his or her previous knowledge;
- social interactions introduce multiple perspectives in learning;
- learning requires the understanding of the whole as well as the parts, and they must be understood in the context of the whole.

The essential aspect of constructivism is the construction of knowledge itself, which is relative, evolutionary, and fallible (Wilhelmsen, Asmul, & Meist Ad, 1999). The evolution of learning theories introduces substantially different approaches to the roles of a learner, a teacher, and evaluation in the learning process. The analysis of the constructivist models allows for characterising the different facets of the constructivist theory in more detail.

Teaching theory integrates a body of theoretical approaches that came throughout the 20th century, with a view to creating guidelines for the work of teachers. Snelbecker (1999) writes that teaching theories are only general guidelines for the teaching work, complemented by Reigeluth and Frick (1999), who consider it advantageous to integrate several theories and methods adapted to each of the cases in which one is working. The evolution of theoretical bases is closely linked with the evolution of different currents of teaching theory, namely behaviourism to constructivism. Boyle (1997) has introduced two main points – "Instruction" and "Constructivism." Smith and Ragan (1999) classify as "traditional" the situations when knowledge is acquired and as "constructivist" – when knowledge is constructed. Teaching theories are commonly referred to as ID theories or instructional design. Reigeluth and Frick (1999) understand that due to the constant evolution and updating of theoretical models, the main objective will be the permanent analysis of new theories with integration and synthesis with the body of existing theories. As we have already mentioned teaching theory, it is closely related to learning theory, curriculum, and the ID process.

Constructivist knowledge environment has three steps and three levels:

1. defining rules and moulding;
2. teaching and coaching – learn and learn, and learn how to make; and
3. the scaffolding stage – the learner should build his or her own knowledge.

It creates new information and builds the student's own knowledge. According to Lima and Capituo (2003), the evolution from behaviourism to constructivism introduces enormous changes in all aspects of the teaching and learning environment. In a pedagogic and philosophic perspective, the profile of a teaching institution, the profile of the contents, the teacher's and student's profile, and assessment are changed as well.

In behaviourist and cognitivist environment, knowledge exists in the outside world. Learning is a cognitive process not depending on the learner's profile.

The learning process is coordinated by the teacher. Learning is a sum of isolated facts, and the student's learning styles are homogeneous. In the constructivism environment, the perspective is different. Knowledge is built up by the learner and inside himself or herself. Learning is an intellectual and social process influenced by the interaction with the learner's culture and knowledge. The learning process is centred and controlled by the learner. Learning is supported by real facts. Learning is a cooperative process and group work. Learning styles are heterogeneous.

In the behaviourist and cognitivist environment, the teaching institution is static; the foundation of the teaching process is knowledge organisation, transmitting knowledge to students, and preparing students for a life career. Teaching is based on the quality and quantity of information. Yet, in the constructivist perspective, a teaching institution is a learning resource centre, preparing learners for knowledge information society and lifelong learning, preparing students to ongoing professional update and professional changes throughout their lives – teaching with a focus on quality and quantity of learning.

In the behaviourist perspective, the content as a teacher-centred activity is homogeneous with limited training and information process. In a constructivist perspective, the content is centred in the learner and in real cases, and it is personalised in content diversity and learning process; it is dynamic and with an access to large quantities of global information.

As to a teacher's profile in a behaviourist environment, a teacher is a master and the centre of knowledge. A teacher is a knowledge diffuser. In a constructivist perspective, a teacher is a learning facilitator that integrates real experiences in the learning process, and teaches how to learn, how to search, and how to select results. A teacher structures and summarises information, motivates students, promotes group work, promotes a critical perspective, and stimulates self-study capacity and the quality of analyses. In the behaviourist and cognitivist environment, the students are passive knowledge receivers; they learn other people's knowledge, assimilate information found by others, and accept knowledge diffused by others with conformism. In turn, in a constructivist perspective, students are active knowledge builders. They learn how to learn and develop their own knowledge; they learn how to work in a group for a personal result or for cooperative work; finally, they express critical thinking and might have totally different perspectives.

Assessment in behaviourism is based on tests and examinations in summative assessment perspectives. However, in the constructivist environment, the assessment has important objectives to evaluate the evolution of the student, the evolution of the teacher, and the evolution of the educational institution. The assessment has new pedagogic tools, as it continues its formative assessment evaluation diagnosis, self-assessment, group assessment, pear assessment, course assessment, and summative assessment.

Basic differences between Socratic behaviourism and constructivism are the following:

- behaviourist learners learn the master's knowledge,
- constructivist learners learn and build up their own knowledge.

The Practical Outcome of the Study: Seminars and Workshops, Presented at the *DLCC2017* International Conference

In order to show the evolution of methods and techniques up to the digital age and characterise the main aspects of behaviourist and constructivist models, we prepared a series of workshops that were carried out to study the development of new advanced pedagogical tools and methods in education science, in a constructivist environment. The workshops became the practical outcome of the studies, coordinated by professor António dos Reis. The seminars and workshops were held during *DLCC2017* Conference (*Theoretical and Practical Aspects of Distance Learning*, subtitle: *Effective Development of Teachers' Skills in the Area of ICT and E-learning*) at the University of Silesia in Katowice, Poland.

The activities were prepared by the international team of the IRNet project: António Manuel Diogo dos Reis (The Graal Institute, Portugal), Olga Yakovleva (Herzen State Pedagogical University of Russia), Eugenia Smyrnova-Trybulska (University of Silesia in Katowice, Poland), Nataliia Morze (Borys Grinchenko Kyiv University, Ukraine).

The main objective of the first keynote – "Evolution part I – From Socrates Behaviourism to Digital Constructivism" – was to present a synopsis of the evolution of methods and techniques up to the digital age and characterise the main aspects of behaviourist and constructivist models in order to study the development of new advanced pedagogical tools and methods in education science in a constructivist environment (Figure 3). Consequently, the main question of the seminar was: "How has the evolution from Socrates behaviourism to digital constructivism led to a different way of teaching in the 21st century?" The video recording of the keynote is available at https://youtu.be/rp-suGGBKWU.

The main objective of the second keynote, "Evolution, Part II – Disruptive Innovation in the School of the Future with a Focus on 'Flipped Classroom'," was to show the prospects of the technological evolution with the focus on education that involves the alteration of teaching and learning methodology. The recording of the keynote is available at https://youtu.be/g_FJcFe2b3g.

Figure 3. Keynote "Evolution, Part II – Disruptive Innovation in the School of the Future with a Focus on 'Flipped Classroom'."

S o u r c e : Own work.

Conclusion

The research presented in this paper together with the results of the seminars and conferences are the part of the IRNet project. The results are opening the gate for important conclusions that are available in didactic videos and published papers. All the results are in free access at the IRNet website (http://www.irnet.us.edu.pl) and https://goo.gl/5AU1dc for the scientific community, researchers, and students.

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Od sokratejskiego behawioryzmu do cyfrowego konstruktywizmu

S t r e s z c z e n i e

Artykuł przedstawia przegląd ewolucji metod i technik nauczania aż do ery cyfrowej. Podaje charakterystykę głównych aspektów modeli behawiorystycznych oraz konstruktywistycznych w celu zbadania rozwoju nowych zaawansowanych narzędzi i metod pedagogicznych stosowanych w naukach o edukacji w środowisku konstruktywistycznym. Dla potrzeb badań dokonano analizy ewolucji technologicznej, jaka zaszła w ciągu ostatnich dekad, oraz jej wpływu na edukację, ze szczególnym uwzględnieniem wirtualnego uczenia się i nauczania. Praktycznym rezultatem badań była seria seminariów i warsztatów przeprowadzonych online, które przygotował zespół projektu IRNet. Wystąpienia i warsztaty odbyły się w ramach przeprowadzonej w 2017 roku konferencji *DLCC* (Teoretyczne i praktyczne aspekty nauczania na odległość: efektywne kształtowanie umiejętności nauczycieli w obszarach ICT oraz e-learningu).

S ł o w a k l u c z o w e: behawioryzm, konstruktywizm, e-learning, mieszane uczenie się, środowisko cyfrowe, IRNet

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От сократовского бихевиоризма к цифровому конструктивизму

А н н о т а ц и я

В статье представлен краткий обзор эволюции методов и техник вплоть до эпохи цифровых технологий, а также основные аспекты бихевиоризма и конструктивизма с целью изучения развитие передовых педагогических инструментов и методов педагогической науки, в конструктивистской среде. Для целей исследования был проведен анализ технологической эволюции за последние десятилетия и ее влияния на образование с особым акцентом на виртуальном обучении и учении. Практическим результатом исследования стала серия семинаров и вебинаров, подготовленных международной командой проекта IRNet. В ходе конференции DLCC 2017 («Теоретические и практические аспекты дистанционного обучения, подзаголовок: эффективное развитие навыков преподавателей в области ИКТ и электронного обучения») в Университете Силезии в Катовицах, Польша, были реализованы основные доклады и семинары.

К л ю ч е в ы е с л о в а: бихевиоризм, конструктивизм, электронное обучение, смешанное обучение, цифровая среда, IRNet

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Del conductismo socrático al constructivismo digital

Resumen

El artículo presenta una sinopsis de la evolución de métodos y técnicas hasta la era digital y caracteriza los principales aspectos de los modelos conductistas y constructivistas, para estudiar el desarrollo de nuevas herramientas y métodos pedagógicos avanzados en ciencias de la educación, en un entorno constructivista. A efectos del estudio, se realizó un análisis de la evolución tecnológica durante las últimas décadas y su impacto en Ciencias de la Educación, poniendo especial atención en la enseñanza y el aprendizaje virtual. El resultado práctico del estudio hizo posible el desarrollo de seminarios y talleres en línea, preparados por el equipo internacional del proyecto IRNet. Las conferencias magistrales y los talleres se llevaron a cabo durante la conferencia DLCC 2017 (Aspectos teóricos y prácticos del aprendizaje a distancia, subtítulo: Desarrollo efectivo de las habilidades de los docentes en el área de TIC y aprendizaje electrónico), en la Universidad de Silesia en Katowice, Polonia.

Palabras clave: conductismo, constructivismo, e-learning, blended learning, entorno digital, IRNet