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TECHNOLOGIES AND LANGUAGE LEARNING:
TOWARDS NEXT GENERATION DIGITAL LEARNING ENVIRONMENTS

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Abstract

The exploitation of computers in language teaching/learning begins in the ’70s and continues uninterruptedly until today. This time period can be divided into different phases, characterized by different approaches concerning the use –and role- of computers, the learning theories on which the corresponding software applications were based on and of course, the pedagogical and linguistic goals. The emergence and popularization of the internet has led to the creation of a generation of eLearning applications and language e-courses for which, at least in higher education, LMS has been the main distribution pillar. Nowadays, LMSs are widely used in universities around the world to provide online courses in every specific knowledge area. However, in the last few years, there is a transition in progress from the previously isolated learning process that LMSs offer to a model of interconnected, free and informal learning. Thanks to web 2.0 services and tools, users can now produce content, communicate, collaborate and use a variety of sources, while at the same time teachers can apply more creative approaches and practices in class. In this new context, LMSs have started to appear rather outdated, as they cannot fully support this new pedagogical philosophy, the new learning-centered model that increasingly characterizes higher education practice. Extensive research is under progress in order to conceive and develop a new generation of digital learning environments that aims either to expand the capabilities of LMS or to replace them completely. As far as Higher Education is concerned, these next generation learning environments must evolve from a strictly structured environment such as an LMS, to an ecosystem based on open standards, made up of a variety of interconnected pedagogical applications and services, more suitable for and adaptable to support emerging instructional practices. These New Generation Digital Learning Environments (NGDLEs) should also allow access to institution-centric courses, as well as to free-range learning experiences, combine open content and educational apps and support more personalized and flexible learning experiences into an interconnected community of learners and instructors. NGDLEs are among the technologies that are expected to have a direct impact on FLT in the following years. This paper presents the concept and the current reality of NGDLEs as shaped by the research so far, and examines the ways in which NGDLEs could stimulate the learning / teaching of a foreign language.

Keywords: NGDLE, Technology Language Learning, ICT, CALL 2.0, Future LMS, LMS 3.0

1 TECHNOLOGY AND LANGUAGE LEARNING: THE CALL YEARS

The use of digital technology in foreign language teaching / learning is not an innovative idea, as the relationship between ICT and language teaching has been close and permanent since the 1960s. Throughout this time, the exploitation of the "new" technologies has always been a priority for language specialists whenever a new technological tool was made available. The collaboration with IT specialists contributed to the development of software and programs designed to be used in various language-related areas, such as language learning, natural language processing, or machine translation. In the course of time, we could note that a two-way relationship has been established, in which the requirements of language learning/teaching led to new specific technological applications and, reciprocally, the inventions of technology to new applications useful in didactics.

The first period of technology engagement in language teaching relied on the “Structural Approach”, a methodological proposition that emerged from the combination of the principles of structuralism and American behaviorism with Skinner's rewarding theory. “Programmed instruction”, “audio active” method and “audiovisual” method have emerged from this approach. Programmed Instruction used “linear programs” (based in Skinner’s and, later, in Crowder’s model) which were executed by specially designed
“teaching Machines”. The “audio active” method appeared in America in the ‘50s and was supported by
language labs with sound recording equipment. The student repeats (drill) oral exercises on a particular
pattern. Shortly thereafter, the “audio visual” method was presented in France. Although the exercises used
(exercices structuraux) are pattern drills, this method introduces the Visualised situation (situation
visualisée) and attaches particular importance to both the communication situation and its content. At the
technical level, apart from the language labs, all available image sources (slide projectors, stripfilms, TVs,
projectors) are used to present the teaching material as realistically as possible. In this first period of
technology utilization in language teaching (‘30 - ’70), the aim was to teach the language system. As oral
speech and pronunciation were the main priority of acoustic methods, particular efforts were made in the
field of phonetics with devices such as oscilloscope and spectrometer. After the 60s the technological tools
used in this period in language teaching started to be replaced by computers, which offered new possibilities
and opened up new perspectives.

The use of computers in language teaching, which is generally referred to as CALL, begins in the 1970s
and continues until nowadays. In this period of 40-50 years, different phases can be identified. These
phases are characterized by different approaches in the way computers are used, different learning theories
used in the development of applications or, of course, the pedagogical and linguistic goals. Several
proposals have been submitted in order to describe the phases of CALL. The most notable are those of
Bax [1] and Warschauer & Healey [2]. According to Warschauer & Healey [2], the evolution of CALL can
be divided into three phases, which correspond to the methodological trends of the time: behavioural -or
structural- (‘70-’80), communicative (‘80-’90), and integrative CALL (‘00+).

The first phase was based on the behavioral model of learning and placed particular emphasis on training
the student with exercises, known as drill and practice. The applications of this period were mainly based
on mini or mainframe computer systems and the computer was used as a teacher. The second phase,
influenced by cognitive theory, was based on the principles of the communicative approach and
emphasized the use of language structures. This phase was supported primarily by personal computers,
which had just been presented. Finally, the third phase is characterized by the emergence of the Internet.
In this phase the constructivist approach is adopted, and the importance of using the language in authentic
social circumstances is highlighted. It is obvious that a transition from the isolated learning process to the
communication and collaboration with others is taking place. Particularly after 2005, with the emergence of
web 2.0 and its services, this shift becomes even more apparent: users can now produce content, and this
allows teachers to implement more creative approaches and practices in the classroom [3]. Changes in
pedagogical practices and teaching methods are so important that many researchers have introduced the
term CALL 2.0 (Computer Assisted Language Learning 2.0) as an obvious derivative of the terms Web 2.0
and elearning 2.0 ([4], [5]) in order to highlight the influence of web 2.0 on foreign language teaching.

2 FROM VLES TO PLES

In parallel with CALL’s latest development phase, the internet is rapidly spreading and a number of
elearning applications, most of which are offered through a VLE or LMS (Virtual Learning Environment or
Learning Management System), are developed. In fact, since the mid-90s, VLEs / LMSs have emerged as
the main provider of e-learning both in universities and other educational institutions, as well as in most
training or lifelong learning programs. The reason for their success is obvious: VLEs/LMSs offer a wide
range of administrative, organizational and educational opportunities that optimize the delivery of content
and facilitate the work of both teachers and students. However, this success is not accompanied by
equivalent pedagogical innovations. Despite the constructivist theoretical background, VLEs are teacher-
or course-centered rather than learner-centered environments. For this reason, VLEs are starting to look
outdated and weak to meet new user requirements [6] in the new landscape that is shaped by the advent
of web 2.0 and its services.

It is true that the educational environment offered by VLEs focuses on the delivery of –strictly structured-
content [7] and not on the development of cooperation among learners ([8], [9]). VLEs create an isolated
world built according to the needs of teachers –and institutions- ([10], [11]) in which interactivity is limited
and, consequently, the level of motivation and engagement is very low ([12], [13]). In this environment, the
learner’s role is passive and restricted by the hierarchy of the content and the functions the teacher (or the
VLE) allows, while the learning path is the same for all users, regardless of each learner’s specific learning
needs [14]. However, the biggest issue, which is in stark contrast to the new features offered by web 2.0 and its innovative tools and services, is the inability of users to choose the content that is appropriate for their needs, approach it in ways that they prefer, and function in a less restrictive online environment [7]. The elearning system designers have made efforts to enhance the existing systems with new features such as social software, collaboration, or content creation tools in order to adapt these systems to new demands of users. However, this is something that VLEs do not seem to be able to offer as it does not fit either their philosophy or their design ([15], [8], [12], [16]).

Therefore, it is obvious that a new educational model that focuses on the personal effort and pursuit and on the social production of knowledge is needed [17]. In this new model, the dynamics of social software (blogs, wikis, podcasts and long tail learning) should be exploited as many researchers in the field believe that social software offers significant advantages for education ([18], [19], [20]). In this new model, users should be able to create, publish and share content, communicate and collaborate with others, and take their decisions concerning the time, the place and the path of learning. In this spirit, it is obvious that there is a need for new pedagogical practices which will be supported by new technological tools that must suit the natural way people learn in their everyday lives and allow them to build learning environments/spaces suitable for communication, social interaction, knowledge sharing, informal and collaborative learning [21].

The first attempts to create learning environments with these characteristics started in 1998 with the FLE3 project and continued in the 2000 decade with the NIMLE, SHELL, EDUTELLA and ROMA projects [21]. At the same time, and also based on this open approach, the social networking sites Elgg and 43Things, as well as a number of new educational environments are developed. Projects such as Manchester PLE [11], PLEF [22] and PLEX ([23], [11], [24]) and the European programs TENCompetence and ROLE [25] are among the most well known. The results of the applications developed show that PLEs offer solutions to those points where VLEs are at a disadvantage ([14], [26], [7], [11]).

For the description of these new learning environments, which most researchers in the field consider as a step towards the replacement of the VLEs in e-learning applications ([14], [26], [7]), the term Personal Learning Environments (PLEs), that firstly appeared at JISC/CETIS Conference [27], is adopted. PLEs are systems, environments or collections of tools and external web 2.0 services (SAAS) which users organize in such a way as to build their Personal Knowledge Networks and serve their learning needs ([27], [10], [11], [28], [22], [29], [15]). From a technical point of view, PLEs differ in design, features, complexity and possibilities. They are based on AJAX (Asynchronous JavaScript and XML) technologies as well as on technologies such as RSS, Mashups and Widgets that are important for both the reuse of knowledge and the production of new knowledge [21].

As is easily understood, the term PLE is mostly a concept, an “umbrella-term” which covers a variety of applications and learning environments, which offer a variety of characteristics tools and features. Actually, PLEs follow a “new design pattern” [10] that distances itself from the isolation rationale of VLEs and emphasizes the learning practices of users via numerous technologies. PLEs adopt a learner-centered approach, as they are based on Informal learning and constructivism and on social constructivism or “connectivism”, in particular [30]. As a result, PLEs present some common characteristics: they are open, customizable systems, they concentrate all the tools users need in one place/environment and they offer access to a network of peer learners. Consequently, they promote informal and lifelong learning assigning the user the responsibility of knowledge building via the formation of communities and the creation, remixing and sharing of resources. Thus, PLEs represent a digital substitute of the natural environment where users function outside institutional space, in which they can learn in an informal way, through discussions and collaboration with peers [14].

It is obvious that environments of this kind allow the access to a foreign language with completely different practices than those used so far in both CALL systems and elearning applications based on traditional VLE systems. The advantage of PLEs over the traditional VLEs, is that they have the flexibility and the openness to support a variety of educational practices –both informal and formal–, different information literacy goals, using a variety of sources, tools and services especially selected and concentrated in one common space [31].
3 THE NEED FOR NEW LEARNING ENVIRONMENTS

From all that was mentioned in the previous paragraphs, it seems that educational technology has followed an evolutionary path from basic technology use (CBT and websites) to LMSs and then to PLEs, MOOCs, e-portfolio software, etc. [32]. Today, we have enough data and conclusions that can lead us to the next generation of learning environments:

- LMSs, despite the strong criticism, still appear to be the main pillar of educational provision, at least in universities. According to several researchers the LMS is consistently ranked by students among the most important instructional technologies for their academic success ([33], [34]). Furthermore, 85% of the U.S. institutions believe that the LMS is the most important technology to online programs [35], while 15% are planning to replace their LMS within the next three years [36]. However, on-site LMS implementations are gradually abandoned. As of 2016, 85% of LMS migrations are in hosted “cloud” or SaaS solutions such as Canvas (Instructure) and Moodle (Moodlerooms). This is why many researchers believe that the transition from the existing elearning systems (LMSs) towards more learner-focused systems -such as today’s PLEs- should not exclude LMSs, but it should aim for new hybrid systems that combine the best of two worlds. This transition, which some researchers think is already underway ([37], [23]), should lead to more flexible platforms capable to support emerging instructional practices and to remix open content and educational apps in new ways ([38], [39], [40]).

- It's true that PLEs are becoming more and more popular. However, in their majority they are still loosely coupled customized collections of tools and therefore, they cannot be considered as a reliable alternative. Despite the flexibility and the openness they offer, the lack of any standardization and the absence of any kind of common standards make it difficult for them to be adopted by traditional academic institutions.

- Nowadays, the exploitation of mobile technology is a major trend especially in education. As smartphones and tablets have become an integral part of the everyday life of new learners, the need for language learning applications accessible via mobile devices has already created a new field, MALL (Mobile Assisted Language Learning). This is why, in the last few years there is a strong tendency towards the adaptation of learning materials for delivery via mobile devices, and also an increase in the development of new apps and eCoursebooks suitable for a blended learning approach [3]. In this context, the development of future learning environments should be based on cloud solutions. According to Baer & Norris (p.4), these environments “…will enable the seamless combination of learning and developmental experiences from a wide range of sources: institution-centric courses, prior learning, free-range learning experiences, and other co-curricular and work activities…” [41].

- There is also a strong tendency towards the individualization of learning, which is a basic weakness of traditional LMSs. This could allow learning environments to be personalized and to offer students customized learning paths, learning materials and support. This is directly dependent on the use of “learning analytics”, which learning systems designers are already trying to use in order to enhance learning outcomes. Conole et al (p.2) argue that learning analytics is the “…measurement, collection, analysis, and reporting of data about learners and their contexts, for the purposes of understanding and optimizing learning and the environments in which it occurs…” [42]. Although there is skepticism about their current potential - such as INHOLLAND University [43] – the relevant technology is being developed continuously, and standards that will be used for describing, collecting, and exchanging learning activity data between systems are proposed. In this way, data from different systems will be easily exchanged, accumulated, and queried. An example of this is IMS Global’s Caliper Analytics (p.4) which “…standardizes the process of describing learning activities and tracking learner engagement across the learning technology ecosystem…”[44].

Taking into account the parameters discussed above, a set of characteristics that new learning environments should have is clearly formed: these environments must be cloud-based learning spaces, that will combine the administrative and delivery power of LMSs, the openness, flexibility and customizability of PLEs while, at the same time, they will exploit learning analytics to deliver personalized learning to users. Dahlstrom et al (p.4) argue that these systems should also be adaptive, intuitive, integrated and function “…as digital learning environments for students, administrative systems for faculties, and interoperable systems that institutions can integrate into their administrative IT portfolio to leverage analytic applications…” [36].
4 WHAT ARE THE NEXT GENERATION DIGITAL LEARNING ENVIRONMENTS (NGDLEs)?

Actually, research seems to be moving towards this direction internationally. A number of nonprofit organizations, academic institutions, software producers and vendors are working to form a general framework for describing these new environments -Next Generation LMSs or Future LMSs, or post-LMSs as usually reported in the literature.

Although no institution officially coordinates the effort, EDUCAUSE, a US nonprofit association, has already been leading the "Next Generation Digital Learning Environment Initiative" since 2014 aiming at investigating and defining the NGDLE space, publishing the results of the corresponding research and defining future investments in the field. As a result, in 2015 a White Paper was published, officially introducing the term NGDLE and describing the general framework [45]. Equally important for this research is the contribution of IMS Global Learning Consortium, an international non-profit organization that develops interoperability standards to promote collaboration between education technology organizations and applications. IMS has 350 members (55 from higher education) that participate in activities around standards creation. Concerning NGDLEs there is work in progress in four areas: accessibility, analytics, interoperability, collaboration and personalization. For this purpose, IMS Global has developed several relevant standards and an API.

Two consortia of universities are also among the leading group in NGDLE research: UNIZIN and C-BEN. UNIZIN is a consortium of 25 higher-education institutions, educating over 900,000 students since 2014. UNIZIN's research focuses on digital content, a "plug-in" based learning platform and learning analytics ([46], [47]). C-BEN (Competency-Based Education Network) is a consortium of colleges and universities collaborating to address shared challenges of the design, development and scaling of competency-based degree programs [45]

Private companies, such as LoudCloud (Competency Learning Platform) and Instructure (Canvas, native cloud LMS), which have released tools combining learning platforms and learning analytics [48], are also in the forefront of the research. Among others, EdCast is working on AI powered knowledge cloud for personalized learning in order to facilitate content research and Brightspace Leap is working on an adaptive learning engine that can automatically recommend supplementary course materials. The EduAppCenter is also contributing to the research, featuring a collection of apps compliant with the LTI standard. Finally, the World Wide Web Consortium (W3C) is developing standards for “WebContent Accessibility Guidelines” and “Authoring Tool Accessibility Guidelines”.

The research conducted so far, concludes that NGDLEs will not be closed or self-contained single systems, nor one-size-fits-all applications. They should be modular learning environments consisting of learning tools and components that adhere to common standards. According to Rhode et al [49], they will combine a networked learning environment and an adaptive learning model enabled by advances in technology, machine learning, AI, and learning science. In that sense, NGDLEs must be conceived as ecosystems built on a component-based approach, which will aggregate tools, application components and content. They will be able to use a variety of learning technologies but they will operate under a specific set of specifications and standards. NGDLEs will be able to offer flexibility and variability to address specific learning needs. As EDUCAUSE put it (p.9), their philosophy will be that of Lego bricks: a “…. toolbox of applications, content and platforms that could be assembled in custom ways” based on how the individual or institution wants to build it [45].

According to the researchers of the field, five key areas need to be ensured in order for a NGDLE to function as envisioned:

- Interoperability: the system must be easy to use and allow parts to connect and share data. It must also support the integration of tools and components and the exchange of data and content between parts
- Personalization: the system must offer a high degree of customization, so that the environment and learning activities can be tailored to individual users and academic needs
- Learning analytics: the system should gather and analyze learning data, both personal and course-level, and make use of the resulting information. It should also offer support and advice, especially in the field of competence-based education.
- Collaboration: the system must support communication and collaboration at any level between the participants, and allow for easy switching between private and public learning spaces, and
- Accessibility: the system must adopt a universal design approach that will ensure both learners and instructors easy access and unimpeded participation in its functions and the learning content as well.

5 CONCLUSION

From what has been discussed, it is obvious that NGDLEs will arise from the evolution of traditional LMSs and their convergence with the openness and connectivity of PLEs. They will result from the substantial evolution of PLEs, from a free but indistinct collection of tools and resources to a robust and reliable learning environment that will be able to replace the existing elearning systems in the near future.

The emergence of cloud-based NGDLE seems to fit perfectly with the emerging “4th generation” of educational technology, which refers to distributed and digitally shaped technologies: adaptive learning, distributed infrastructures, and competency models [32]. Furthermore, as Brown et al believe [45], NGDLE implementation will result in improved cost and functionality, which will enable lower costs for administrative systems and increasing investment in academic systems. However, this transition will not be easy or trouble-free. While a NGDLE can be a powerful combination of the most advanced cloud-based tools and emerging protocols-such as LTI and xAPI-, the coexistence of a LMS and a variety of tools in each course may lead to a technically complex environment. Thus, even the more flexible NGDLE environment may also require excessive time and knowledge for individual faculty to implement [49]. There will also be non-technological barriers: in order for such a radical change to become a reality, the culture of higher education teaching and learning must evolve to encourage and even demand the realization of NGDLE.

Regarding language learning in particular, the arrival of NGDLEs will definitely offer new possibilities. The aim of any environment designed for language learning is to offer users the possibility to easily approach the foreign language in its original form and in a richer context, as well as to provide the tools that can support the learning procedure and the communication and collaboration with native language speakers or among participants. Thanks to their philosophy and the solid technological and theoretical background on which they are going to be developed, NGDLEs will be able to respond to these goals more successfully than both LMSs and PLEs, as they will combine the easy access to educational materials provided by traditional LMSs with the possibilities for communication, connectivity and informal learning offered by PLEs. NGDLEs, will also offer teachers the possibility to design rich learning environments choosing the necessary tools and resources by which specially designed training scenarios could be implemented in practice, either by individual users for self-learning, or by a community of users in collaborative learning scenarios.

REFERENCES


https://doi.org/10.1080/10494820.2014.884790

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