

International Journal of Grid and Utility Computing

ISSN online: 1741-8488 - ISSN print: 1741-847X

<https://www.inderscience.com/ijguc>

A vision about lifelong learning and its barriers

Jordi Conesa, Montserrat Garcia-Alsina, Josep-Maria Batalla-Busquets, Beni Gómez-Zúñiga, María J. Martínez-Argüelles, Tona Monjo, Enric Mor, María Del Carmen Cruz Gil

DOI: [10.1504/IJGUC.2023.10054826](https://doi.org/10.1504/IJGUC.2023.10054826)

Article History:

Received:	16 November 2020
Last revised:	16 July 2021
Accepted:	05 August 2021
Published online:	21 March 2023

A vision about lifelong learning and its barriers

Jordi Conesa*, Montserrat Garcia-Alsina,
Josep-Maria Batalla-Busquets,
Beni Gómez-Zúñiga,
María J. Martínez-Argüelles,
Tona Monjo and Enric Mor

Universitat Oberta de Catalunya,
Barcelona, Spain
Email: jconesac@uoc.edu
Email: mgarciaals@uoc.edu
Email: jbatalla@uoc.edu
Email: bgomezz@uoc.edu
Email: mmartinezarg@uoc.edu
Email: amonjop@uoc.edu
Email: emor@uoc.edu
*Corresponding author

María Del Carmen Cruz Gil

Universidad de Zaragoza,
Zaragoza, Spain
Email: mccruz@unizar.es

Abstract: Around 25 years ago, some researchers argued for moving towards innovative learning models characterised by being more personalised and where the students would have a more active role in deciding what to learn, when to learn and how to learn. Nowadays, there is a need for a flexible, efficient, universal and lifelong education. Lifelong learning is fully integrated into our society and, from the student point of view, it is very different from regular learning. Among these differences there is the maturity of students, the fact that the domains of interest are much broader, the way how learning occurs at different depths, the fact that the topics to study may be related to work, family and leisure, and that students have little availability due to their necessity to conciliate home, work, leisure and learning. Lifelong learning requires personalised models that adapt to students' needs and constraints, but lifelong learners keep suffering from models that are adapted neither to their necessities, nor to the needs of society. This paper reflects on the actual situation of lifelong learning, analyses some of the relevant literature and discusses the challenges to conceptualise, from a transdisciplinary point of view, innovative e-learning models that promote self-determination of students.

Keywords: lifelong learning; lifewide learning; heutagogy; self-determined learning; self-directed learning; adaptive learning; eLearning; digital learning; andragogy; learning barriers; learning autonomy.

Reference to this paper should be made as follows: Conesa, J., Garcia-Alsina, M., Batalla-Busquets, J.-M., Gómez-Zúñiga, B., Martínez-Argüelles, M.J., Monjo, T., Mor, E. and Cruz Gil, M.D.C. (2023) 'A vision about lifelong learning and its barriers', *Int. J. Grid and Utility Computing*, Vol. 14, No. 1, pp.62–71.

Biographical notes: Jordi Conesa is an associate professor at the Faculty of Computer Sciences, Multimedia and Telecommunication of the Universitat Oberta de Catalunya. His research is addressed to improve the learning and teaching experiences in virtual environments.

Montserrat Garcia-Alsina is an associate professor at the Faculty of Information and Communication Sciences of the Universitat Oberta de Catalunya. Her research is focused on information science and knowledge management in Higher Education Institutions.

Josep-Maria Batalla-Busquets is an associate professor at the Faculty of Economics and Business of the Universitat Oberta de Catalunya. His research topics are related to e-Learning and economics.

Beni Gómez-Zúñiga is an associate professor at the Faculty of Psychology and Education Sciences of the Universitat Oberta de Catalunya. Her research addresses adoption and adherence to assisted technological solutions in the context of behaviour change and student engagement.

María J. Martínez-Argüelles is an associate professor at the Faculty of Economics and Business of the Universitat Oberta de Catalunya. Her research topics are related to management and organisation in the educational context.

Tona Monjo is a Phd Student at the Faculty of Computer Sciences, Multimedia and Telecommunication of the Universitat Oberta de Catalunya. Her research topics are related to user experience in e-Learning collaborative contexts.

Enric Mor is an associate professor at the Faculty of Computer Sciences, Multimedia and Telecommunication of the Universitat Oberta de Catalunya. His research topics are related to the interaction design and user experience within Virtual Learning Environments.

María Del Carmen Cruz Gil is an associate professor at the Faculty of Philosophy and Letters, Information and Documentation Degree of the Universidad de Zaragoza. Her research topics are related to information science, seeking and retrieval information.

This paper is a revised and expanded version of a paper entitled 'Towards an educational model for lifelong learning' presented at the '14th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing', Antwerp, Belgium, 7–9 November 2019.

1 Introduction

We constantly need to learn in our everyday activities: for travelling, for using new software programs, for keeping updated, for curiosity, etc. Particularly in the professional context, lifelong learning is a need, and it has been argued that all professionals should be lifelong learners (Ashton and Newman, 2006) and should use different kinds of environments (Aoki, 2020), such as formal, informal and non-formal learning environments (Manuti et al., 2015). Hence, LifeLong Learning (LLL) is fully integrated into our society.

According to these needs, lifelong learning has some specific characteristics to take into account (Gouthro, 2017). Some of them may be due to the time and availability constraints of people, such as schedule constraints, time periods of unavailability, the impossibility of having a full dedication, or the lack of constant dedication. Others come from the complexity of the current world or the myriad of preferences of people, which often require a more multidisciplinary learning based on mixing leisure and professional aspects, as well as aspects related to daily activities. Others are due to the uniqueness of each person; both referring to the current knowledge, skills and competences different people might have, as well as to their different needs related to skills and knowledge. Therefore, the most suitable environment for lifelong learning is one where adults are able to choose what to learn, how to learn, when to learn, in what order and at what pace, which is known as heutagogy (or self-determined learning) (Blaschke, 2012).

Around 25 years ago, some researchers argued for moving towards innovative learning models, more personalised and where the students would have a more active role and would decide what to learn, when to learn and how to learn (Candy, 1991). The Commission of the

European Communities (European Commission, 1995) also pointed at the need of an education that was flexible, efficient, accessible and lifelong, reaffirming the necessity and importance of this change. Nowadays, we are still far from that scenario (Blaschke, 2017; Conesa et al., 2020).

Changes should be done not just in the way students learn, but also in *what* they learn and *when* they learn. Choosing what content to learn requires new ways of enrolling and choosing courses, different to the traditional enrolment bound to a given subject, or a group of subjects related to a given topic, which are the typical structures behind masters and subjects offered by educational organisations. Learning whenever learners prefer to do it requires having flexible schedules, allowing each student to decide when to begin the course, when to finish the course and at what pace the student will work. Implementing these changes requires educational organisations to evolve, mostly in their business and organisational models. Therefore, the change of paradigm does not just affect pedagogy, but the whole learning experience; that is, all the facets related to learning activities and their actors/resources: the need for new materials, new technological tools, people with new roles, new business models, new motivational policies, etc.

This work aims at providing a discussion about which are the needs of adult learners in the context of LLL, how these needs can be addressed, from what perspectives and what is the related research. The paper also provides insights about a model called iLearn under development at the Universitat Oberta de Catalunya. It designs, implements and evaluates new methodological and technological tools in order to move forward to a more suitable lifelong learning environment.

The rest of this paper is organised in five sections. Section 2 presents a motivational case that collects some of the more common needs and constraints of lifelong learners. Section 3 follows to define the terms lifelong learning,

lifewide learning, andragogy, heutagogy, provides a literature review of the models and approaches promoting lifelong learning, and points to the main differences between lifelong and regular learning. Section 4 draws the main needs of lifelong learners and point out the current gap between their needs and the current educational offer. Section 5 provides some reflections about the different aspects to consider when adopting lifelong learning models and briefly presents the different characteristics that a model of lifelong learning should have. Finally, Section 6 reports the main conclusions and provides on-going and future directions of research.

2 A motivational case study

In general, there is a gap between students' needs and the main response of higher education organisations to lifelong learners. Due to the bias we may have for the continued use of the traditional educational model, it may be difficult to imagine how new lifelong learning environments should be and how they may differ from current ones. In order to facilitate such an imaginative exercise, we provide a case study that shows some of the constraints an adult faces when learning and presents a possible lifelong learning environment that helps the learner in her learning process, by adapting seamlessly to her constraints and needs.

We consider a 35-year-old woman, Maria, who works as an architect in a construction company and is the mother of a 5-year-old daughter. She enjoys learning new things related to her hobbies, such as travelling and health. She is also interested in the education of young children. She would like to study something related to her interests, but she had neither the willingness, nor the time to enrol in a long-term program. Although there are monthly short-term programs dedicated to specific topics, they require a continuous dedication that this person, with her son and her current work, cannot guarantee. In this context, Maria discovers a new lifelong education service that offers courses, which are very focused and have a short duration, ranging from few hours to one week. She decides to sign up.

Just after her subscription, she receives an email from Elena, her personal mentor, that introduces herself and explains how courses work. The personal mentor also asks about her availability, hobbies, interests, goals and learning expectations in order to provide better guidance to her. According to Maria's availability, the personal mentor posits which courses are available and how to search and navigate through them. Every course has a schedule, but its purpose is only to act as a guidance on how to work throughout the course. Students can begin courses whenever they need and can spend as much time as they need to finish them. Every course provides the knowledge required to address the proposed challenge. They also present examples that facilitate their assessment activities, which require the adequate use of the learned skills and knowledge to address the proposed challenge. There are complex interrelations between courses to respond to larger and complex challenges. Courses are grouped into different abstraction levels that reflect the difficulty of the proposed

challenge and the skills needed to address it. The platform where the courses take place offers an interactive and navigable visualisation through a graphical representation of courses, their relationships and aggregations.

Maria tries the system and thirty minutes later of her first contact, she is already aware of the structure of the courses, of the main courses related to her interests and she also understands the most convenient order of courses to address her learning. Then, she chose the courses she will face, as well as in what order she wants to follow them. Firstly, she takes a course about the impact of sugar-sweetened beverages in health. The course is composed of five smaller courses: one introduces the digestive system, others are focused on carbohydrates, glucose, and how much of these a person needs, and two more courses about how to identify soda drinks, and presenting evidence-based studies on the abuse of soda drinks, respectively. Since she already knows about the digestive system and carbohydrates, she decides to enrol in the glucose course "Do I need glucose? How much?" After the enrolment, she immediately receives a personalised message from her teacher on this course that briefly introduces the topics: benefits of the glucose, the risks of its excessive consumption, a guideline for the course and a link to the course materials. Although there is no time limitation to finish the course, it has a planned dedication of one week. Due to the course's flexibility, Maria has the chance to adapt her studying habits to her availability, and devotes two weeks to the course before finishing it.

During the attendance of her first course, she is worried because the company where she works will implement an Enterprise Resource Planning System (ERP). Maria does not know what an ERP is and what problems its implementation may have. Besides, she has heard negative opinions about these systems from friends. She wonders if there are some available courses on ERP and decides to contact her mentor to ask whether the LLL service offers courses about this topic. In few hours, she receives information about these courses. There are courses with one year duration, but she decides to just take a short introductory course, that takes only a couple of days, titled "What is an information system for organisations?" After completing the course, she gains an awareness about the potential advantages of ERP, but also about the potential problems their implementation may have. Hence, she asks for another course about what can be done to increase the chances of success of the ERP implementation. After navigating through the visualisation of courses, she finds a course that seems interesting. It belongs to a compound course in project management, titled "What should be done to guarantee success in the implementation of an ERP?" Although there are some preliminary courses, she ignores them to take with urgency and high interest what she considers a relevant course. In a few hours, she learnt which critical success factors should be considered to implement an ERP. Maria shares with her teacher what worried her, and the teacher provides to her some success and failure cases of ERP implementations. After studying these cases, she talks with her boss about the critical features and potential risks around the future ERP implementation and ways to mitigate them.

Thanks to her recent acquired knowledge, she will become a coordinator member of the implementation project team because her boss considers that she will be able to deal with such responsibility. She appreciates her ability to learn what she needs, when she needs it.

Some weeks later, Maria returns to her study about sugar-sweetened drinks, interrupted due to the ERP courses. She restarts where she stopped, because the virtual learning environment provides her with a visual reminder of what she had done, what she had read, the interactions she had with her teacher and the activities she performed. Such information helps her to resume the learning in few hours. Since that day, Maria promotes the lifelong learning service, because it is useful for both her work and her life.

3 Literature review

Lifelong learning has become relevant to keep people's skills and knowledge updated into work environments (Kettle, 2013), but also in daily life (Tuckett, 2017). Some research also points out its potential to improve society (Carr et al., 2018b; Louw, 2014). Hence, lifelong learning is both in the agenda of the developed countries, as well as in that of international organisations such as United Nations and EU. On the other hand, the application of new technology into the education field and eLearning may be game changers to break the barriers between education and work (Ashton and Elliott, 2007) and provide solutions for the different lifelong learning needs, mainly because of its ability to deal with ubiquity, personalisation, communication and automatization (Laal, 2014).

Even though the importance and necessity of LLL and the novel technology associated with it is beyond doubt, it is still a pending issue; its application is not as successful as it was expected, there are still many barriers to overcome, and the proposed approaches do not consider students' needs and constraints, which are in fact quite numerous due to their necessity to conciliate learning, family, work and leisure.

The main difference of LLL, with respect to traditional learning, is the context. Even though the context should also be considered in traditional learning, in LLL it has a prominent role. Since LLL promotes the learning as a way of improving the individuals both in a personal way (in any aspect, such as health, empathy, employability, reflection, etc.), as well as collectively, a significant LLL can only be reached when the personal dimension of it has been done in such a way that the individual integrates the learned concepts or skills as a habit. The context should consider, at least, the time and dedication constraints of learners, the previous knowledge of learners (gained formally or informally), the broad domains of interest for each learner and the learners' objectives (which may be related to work, family or leisure). Addressing all these aspects would require a more multidisciplinary and personalised learning (Candy, 1991; Conesa et al., 2020; Laal, 2014). These contexts and constraints are scarcely considered in the actual offer of higher education organisations or educational organisations in

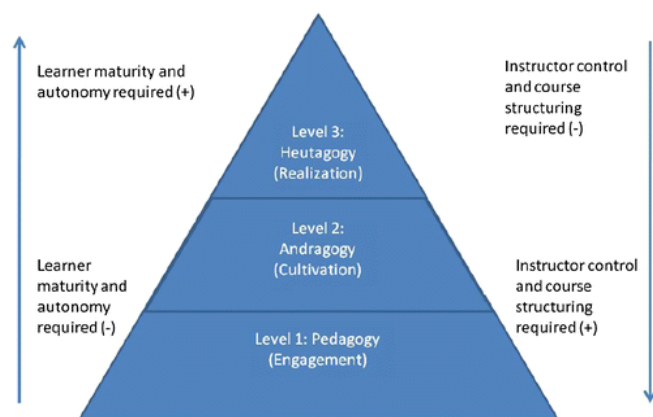
general. The use of communities of practice to promote LLL seems to be a good practice (Blaschke, 2018; Carr et al., 2018a), since they promote significant learning and promote new knowledge, skills and habits in communities and beyond individuals. Elements being used in regular learning may still be useful for lifelong learners, but should be enhanced to consider the learners' context, as further discussed in section 4.

Lifelong learning may be considered by taking into account four pillars: 1) educational features, including the teachers' role and the learners' degree of autonomy; 2) business model components sustainable for a long time; 3) psychological models (including evaluation and motivation); and 4) technological platforms that give support to lifelong learning and also to informational behaviour and knowledge sharing.

In relation to educational models, many authors claim that lifelong learning should be addressed from a heutagogical perspective. That means that the learner is the major agent in their own learning, which is called to be self-determined learning. Heutagogy can be viewed as an evolution of pedagogy and andragogy. In this evolution the learner moves from a structured, less autonomous educational environment (pedagogy) to a self-directed learning where the learner has self-responsibility in learning, defining objectives, and identifying its needs (andragogy). And finally, from the heutagogy perspective, in this evolution the learner moves from the pedagogy context to an environment of higher autonomy with little or no structure (Blaschke, 2012, 2017). Heutagogy occurs due to the maturity, awareness and autonomy of lifelong learners (Carr et al., 2018b; Kettle, 2013). Blaschke has proposed a framework, in the form of a pyramid, to reflect such perspective (Blaschke, 2012), depicted in Figure 1. Pedagogy may be seen as the theory of teaching. At this level, the teacher is responsible for the learning process, choosing what needs to be learnt, in what order and how. In some sense, we can say that students are "educated" and have few decisions to take about their learning. Second level is andragogy, characterised by a greater self-responsibility and self-control of the students. At this level, students are more aware of how they learn and what are their main necessities. They are responsible for identifying their needs and to plan how these needs will be addressed. The voice of the learners is considered, but the role of the teachers is still very relevant, taking great responsibility in the learning process. Andragogy is also known as self-directed learning. Finally, the third level is heutagogy. It requires students that have progressed in maturity and autonomy, who are ready to take a step further and conduct a self-determined learning; that is, choosing what to learn, when, how and at what pace. Some authors define heutagogy as the learning with the absence of educators (Kettle, 2013). Others state that heutagogy does still need educators, but with a different role, more focused in guiding students during the learning process and in promoting their curiosity by the provision of any resource related to the students' interest (Conesa et al., 2020). Another difference between pedagogy, andragogy and heutagogy is the type of

their learning outputs. The two first levels are useful to get knowledge and skills, but heutagogy is more focused on learning capabilities, understanding a capability as the ability to use skills and knowledge efficiently to deal with different problems, even problems very unrelated to the ones seen during the learning. That requires changes in the learning methodology that require considering a double loop (Hase and Kenyon, 2000), a process in which learners should reconsider how to adapt the skills and knowledge acquired and in what way they can improve their daily activities. In addition, the MOOC model is not the solution since it presents some failures related to lifelong learning (Yousef et al., 2014).

Figure 1 Blaschke framework reflecting the lifelong learning process (from Blaschke, 2012)



From the point of view of business models, universities and other educational organisations are equally sensitive – like other companies in the service sector – to changes in demand from their customers. The constant and progressive implementation of a formative model based on lifelong learning has meant a deep change in the conceptualisation of job training. In this sense, at the beginning of the 21st century, the European Commission (2001) published the Memorandum on lifelong learning with the aim of provoking a debate to establish a global strategy to transform lifelong learning into an individual and institutional reality. The priorities for action include 1) to guarantee universal and continued access to learning in order to obtain and update the necessary qualifications in the knowledge society; 2) to encourage innovation in teaching and learning in order to develop effective methods and contexts for lifelong learning; and 3) to bring learning closer to homes by using digital technologies, so that learning opportunities are close to users. The fulfilment of all these objectives implies a transformation in the way in which universities organise their training portfolio and forces them to evolve in educational methodologies and tools to be more sustainable and scalable. Unfortunately, there are few studies related to business models behind education, especially in relation to lifelong learning (Pastowski, 2004). Most scientific articles focus the analysis on the new pedagogical methodologies that universities adopt to respond to the new educational requirements of society (Emerson and Berge, 2018;

Ibrahim and Dahlan, 2016). Behind the new pedagogical methodologies there must be new models of organisation and business. In this sense, that is a field that remains to be more thoroughly explored.

Different contexts for lifelong learning should be considered from a psychological perspective. It also requires identifying the experiences of learners and knowing what makes people adhere to a learning model: how to motivate them and how to assess their progress. Therefore, a model should include topics such as assessment, motivation, attitudes and behaviour in order to empower people/learners to enrol in lifelong learning. This model should guarantee a high level of adherence, because low levels of adherence are associated with reduced intervention efficacy (Wantland et al., 2004). This topic of adherence is both relevant for the self-commitment and the student's adherence to the technology that support lifelong learning.

Finally, the pillar of technology should be considered because it helps to cover the necessity of providing a self-determined learning for lifelong learning, united to informational behaviour and knowledge sharing. There are different models of information seeking behaviour such as Dervin, Elis and Wilson, that consider different topics from the point of view of person, work, affective needs, or emotions that influence informational behaviour (Platero and Ortol, 2016; Wilson, 1999, 2006, 2016). The model of information seeking behaviour from Wilson is a consolidated model that consider the stages and context of information search, starting at the identification of needs, and throughout search and exchange (Wilson, 2006, 2016). It has evolved to also include the context of technology. There are works that show social media as a useful tool to share knowledge and support lifelong learning in workplace or in daily life (Blaschke and Hase, 2019). On the other hand, technology, with millions of digital learning resources, thousands of organisations teaching online, information systems able to provide personalised learning and a huge amount of social/collaboration tools that could be used, should support a personalised learning in which learners take a more active role, deciding what to learn, when to learn and how to learn (Aoki, 2020; Candy, 1991; Ouadoud et al., 2016). However, we fail in offering e-learning platforms to support this flexible learning way (Elisabeta and Alexandru, 2019; Graf and List, 2005) and, therefore, lifelong learners continue suffering from a similar model, more ubiquitous and efficient thanks to the use of technology, but still not adapted to their needs and/or preferences. In this sense, ways to integrate different modules oriented to the different needs and topics pointed out above are fields where more research is needed.

4 The gap between students' needs and academic offer

There are some experiences in which learning has been adapted to lifelong learners' necessities, but they are mostly punctual and isolated (Carr et al., 2018b; Harrison and Vanbaelen, 2016; Liang et al., 2015; Osborne and

Borkowska, 2017). In Carr et al. (2018b), for example, authors analyse an experience focused on dealing with the fourth sustainable development goal (4SDG) from the WHO (Robert et al., 2005), which ensures inclusive and equitable quality education and promotes lifelong learning opportunities for all (“Goal 4. Ensure Inclusive and Equitable Quality Education and Promote Lifelong Learning Opportunities for All”, 2018) in Kenya. This experience used an heutagogical approach to promote agricultural education, where students were not just knowledge receptors, but also knowledge generators, promoters and communicators. The provided education was focused on addressing three different dimensions: human, financial and society. Some communities of interest have blossomed from the experience, providing a rich and natural environment to learn, but also to share the lessons learnt about agriculture that farmers, who were the lifelong learners, have learnt during their life – and which are lessons that may be difficult to learn from academics. In Liang et al. (2015), the relationship between travelling and learning is analysed. The research presents travelling as a very suitable platform for lifelong learning, since through travelling we do not only acquire knowledge, but also competences and soft skills (stereotype removals, cultural changes, motivation, etc.). In Harrison and Vanbaelen (2016), lifelong learning approaches are used in order to deal with poverty, social inclusion and long-term unemployment. In the particular case of Singapore studies (Sung and Freebody, 2017), learning proposals point out the need to improve lifelong learning implementation. Finally, Osborne and Borkowska (2017) analyse different lifelong learning approaches in the contexts of Europe and Asia. It results that European approaches are more focused on individuals, promoting their employability, whereas in the Asiatic countries there is a lot of focus in the education that promotes community and collective ethos.

In general, the main response of higher education organisations to the lifelong learning needs of people are academic offers that end up being very similar to conventional formal education, but with more practical or work-related contents. These offers tend to have the form of long courses, scheduled like undergraduate courses (by semesters and with similar calendars), with none (or few) opportunities that offer flexibility in the assessment activities and with constraints related to when the courses can be started, how they can be taken and at what pace they should be studied. Some of the offers are composed by several courses and allow few (or no) electives, such as a master. A master has a curriculum designed for a given standard student who possesses a certain set of skills and knowledge; a student who, in the real world, may be very difficult to find, and even more difficult in the case of lifelong adult learners.

It seems clear that students’ needs do not fit with the characteristics of the offer that higher education institutions are providing. Table 1 shows some of the mismatches between the academic offer and the students’ needs, which will be discussed in more detail below.

Table 1 Main mismatches between academic offer and students needs

<i>Students’ reality</i>		<i>Constraints of the educational offer</i>
Does not have full dedication	≠	Full dedication during a long period is required (semester)
May have some schedule preferences	≠	Schedule is planned by the university
May have periods of unavailability	≠	Schedule is fixed (does not allow disconnection)
Have personal needs related to competencies/knowledge	≠	Offers a generic program created for a given community (standard student)
Does have multidisciplinary necessities	≠	Most programs are within a discipline
Have very extensive expertise in different aspects, maybe not broad	≈	Take into account students’ expertise to recognise subjects
Used to subscription and other business models of pay per use	≠	Traditional business model, focused to cover university costs and resources used under conventional offers

Adult students do not have full dedication because they should conciliate their family, work, leisure and learning activities. In addition, they have responsibilities at home and at work that may leave them unavailable for a given period of time: an urgent project at work or an emergency related to a baby in the household, for example. The regular academic calendar may be very unsuitable for them, since courses’ lengths are long (several months) and constant dedication is expected. In addition, assessment activities from courses are scheduled and allow few (or no) flexibility options; it is not rare the case of students who fail a course because they had to travel for a couple of weeks and are unable to deliver an assessment activity on time. Therefore, short courses with a lot of flexibility to deal with the potential unavailability of students is advisory for lifelong learning.

Apart from schedule preferences within courses, we should consider also when the courses start. Schedule preferences of students are shaped by their responsibilities. Some may work in shifts of one week and have one week free, for example, and others may have availability just over the summer. Considering this, why academic institutions do not allow them to take the courses whenever they want? Current schedules (mostly aligned with fixed semesters) are, obviously, not the best solution for most people, but very convenient to academic organisations.

Each learner is different, since past experiences shape our knowledge and abilities to the current state. The differences among learners are more noticeable in adults. In addition, lifelong learners do not focus on the learning of just one topic, but many of them, related to the different facets in their life: work, leisure, travelling, family and others. These characteristics make difficult the creation of academic offers

that are suitable for large communities of students. It seems more suitable to create very small courses, focused to cover a given piece of knowledge or a skill. In that approach, it is easier to find out interested learners and the courses can be grouped to create compound courses that deal with a given topic in more detail. Under such structure, students would be able to choose the curriculum they want, avoiding unnecessary courses, taking into account their interests and facilitating to take the courses in the order that better suits their needs.

Since lifelong learning is not a one-shot activity, but rather a long-distance race, the current business model (payment for enrolment) may not be the most adequate. New business models should be considered, models that charge students for the way they use the system, which are affordable, scalable, and with the final goals of making academic organisations sustainable and making lifelong learning a right for everyone. Payment by subscription seems to be an alternative but applying the same recipe for everyone is unreasonable. Some students will make a more intensive use of learning than others; for instance, some students will need little interaction with teachers, while others will need more frequent and specialised interactions, due to the specialisation, the topic or even the background of the student. In addition, some accreditation may be relevant for students when the learning is somehow related with their workplace tasks. Due to these, and other situations, the business model should be flexible and should allow personalisation for each student.

The changes on the business model should consider not only students, but also learning institutions. The dynamism of a student-centred system, as proposed, means to have high variability in the number (and dedication) of the teachers needed for each topic from day to day. Hence, organisations should be able to manage the variant need of teachers in almost-real time and provide smart systems to facilitate such scalability.

5 Towards an educational model for lifelong learning

In order to provide a solution to the mismatch presented in the previous section, we are working in a long-term project to provide, implement and test a model that facilitates lifelong learning in a distance learning environment. The model should be created taking into account the scientific evidence and lessons learnt during the last decades. In this section we provide the main thoughts distilled during our project, commenting the main characteristics an educational model for lifelong learning should have.

The problem cannot be solved just by providing a new pedagogical model: there already exist models for andragogy and heutagogy, but they are rarely applied in real world. We humbly believe that the solution should be more multidisciplinary: a solution that provides the tools (both methodological, theoretical and technological) to deploy an environment where lifelong learning is conducted easily and

conveniently. Such proposal should take into account pedagogy (to promote learning), but also organisational studies (to propose suitable ways to structure lifelong learning educational organisations), business models (to make the proposal sustainable and scalable), user experience (to adapt the model to the students' needs and limitations), persuasive and habits theories (to study how we can motivate students in the new paradigm), informational (to study ways of organising academic offers in small pieces that can be aggregated in other pieces of higher level recursively) and technological (to study how technology, eLearning tools, analytics and artificial intelligence can be used to personalise learning and automate the system as much as possible).

The basic characteristics of the proposed model are:

- Educational resources must be digital, very modular and with small granularity. Since learning may occur everywhere and at any time, they should be designed to be available from any kind of device (smartphones, computers and even personal assistants).
- Learning units (the subjects or courses in the current model) should be modular, with a very small granularity (of a few hours or less) and very interrelated. The interrelations between the different units will allow to define units of greater granularity and complexity, but also to identify prerequisites, related subjects and possible paths that the students can take. These interrelations will have to be shown graphically and interactively so that the student can navigate and understand what there is, and how it is related. Even though all learning units are unique, their challenges and contained topics may be shared. Heutagogy seeks competence, and competence is achieved through repetition. Therefore, it should be relevant to provide different units that deal with the same problem. It will allow students to face a given problem different times, from different perspectives and learn to apply its solution in different situations, promoting its integration in their daily activities.
- Knowledge covered should be as broad as possible. As aforesaid, lifelong learners may be interested in very different topics. A system that provides lifelong learning should provide wide knowledge coverage to respond to the needs of knowledge of students in different topics.
- Students' experience must be integral (taking into account aspects of user experience, pedagogy and psychology), flexible (allowing to begin the courses whenever the student wants), dynamical (allowing to suspend any activity whenever necessary and resume it later), personalised (with the support of analytical tools and technology that allows personalisation), and accompanied (with mentoring figures that accompanies the students throughout their educational experience and that promote empowerment, involvement, good habits and attitude). In addition, the creation of durable practice communities should be promoted, due to the importance they have in learning at different levels (motivational,

knowledge acquisition and professional application). These communities should allow students to act as teachers sometimes. Adult learners, due to their background or experiences, may be experts in some topics. They may be a good asset in the learning of other students, not only for their knowledge, but for their proximity. Their willingness to help others in their learning should be promoted and rewarded.

- Sustainability must be guaranteed through a fair business model adaptable for each student according to their needs and use. Scalability should be provided by a suitable organisational model that provides dynamism and permits to adapt quickly to students' needs.
- A virtual learning environment should provide interaction between educators and students, knowledge management functionalities to make learning units explicit, accessible and usable and should provide smart technologies to support its users in all the trivial tasks. Such system should be a hub that centralises all the relevant tasks but that promotes the use of the communication channels the students are used to work with (Twitter, WordPress, Youtube, etc.). Since the learning should be student-centred, the learning environment and resources should be as close to students as possible. Obviously, privacy, ethical and pedagogical aspects should be considered.
- Accreditation systems that state the acquisition of competences, knowledge and capabilities should be provided, using badges (Gibson et al., 2015) or similar systems.

Summarising, the main characteristics an LLL environment should provide are ubiquity, digital and accessible resources, small learning units (or courses) that can be combined in order to create bigger units, broad topics coverage, the creation of durable practice communities to promote collaboration and collective learning and a personalised system that allows students to learn what they want, when they want and at their pace. The way to tie together all these characteristics is to provide an online learning environment, which is accessible from any device (computer, tablets and cellphones). The online environment is not the goal of the proposal, but a necessary part for providing a ubiquitous and contextual learning in a sustainable way. Therefore, face to face activities are still useful, expected and should be promoted in different ways, such as using the communities of practice.

6 Conclusions and future work

From the perspective of students, lifelong learning requires high flexibility, personalisation and a fair and affordable cost. From the perspective of educational organisations, it requires a flexible organisation to adapt to the students' changing dynamics and to provide scalability and a wide variety of disciplines to offer, since in lifelong and lifewide learning students may want to learn about any topic. Nowadays higher education institutions have a great deal of learning materials,

courses and learning experience about many disciplines, being able to support learning in many relevant topics and at different levels of depth. Hence, they are in an advantageous position to become lifelong learning providers. However, their lifelong learning proposals are based on the regular education they provide and therefore impose many artificial barriers to lifelong learners, such as deadlines, mandatory subjects, inflexibility, long courses, or time and topic-restricted programs.

In lifelong learning, students should be able to choose what they want to learn, how, when, in what order and at what pace. To allow this kind of empowered students, new educational models should be created in order to adapt the learning experience to the lifelong learning students' needs. We believe that these models should be holistic and focus also on non-educational aspects, which should include, at least, an organisational model that determines what are the roles of the different users in the new model and how to manage them to provide scalability; an economical model that provides fair prices and adapted to the real use of the learners; a user-centred model that facilitate, enrich and beautify the interaction of the learners during their learning experience; a psychological model that motivates students to learn and to keep learning; and a technological model that facilitates the integration of all these needs into a system which is easy to use, and that personalises the students' experience and uses analytics thoroughly.

The paper seeks to provide evidence on the current lack of student-centric support to lifelong learning learners and to arise discussion about current lifelong learning programs offered by higher education institutions and whether they really adapt to students' needs, in order to promote constructive thoughts. To do so, the paper presents a motivational case of a real student and her needs to show some necessities that are difficult to address by actual educational programs; then, it presents a detailed analysis of the literature of lifelong learning, heutagogy, self-determined learning and current experiences; it provides some thoughts about needs of lifelong learners and some misalignments that current academic programs have with these needs; and, finally, states a set of characteristics that a holistic lifelong learning model should provide to give full support to lifelong learners' needs. Although some readers may think that the mismatches or the characteristics presented may be naïve and common sense, we humbly believe that they should still be exposed in a clear way and discussed, since they have already existed for many years and there is not clear sign of any improvement in the current educational context.

As further work we plan to develop and implement a lifelong learning model that adapts to students' needs and covers all the desired characteristics stated in the paper. After that, it would be interesting to address how learning analytics should be adapted to lifelong learners, which have very different context, needs and expectations. Therefore, maybe learning analytics should focus more on the discovery of relevant contents to each learner, even on real time (such as providing contents or courses contextually while travelling), the promotion of the success of communities of practice, the promotion of physical activities that help to interiorise learned concepts and to provide information to learners to

increase their self-awareness and, hence, help them to learn more effectively.

Acknowledgements

This work has been partially supported by the eLearn Center through the project Xtrem 2018 and by European Commission through the project “colMOOC: Integrating Conversational Agents and Learning Analytics in MOOCs” (588438-EPP-1-2017-1-EL-EPPKA2-KA).

References

- Aoki, K. (2020) *Technologies for Lifelong and Lifewide Learning and Recognition: A Vision for the Future*, pp.41–52. https://doi.org/10.1007/978-981-15-0618-5_3
- Ashton, J. and Elliott, R. (2007) ‘Juggling the balls study, work, family and play: student perspectives on flexible and blended heutagogy’, *European Early Childhood Education Research Journal*, Vol. 15, No. 2, pp.167–181.
- Ashton, J. and Newman, L. (2006) ‘An unfinished symphony: 21st century teacher education using knowledge creating heutagogies (Review)’, *British Journal of Educational Technology*, Vol. 37, No. 6, pp.825–840. <https://doi.org/10.1111/j.1467-8535.2006.00662.x>
- Blaschke, L.M. (2012) ‘Heutagogy and lifelong learning: a review of heutagogical practice and self-determined learning’, *International Review of Research in Open and Distance Learning*, Vol. 13, No. 1, pp.56–71.
- Blaschke, L.M. (2017) *Self-determined learning (Heutagogy) and digital media creating integrated educational environments for developing lifelong learning skills*, pp.130–140.
- Blaschke, L.M. (2018) ‘Self-determined learning (heutagogy) and digital media creating integrated educational environments for developing lifelong learning skills’, *The Digital Turn in Higher Education*, Springer, pp.129–140.
- Blaschke, L.M. and Hase, S. (2019) ‘Heutagogy and digital media networks: setting students on the path to lifelong learning’, *Pacific Journal of Technology Enhanced Learning*, Vol. 1, No. 1, pp.1–14.
- Candy, P.C. (1991) *Self-Direction for Lifelong Learning. A Comprehensive Guide to Theory and Practice*, ERIC.
- Carr, A., Balasubramanian, K., Atieno, R. and Onyango, J. (2018a) ‘Lifelong learning to empowerment: beyond formal education’, *Distance Education*, Vol. 39, No. 1, pp.69–86.
- Carr, A., Balasubramanian, K., Atieno, R. and Onyango, J. (2018b) ‘The good teacher for the twenty-first century: a “mentoring teacher” with heutagogical skills’, *International Journal of Mentoring and Coaching in Education*, Vol. 7, No. 2, pp.177–190.
- Conesa, J., Batalla-Busquets, J.M., Bañeres, D., Carrion, C., Conejero-Arto, I., del Carmen Cruz Gil, M. et al. (2020) ‘Towards an educational model for lifelong learning’, *Lecture Notes in Networks and Systems*, Vol. 96, pp.537–546. https://doi.org/10.1007/978-3-030-33509-0_50
- Elisabeta, P.M. and Alexandru, M.R. (2019) ‘Comparative analysis of e-learning platforms on the market’, *Proceedings of the 10th International Conference on Electronics, Computers and Artificial Intelligence, ECAI 2018*. <https://doi.org/10.1109/ECAI.2018.8679004>
- Emerson, L.C. and Berge, Z.L. (2018) ‘Microlearning: knowledge management applications and competency-based training in the workplace’, *Knowledge Management & E-Learning: An International Journal*, Vol. 10, No. 2, pp.125–132. <https://doi.org/10.34105/j.kmel.2018.10.008>
- European Commission (1995) *White paper on education and training - Teaching and Learning - Towards the Learning Society*. *Government Gazette* (Vol. 357).
- European Commission (2001) *Memorandum sobre el aprendizaje permanente. Síntesis del documento original*. <https://doi.org/10.5944/reec.7.2001.7335>
- Gibson, D., Ostaszewski, N., Flintoff, K., Grant, S. and Knight, E. (2015) ‘Digital badges in education’, *Education and Information Technologies*, Vol. 20, No. 2, pp.403–410.
- Goal 4. Ensure Inclusive and Equitable Quality Education and Promote Lifelong Learning Opportunities for All. (2018) *A New Era in Global Health*. <https://doi.org/10.1891/9780826190123.0015>
- Gouthro, P.A. (2017) ‘The promise of lifelong learning’, *International Journal of Lifelong Education*, Vol. 36, No. 1. Available online at: <http://mendeley.csuc.cat/fitxers/ef39a8ab48fdf55cae7946d96126822f>
- Graf, S. and List, B. (2005) ‘An evaluation of open source e-learning platforms stressing adaptation issues’, *Proceedings - 5th IEEE International Conference on Advanced Learning Technologies, ICALT 2005, 2005*, pp.163–165. <https://doi.org/10.1109/ICALT.2005.54>
- Harrison, J. and Vanbaelen, R. (2016) *Lifelong learning as a steppingstone to entrepreneurship and innovation*, Institute of Electrical and Electronics Engineers Inc. <https://doi.org/10.1109/IPCC.2016.7740508>
- Hase, S. and Kenyon, C. (2000) ‘From andragogy to heutagogy’, *Ulti-BASE In-Site*.
- Ibrahim, J. and Dahlan, A.R.A. (2016) ‘Designing business models options for “University of the Future”’, *4th IEEE International Colloquium on Information Science and Technology*, Tangier, Morocco, pp.600–603.
- Kettle, J. (2013) *Flexible Pedagogies: employer engagement and work-based learning Flexible Pedagogies: preparing for the future*. Available online at: https://www.heacademy.ac.uk/system/files/resources/EE_wbl_report.pdf
- Laal, M. (2014) ‘Barriers to lifelong learning’, *Procedia - Social and Behavioral Sciences*. <https://doi.org/10.1016/j.sbspro.2011.11.116>
- Liang, K., Caton, K. and Hill, D.J. (2015) ‘Lessons from the road: travel, lifewide learning, and higher education’, *Journal of Teaching in Travel & Tourism*, Vol. 15, No. 3, pp.225–241. <https://doi.org/10.1080/15313220.2015.1059307>
- Louw, W. (2014) ‘Designing learning experiences to prepare lifelong learners for the complexities of the workplace’, *Psycho-Social Career Meta-Capacities: Dynamics of Contemporary Career Development*, Springer International Publishing, pp.307–319. https://doi.org/10.1007/978-3-319-00645-1_17
- Manuti, A., Pastore, S., Scardigno, A.F., Giancaspro, M.L. and Morciano, D. (2015) ‘Formal and informal learning in the workplace: a research review’, *International Journal of Training and Development*, Vol. 19, No. 1, pp.1–17.
- Osborne, M. and Borkowska, K. (2017) ‘A European lens upon adult and lifelong learning in Asia’, *Asia Pacific Education Review*, Vol. 18, No. 2, pp.269–280. <https://doi.org/10.1007/s12564-017-9479-4>

- Ouadoud, M., Chkouri, M.Y., Nejjari, A. and El Kadiri, K.E. (2016) 'Studying and comparing the free e-learning platforms', *Colloquium in Information Science and Technology, CIST*, pp.581–586. <https://doi.org/10.1109/CIST.2016.7804953>
- Pastowski, S. (2004) 'Messung der Dienstleistungsqualität in komplexen Marktstrukturen', *Messung Der Dienstleistungsqualität in Komplexen Marktstrukturen*. <https://doi.org/10.1007/978-3-322-81768-6>
- Platero, M. and Ortoll, E. (2016) 'El factor emocional en la búsqueda de información', *Ibersid.*, Vol. 10, No. 1, pp.23–32.
- Robert, K.W., Parris, T.M. and Leiserowitz, A.A. (2005) 'What is sustainable development? Goals, indicators, values, and practice', *Environment: Science and Policy for Sustainable Development*, Vol. 47, No. 3, pp.8–21.
- Sung, J. and Freebody, S. (2017) 'Lifelong learning in Singapore: where are we?' *Asia Pacific Journal of Education*, Vol. 37, No. 4. Retrieved from <http://mendeley.csuc.cat/fitxers/0de052d1dcd4287a23b944b84a62c9f7>
- Tuckett, A. (2017) 'The rise and fall of life-wide learning for adults in England', *International Journal of Lifelong Education*, Vol. 36, Nos. 1/2, pp.230–249. <https://doi.org/10.1080/02601370.2017.1274546>
- Wantland, D.J., Portillo, C.J., Holzemer, W.L., Slaughter, R. and McGhee, E.M. (2004) 'The effectiveness of web-based vs. non-web-based interventions: a meta-analysis of behavioral change outcomes', *Journal of Medical Internet Research*, Vol. 6, No. 4. <https://doi.org/10.2196/jmir.6.4.e40>
- Wilson, T.D. (1999) 'Models in information behavior research', *Journal of Documentation*, Vol. 55, No. 3, pp.266–268.
- Wilson, T.D. (2006) 'A re-examination of information seeking behaviour in the context of activity theory', *Information Research*, Vol. 11, No. 4.
- Wilson, T.D. (2016) 'A general theory of human information behaviour', *Information Research*, Vol. 21, No. 4, pp.1–19.
- Yousef, A., Chatti, M. and Schroeder, U. (2014) 'The state of MOOCs from 2008 to 2014: A critical analysis and future visions', *Communications in Computer and Information Science*, Vol. 510, pp.305–327.