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Nutrition and health as virtual class at Open University (Portugal): pedagogical strategies for higher education

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Abstract

The Open University is the sole distance learning public university in Portugal. The present paper reflects the work that is carried out in a curricular unit that belongs to the scientific field of nutrition and that is integrated in an MSc degree. The work is based on the pedagogical model of the University and on the process of didactic and pedagogical transposition in the planning of the structure and dynamics of the curricular unit. Distance education now uses the new technologies of information and communication and the process of teaching / learning benefits from a pedagogical model specifically designed to be used with a platform adapted to the needs of the University. The objective of the reflection and of the proposed study, as well as the results presented, was to show that the interaction between students and between the lecturer and the students is not only intensive but is also beneficial for the learning process and the successful outcomes.

Keywords: Nutrition, Health education, E-learning, Pedagogical strategies, Higher education

Introduction

Although the issue of health education is not new it became more urgent in the past few years. Classically, Health Education has been based on the Biomedical Model of health, where the pathologic, curative and preventive conceptions are the main pillars. However, the more recent approach of Health Promotion looks for the identification of healthy habits and for the development of personal healthy decision-making.

Only in the Eastern Mediterranean Region vast resources are spent every year trying to modify human behaviour. If we define Health Education as a social science that draws from the biological, environmental, psychological, physical and medical sciences to promote health and prevent disease, disability and premature death through education-driven voluntary behaviour change activities, than health education acquires a dimension that is impossible to ignore. The purpose of health education is to positively influence the health behaviour of individuals and communities as well as the living and working conditions that influence their health.

According to Vilaça (2008) today a change in the context of health promotion as a consequence of the present world situation is advocated owing to inequalities in health, globalization, environmental changes, urbanization, demographic changes, new and

reappearing diseases, advances in medical science and in information technologies and the role of the State. The strategies of health promotion are directed towards health risks and determinants of health. Health education has changed from a traditional approach of isolated topics, such as diet, drugs, or physical exercise to an approach where health, environment and education are entangled and getting involved in health education requires competences in different areas as well as the ability to relate different scientific subjects and understanding people and their aspirations.

An emergent health issue that is becoming urgent to tackle are the chronic non-communicable diseases. The early development of chronic non-communicable diseases has represented the greatest concern in the health prevention in all countries (Tkac, Fridlund, Moyses, Werneck, & Moyses, 2017). In this particular aspect of health problems, nutrition has an important role to play. In Portugal, excessive weight and obesity are among the risk factors that contribute most for the health problems among the population (SNS – Serviço Nacional de Saúde, 2016). Nevertheless, there are other health problems related with nutrition such as diabetes type II, hypertension or certain types of cancer. In this way nutrition education is part of health education and it may give a significant contribution to help solving many health problems.

Nutrition education may be said to be any set of learning experiences designed to facilitate the voluntary adoption of eating and other nutrition-related behaviors conducive to health and well-being. The Portuguese strategy for the Promotion of Healthy Eating, set by the Portuguese government in 2017, identifies a broad group of measures of health promotion and disease prevention (SNS – Serviço Nacional de Saúde, 2018). It is well known that eating habits are a part of any lifestyle and that the dietary pattern of adolescents is one of the major public health concerns, because there is a direct link between poor diet and chronic diseases (Naserpoor, Zamani –Alavijeh, Shahri, & Malehi, 2018). This is the major reason why nutrition education should start early at school and be extended to adult education so parents may reflect in their family good eating habits learned at higher education.

Nutrition/food education may be done in many different ways. National academic curricula for the 6th grade schools in Portugal includes basic principles of nutrition. The University of Oporto was the first higher education institution in Portugal to introduce a BSc in Human Nutrition (in 1976) evolving later to postgraduate degrees. Other higher education schools followed in the teaching of nutrition or dietetics but at Universidade Aberta (UAb) (the Portuguese distance learning University) nutrition education started in 1997 and because of the nature of distance learning immediately proved its ability to reach a vast number of formal and non-formal students.

This work highlights in detail the pedagogical and didactic structure carried out in the curricular unit Nutrition and Health that belongs to a master's degree and that potentiates the teaching work in the planning and development of the pedagogical design for student learning. The specificity of the analysis presented here is exactly in the pedagogical model used at Lisbon Open University, validated and scientifically applied over 10 years of experience. Some studies in the same area were done by Miller (2016), Spielmaker et al. (2018) and Wengreen, Litchford, and Graff (2015).

Methodological procedures

Based on the goals of presenting elements and characteristics of the planning, development and evaluation of a curricular unit in the area of health in the online modality of

distance learning, this study is justified by the importance of having references that help to build up practices and scientific scenarios in the area of the online teaching between researchers in a network and in a collaborative spirit.

The specific goals are: to reflect on the possibilities of involving the teaching community in the problem of health education, and to reflect on the major themes that are important to include when embracing health education and to decide on the best approaches to make the message effective.

The methodological options of this case study were based on a diversity of strategies to collect information, favoring both qualitative and quantitative aspects, given the complexity of the study object (Merriam, 2009; Yin, 2005, 2010).

The Lisbon Open University (UAb) is a small institution, but it has a pedagogical model that is recognized as being the first e-learning model in Portugal and in Portuguese language. The e-platform in use is Moodle 3.0 customized for the University's pedagogical model, where 150 teachers attend around 10,000 students in all Portuguese-speaking countries around the world. For the purpose of this study data collection included the records of interaction of the unit "Nutrition and Health". As for the profile of these students, it can be said that most of them are over 30 years old, they are students with a professional life and they are also parents. The relationship they establish with education is very clear and aims to help them growing as professionals as well as culturally.

The theoretical referential used was drawn from the scientific areas of health and online education, education and technologies, collaboration, networks and learning scenarios. The reflections and discussions focused mainly on the use of the online environment and on the organization of the unit, and especially on its development.

Pedagogical model in virtual class: the Portuguese distance learning model

The Lisbon Open University Pedagogical Model is based on four main lines: student-centered learning, flexibility, interaction and digital inclusion. These lines conduct the organization of the teaching methodology, the role of the student and the teacher, the planning, the design and management of the e-activities to be proposed to students, the type of materials to be developed and the nature of the evaluation of acquired skills (Pereira, Mendes, Morgado, Amante, & Bidarra, 2007). In the particular case of UAb the pedagogical model is based on prime e-learning, using the Moodle platform adapted to the Institution. For undergraduate programmes its organization is based on the following elements:

The Curricular Unit Plan, which can be called the guiding document of the learning process. There the student finds the goals to be achieved, the skills to be developed, the contents and resources that will be used for the acquisition of competences, the calendar and the methods of evaluation.

The training activities are the set of small works that aim at helping the student to develop their tuition. They are not evaluated or graded. On the contrary, they are meant to be self-corrected by the student himself having the evaluation indications available.

The e-folios are the activities carried out during the semester to which a marking grade is given. There are at maximum three of these grading activities and they are designed according to the contents of the Curricular Unit. The strategy of using e-folios is part of the continuous evaluation that is aimed for a more fruitful learning scenario.

The Work Forums and the **Forums for study questions** are a way of communication, dialogue and reflection regarding the contents studied. They put in contact class students and the lecturer as well as students among themselves.

Continuous evaluation and / or final exam are the modalities of evaluation that each student may choose at the beginning of each semester in each course unit. Those who choose continuous assessment should carry out the e-folios and a p-folio (final proof). Those who choose to be assessed by a final exam don't have to handle to the teacher the e-folio works.

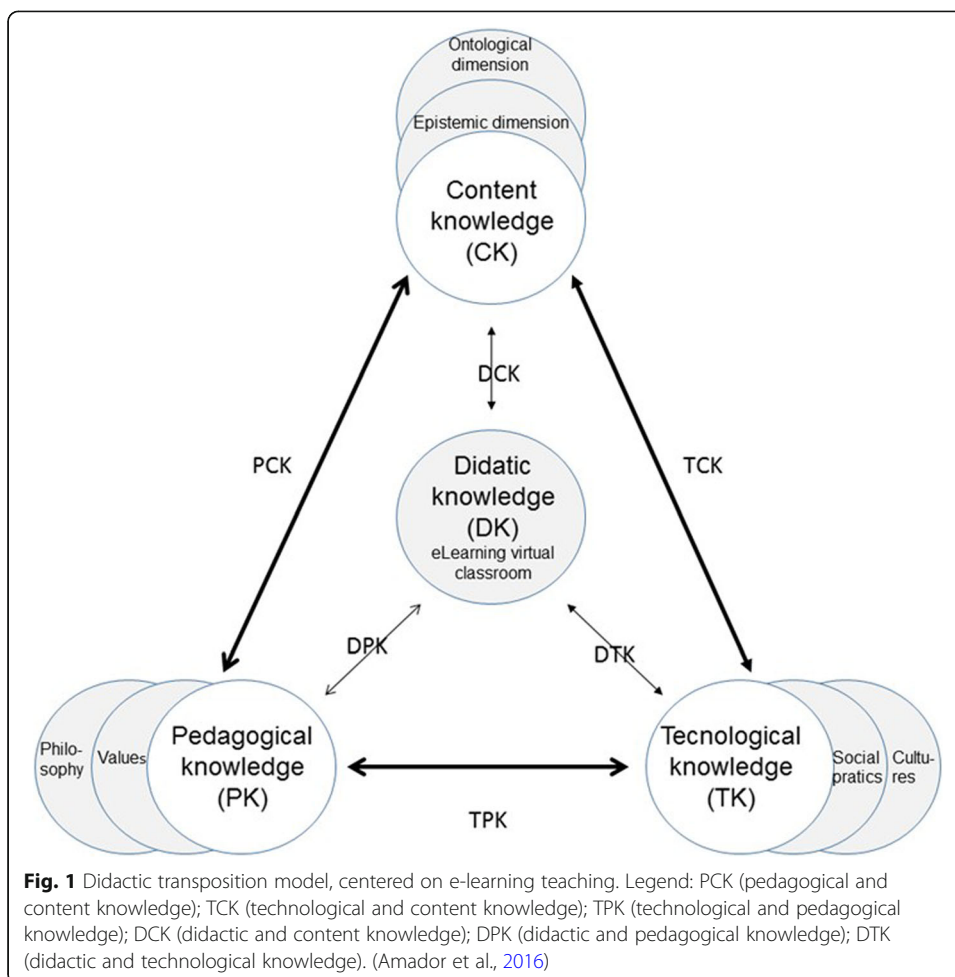
All the work developed within the model of Open University (UAb) is reasoned in the student learning goals. It favors a high quality education that is open and asynchronous.

For post-graduation courses the design of curricular units is somehow different. This happens because, in these specific cases we are dealing with the deepening of knowledge and with students which already passed their basic studies and want to get specialized in a certain field. Although the Pedagogical Model in use is still the same (centered on the student, flexible and autonomous) the process of teaching and learning is more intensive and the five elements present in the undergraduate programmes are somehow different. Instead of a Curricular Plan there is a Learning Contract and instead of e-folios and final exams there are a set of works along the semester.

Fundamentals on pedagogical drawing online

The teaching skills of the twenty-first century are in a dynamic change; the use of digital tools allows innovation in education, the pedagogical dynamics are coordinated with the new technologies, and offers a new meaning in the relationship between teacher and student, especially in the teaching and learning process (Maneira & Gomes, 2016; Wiebe & Taylor, 1997). From this perspective, the conceptual and theoretical framework proposed by Amador, Nobre, and Barros (2016) is particularly suitable for the rethinking of praxis (practice / theory / reflection). Thus, from the suggested didactic transposition model (Fig. 1) where the central circle (Didactics of eLearning - virtual classroom) is connected to the three vertices (PK, CK and TK) the tetrahedron, which works integrated inside other dimensions and is configured as conceptual and theoretical guidelines in a multidimensional, integrated and integrative perspective of knowledge (and competences) that should integrate the pedagogical practice of teachers.

In Fig. 1, the letter "C" indicates the knowledge of the content, the conceptual knowledge of the teacher and the respective ontological and epistemological dimensions, that is, the teaching work with the selection of contents, objectives and competences to be acquired by the students in the conception of the contents and the approach addressed therein. The letter "P" stands for Pedagogical knowledge, values and philosophies. As the pedagogical strategies of the teacher are based on learning theories and enable the knowledge of students, recognizing them at the same time in their characteristics and difficulties through evaluation dynamics. The "T" refers to the technological knowledge, the knowledge that the teacher has to operate computers, Internet network, software and hardware, for example, allowing to contemplate differences in students and provides appropriate experiences to different cases. At the heart of this model is the interdependence between Didactic, Pedagogical and Technological knowledge and teaching / learning in the form of distance learning and eLearning.



The pedagogical design of the nutrition and health virtual class

Within the structure of the online pedagogical model and the didactic transposition model, centered on e-learning teaching, we highlight the work developed in the Curricular Unit (CU) of Nutrition and Health, based on the perspectives for a structured teaching and learning process with a pedagogical design centered in the student. Planning is done annually before the beginning of each academic year. For this purpose there is a CU in the moodle platform named matrix where the teacher inserts new documents or links and updates study contents. After this phase, the CU is duplicated and made available to students at the beginning of the semester. This structure developed in the matrix follows the pedagogical model, and has great flexibility to be designed, thus meeting the diversity of students. Above all, at Open University the pedagogical thinking prizes the possibility to enable students to surpass any possible learning barriers and difficulties that they may feel and that will hinder the process of teaching and learning (Barros, 2016).

The practical cases are prioritized in pedagogical strategies, more active actions by the students, highlighting elements that facilitate the mobilization of scientific knowledge. These strategies can be perfectly worked online with problem solving methodologies or case study methodologies (Barell, 2007; Delisle, 2000; Nilson, 2010).

Problem Based Learning (PBL) arises from the fact that there is a dichotomy between training and professional practice. The new teaching methodologies aim to replace

processes of memorization and transfer of unidirectional and fragmented scientific knowledge, through self-learning, where active learning processes are emphasized, capable of developing different competences in the students of higher education.

In the online context, the difference between synchronous and asynchronous strategies is essential for the constitution of these students' training processes. Asynchronously, the difference between time and space, the personal conditions and the organization of the studies is privileged, and the synchronous is characterized by virtual presence and immediate interaction (Mello & Barros, 2015).

As referred before this a unit belonging to an MSc degree which means that its structure is somehow different from those integrated in BSc courses. Within the pedagogical model in use there is still a lot of freedom for teachers to build their own units according to the specific needs of each subject.

For the Nutrition and Health unit the process of teaching / learning is based on written texts, videos, website links and discussion forums. For each chapter that composes the whole unit students have compulsory readings selected by the lecturer about which they should reflect upon and later discuss in the forum.

The unit is taught online and lasts for one semester. Its programme includes (i) Health Concepts, (ii) Diet and Food Patterns, (iii) Obesity, (iv) Nutrition During Pregnancy and Lactation, (v) Nutrition for the Elderly, (vi) Nutrition and Cardiovascular Diseases and (vii) Nutrition and Diabetes. Within each one of these major themes, subjects are divided into chapters that deepen the knowledge by studying in detail various aspects that are important for the construction of a solid academic curriculum.

Although the unit is an integrant part of the MSc course it is also offered to non-formal students that want to learn this particular subject. The only academic requirement is that they already have a BSc.

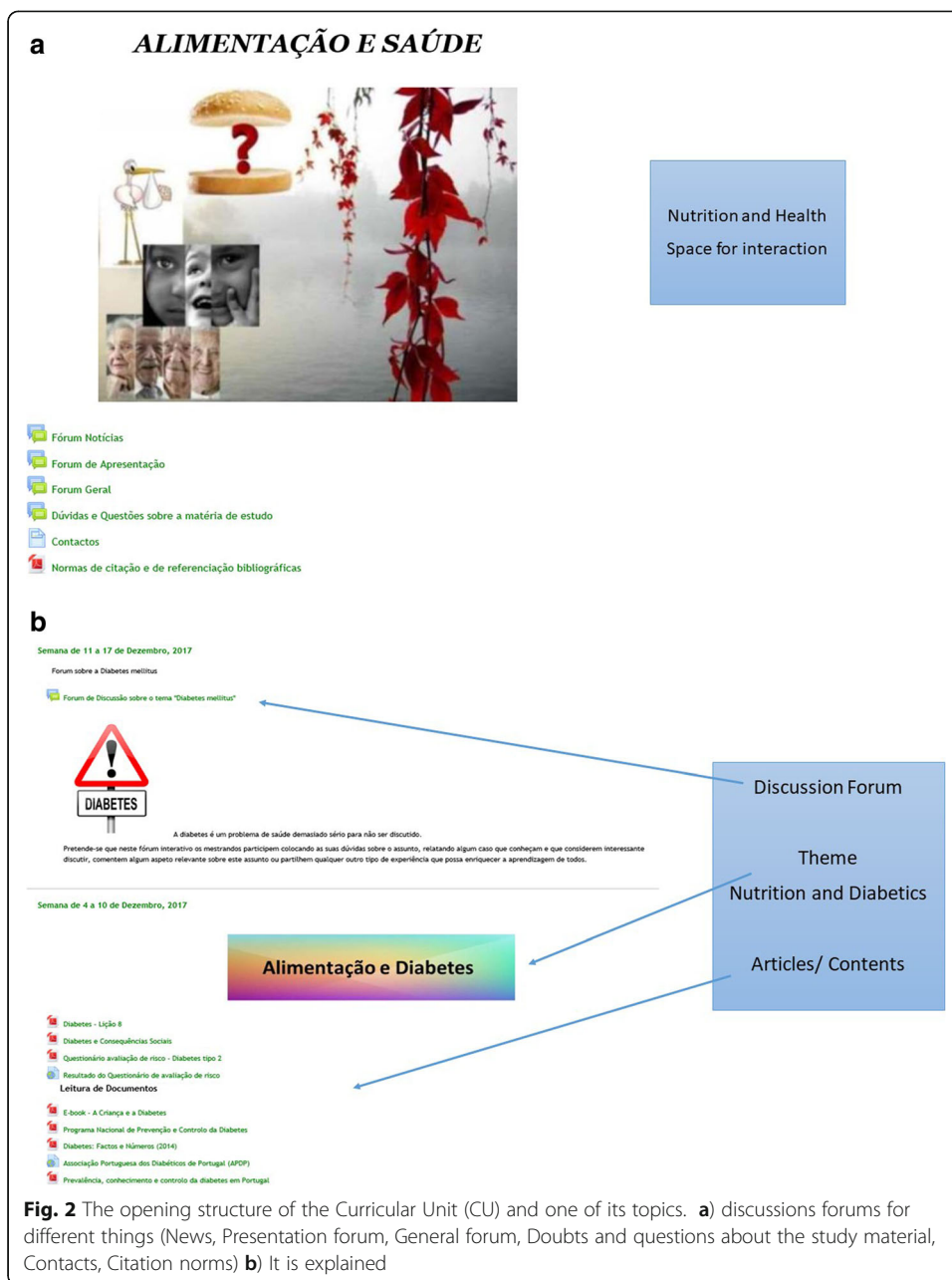
Next in Fig. 2 we can observe the opening structure of the Curricular Unit (CU) and one of the topics of the weeks of work in the semester.

The online teaching of the Nutrition and Health unit may be seen as a case of success if we measure it by the willingness of students to attend the unit, by the success rate at the end of the semester and by the participation of students during the teaching/learning process. The use of the new technologies give our students an insight of what is happening in different countries, how the world is coping with different health problems related to nutrition and how different cultures are dealing with the same problem. In addition, Portuguese people are spread all over the world having set since historical time's communities in different parts of the globe. Moreover, Portuguese is the sixth most spoken language and because of that, our students come from very different regions of the world. This adds a supplementary interest in the distance learning since students can exchange experiences that are extremely different although they still share a common cultural background.

The pedagogical and didactic design of the Curricular Unit (CU) is structured according to the mentioned transposition model. We now proceed to detail the design, its structure and the interaction of the student with the process of teaching and learning (Table 1).

Results and discussion

Tem MSc course where the curricular unit Nutrition and Health is integrated owing to different policies only accepts 15 students each academic year. The unit Nutrition and



Health is an optative one and in the academic year 2016/2017 from the 15 MSc students 11 have chosen attend this unit.

Before the analysis of the results it is important to recall that all the students enrolled in the unit Nutrition and Health are part of an MSc degree and that all of them are adults, are already in the working market and have families to support. These aspects are important because students have to be able to coordinate their time and efforts to attend successfully to all aspects of their lives. Not all the students that attend this unit are health professionals. Some of them just want to learn more about the subject as a way to promote their own culture and in that way to be able to improve their life quality. Table 2 shows the professional profile of the students included in this study.

Table 1 Structure and the interaction of the student with the process of teaching and learning

Model of didactic transposition (Amador et al., 2016).	Pedagogical and Didactic Design of CU	How the student interacts
PCK (pedagogical knowledge and content);	<p>In the structure of the CU the materials available are: texts, questionnaires, books, links, ppt files, and videos. All these materials have contents related to the proposed themes according to the objectives and competences to be acquired by the students. The selection of materials was based on the concepts, characteristics and contextualization of the study chapter. In the unit "Nutrition and Health" the curricular plan starts with an introductory week where students have access to 5 videos that explain the functioning of cardiovascular and circulatory system, digestive system, the liver and the heart. This is important since our students come from different backgrounds and not all of them are familiar with these human vital processes. Also in the introductory week students have access to the link for the e-books that make part of the compulsory bibliography for the study of the curricular unit. Then, in each week, a new module is introduced and in each module students have access to a lesson written by their lecturer where the core of the study subject is explained. These lessons are important documents since the lecturer puts in a written text what he feels is the most important for students to understand, memorize, relate with other subjects, etc. Apart from these lessons there are always recommended readings which are scientific papers about the most recent research connected to what is being taught. Links to recent TV programmes where certain topics have been discussed are also made available, links to professional sites are provided (ex. The Diabetics Association), documents in ppt format so that images may help explaining concepts and within the ppt links to sites of interest make also part of the study material of the CU.</p>	<p>The student has a period of time to explore and study the materials according to the schedule of the CU. For this guidelines are provided on how to use, what to explore and how to read and analyze the experience in using the material made available for the learning process.</p>
TCK (technological knowledge and content);	<p>When structuring the CU the interfaces, tools, applications and software used are of common and open use both for platforms and web 2.0. These selected applications should facilitate and minimize learning barriers in relation to the intended content.</p>	<p>Students have a literacy level in the use of the available apps that enables them to learn in an autonomous way. It is worth mentioning that at Lisbon Open University at the beginning of a degree students always carry out an Online Adaptation Module where they develop competences to use in the specific learning environment of the informatics platform that the university uses.</p>
TPK (technological and pedagogical knowledge)	<p>The use of technology in a pedagogical way, or better said, the making of these tools as didactic instruments, applications, interfaces and software is a type of work that is differentiated in the online courses. This process is based on what Barros (2017) analyzes as Form and Content of these technological services, that is, the technological format and what kind of service this technology offers to the user, and the transposition to the pedagogical use for the teaching and learning process.</p>	<p>Students using technology learn making use of different experiences and interactions that require different kinds of efforts in the process of learning.</p>
DCK (didactic knowledge and content);	<p>Strategies, teaching methods and learning resources require a constant assessment as well as accuracy in their coherence and cohesion. This might be one of the most important</p>	<p>Students produce learning outcomes from the combination of learning strategies with the content available.</p>

Table 1 Structure and the interaction of the student with the process of teaching and learning (*Continued*)

Model of didactic transposition (Amador et al., 2016).	Pedagogical and Didactic Design of CU	How the student interacts
DPK (didactic and pedagogical knowledge);	<p>aspects in this type of learning process.</p> <p>Both should be responsive to facilitate student's learning. When choosing a pedagogical design, the didactic knowledge must be in the efficiency of the processes through the methodology and the structures used. The coherence of this is shown when students are able to learn in different ways and are also able to gradually find solutions to problems, questions or challenges.</p>	<p>Students understand what they have been guided to, choose how they want to do their learning progression and act in response to what is requested with the written works produced.</p>
DTK (didactic and technological knowledge).	<p>The use of technologies to guide the didactic strategies is carried out from what is expected of the student's goals and competences. So any strategy includes technologies that promote different learning scenarios online, individual, collective and collaborative or in a network.</p>	<p>Technology is provided as a pedagogical path to be used in the learning process. These tools use the content and form of applications, interfaces and other instruments to facilitate the outcome of difficulties in the learning process.</p>

Adapted from Amador et al., 2016

Table 2 Students profile attending the unit Nutrition and Health in the academic year 2016 / 2017

Previous Academic Degree	Professional Area
BSc in Food Engineering	Food sanitary security
BSc in Social Sciences	Social worker
BSc in Environmental Sciences	Health area
BSc in Economy	Distribution and sale of frozen food
BSc in Chemical and Biological Engineering	Maths professor in secondary school
BSc in Engineering in Management and Planning	Institute of Port Wine - administrative control management area and wine tester
BSc in Agro-food Engineering	Food Hygiene and Safety
BSc in Human Nutrition	Nutritionist
BSc in Management	Director of Computer Systems
BSc in Environmental Sciences	Consumer Directorate
BSc in Environmental Engineering	Environmental Management Systems

With the pedagogical and didactic design applied throughout the semester, the results of the interaction of the students were very positive. They have actively participated in discussions and were regularly present in the virtual classroom. The unit is updated every year at the beginning of the semester and new cases or reports are introduced in the discussion forums whenever some important news or research happens. Sometimes the students are the first ones to bring these new subjects to the discussion forums.

In the academic year of 2016/2017 the unit was attended by 11 students and the works that they had to comply for their evaluation included: (i) two interactive forums, (ii) two written works as publishable papers and (iii) one test on-line. Interaction in both forums were 100% participated by the students with 44 messages.

Teacher participates in the forums if they are not an evaluation activity. In these cases teacher not only promotes discussions as intervenes as a moderator or to clarify concepts. If forums are an activity to be evaluated teacher only determines the theme to be discussed and in the end will comment each student intervention. One of the interactive forums to be evaluated asked students to “write a reflection on one of the themes discussed in the topic Food Patterns”. Students were allowed to introduce in the discussion new food patterns that have not been discussed in the study materials. This is especially useful since we have students from different parts of the world and they may have or have been in close contact with food patterns that are less well known.

The most participated forum was the one where students may freely interact with questions or news (not to be evaluated) which had 117 messages (not including teacher’s messages). However, it was very relevant the interest and the interaction that happened in the forum dedicated especially to Diabetes. Some students reported to have cases of diabetes in their families and asked different types of questions about how to deal with specific situations. Other students helped offering indications of medical research or news of what was happening in other countries. This forum was opened during 1 week and had 25 questions / answers. This discussion forum helped students to understand better this health problem and they have deepened their knowledge through the discussions.

Written works serve different purposes:

- a) they allow students to make some research on their own about the proposed subject
- b) incite students to a deeper reflection of the theme
- c) help students to present their thoughts in a coherent form

After correcting these works the lecturer interacts with each student through private messages, although still using the teaching platform. This interaction between teacher and student serves for the former to make constructive comments about the work handled and to explain where the students have failed or what should be improved in the next work.

The introduction of a test online serves the purpose to force students to face what they really know as opposed to what they think to know. This type of test falls upon fundamental concepts that must be well cemented to understand the whole unit.

Table 3 summarises the interaction between students and teacher as explained before and other pedagogical results of evaluation.

In addition to the results here mentioned, concerning the interaction and participation of students, we may say that the deduction capacity of the students was enhanced with the model of didactic transposition and the interaction was increased. In this specific case, the inference in the communication spaces, besides interaction and participation, could however have been greater which encourages us to implement new adjustments to enable students to contribute more using posts and build knowledge in a more collaborative way.

The asynchronous work model facilitates the interaction and continuous participation of students through their own dynamics. In addition, it allows a process of adaptation to pedagogical strategies and online collaborative work different from synchronous models that establish a moment of greater interaction but without a continuous process more intense. Therefore, the advantage of asynchrony lies precisely in facilitating long-term work for the establishment of sustainable interaction and collaboration processes.

Final considerations

E-learning remains a challenge for all areas of knowledge. At the same time it breaks paradigms, brings innovation and new perceptions in pedagogy, thus facilitating an alternative process of teaching and learning. The experience here reported, based on the didactic transposition model for online teaching, has emphasized in its essence a didactic and pedagogical structure that facilitates learning and the construction of scenarios for online students.

Table 3 Summary of interactions in three discussion forums during the semester curricular unit “Nutrition and Health”, academic year 2016/2017 number of students enrolled in the unit = 11

Free interactive forum (questions/doubts/news)	Interactive forum on “Food Patterns”	Interactive forum on “Diabetes”	Two written works as publishable papers	Test on-line	Pedagogical Results
Total number of posts = 117	All students have participated. Total number of posts = 19	All students have participated Total number of posts = 25	All students have participated The interaction remains private between teacher and student.	All students have participated Faces students with their own knowledge about fundamental concepts.	All students finished the unit with grades ranging from 50% (1 student) up to 90% (mean = 69.54%).

We have presented the elements and characteristics of pedagogical design of a curricular unit in the field of online nutrition. The importance of sharing these experiences and constructions in this area results from the significant work for the area of nutrition and health teaching. With this model an effective teaching and learning process may be taken to several parts of the world where there is a need to educate adult population without having to make them to choose between their professional and family lives or going back to university to improve their knowledge and self-confidence.

The contributions of the study presented here facilitate the reflection on the interaction processes in the didactic design and the value of this process in the teaching and learning work. The highlight is on communication and on the relationships between contents – didactics – and – technologies.

In another opportunity these elements should be deepened and expanded in the discussions in this context.

Abbreviations

CU: Curricular unit; UAb: Universidade Aberta, the Portuguese Open University

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Authors' contributions

Both authors have contributed to the present work with the same amount of relevant work and expertise. Both authors read and approved the final manuscript.

Competing interests

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