MAKING EDUCATION THROUGH INTERFACE (CULTURE): THE EXPERIENCE OF FEDERICA WEBLEARNING

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Abstract

This paper aims to investigate the role of digital interfaces in learning environments on the Net. As the technological infrastructure for accessing the web has improved, and as use of portable devices has become more widespread, so the focus of research and construction of “operating environments” has changed. Over the last two decades, there has been a move towards creating tools that embody and reflect the processes of learning. This can include video lectures, or study groups on social networks. There are also platforms whose structure reflects a specific approach and method of teaching and learning.

Interaction on these learning environments has gradually moved from limited interaction with a form of repository, where the learners / users could simply download some files, to more interactive dimensions, through the use of community forums or chats.

The increased complexity of the learning objects favored routes with different levels of inter-modularity: texts, images, video and audio products, links - in the usual philosophy hypermedia Network - interact with each other, offering to the users real operating environments in which they can study [1].

Even in e-learning processes, digital interfaces place themselves not only as access ports, but also as real places of action, and true “cultural interfaces”; network environments in which new roles and behavioral shapes are formed and encoded [2; 3].

This analysis will focus on the MOOC phenomenon that has exploded globally in recent years as a new technology for advanced learning (TEL, technology enhanced learning).

Starting from an observation of the major MOOC providers at the international level, the paper will present the experience of Federica WebLearning, the open access MOOC portal of the University of Naples Federico II. Starting with the seamless interface developed by Federica, in comparison with other providers, we will propose a first analysis of its main characteristics, in order to investigate some of the cultural and educational approaches underpinning the Federica learning environment.

Keywords: Weblearning, interface, culture, MOOC, teaching environments.

1 LEARNING ENVIRONMENTS

In order to analyses how a given individual learns something we need to focus on his or her specific characteristics (physical, cognitive, psychological and cultural) as a human being. However, other elements, such as spaces and places wherein the learning process occurs, must also be considered. It is not uncommon today that traditional ‘physical’ educational environments such as classrooms are used together with new ‘digital’ spaces, something which is made possible by high-speed Internet services. Distance learning, for example, is intrinsically based on the delocalization of learning spaces. Surely, correspondence learning has existed for decades, but distance learning has become much faster today than in the past: you only need access to a search engine displaying all online courses opportunities and you can start learning immediately.

There is a rich literature exploring the characteristics of different learning methods, especially centred on the main features of presence-based learning processes as compared to in absentia and blended methods [4; 5]. However, we make the point in this paper that the configuration of different learning spaces is something of major importance for understanding the educational process. Instructional design and learning design are generally applied when learning environments are planned and realized, with classrooms’ objects (chairs, desks, blackboards) being designed to be positioned to facilitate both teacher-student and student-student interactions.
This becomes of particular interest when virtual learning is considered: how can learning spaces be designed in the absence of physical objects and structures, and when teachers and students alike can predominantly interact only through a computer screen (laptop or desktop)? Nowadays, interaction spaces are characterized by ‘mediating artefacts’ [6], e.g. icons, app, software, windows, menus and cursors. WIMP (Windows Icon Menu Pointer) interfaces regulate individual activities such as work, entertainment, and learning. The diffusion of touch devices has brought about a new element of direct interaction which relies on the innate inclination of human beings to ‘touch’ things and use their hands in their daily activities. The digital ‘extension’ of the human hand, the mouse, has now been abandoned; the ‘tap’ has substituted the ‘click’, the ‘pinch’ has replaced the ‘zoom’. Digital elements can be enlarged, rotated, modified by simply using a finger and, potentially in the future, by voice command. It can be said that learning methods and processes are profoundly affected by these new spaces of interaction [1], that can be looked at as the two extremities of a continuum: interfaces programmed to enable traditional learning processes, on the one hand; interfaces introducing new learning models and methods, on the other. It should also be reminded that students represent a major element in this process, with their personal traits, learning methods, mental processes, cultural backgrounds. In fact, interfaces can be considered instruments of cultural mediation which allow individuals to create, access and share culture [3]. As early as 1963 Carroll [4] identified a number of variables influencing learning achievement levels: perseverance, amount of time spent on learning activities, education quality, learning attitude and ability [5].

Among others, instructional design (ID) provides different learning models. ID is centred on learning processes, rather than teaching methods. As a consequence, learning targets and learning modes are the major elements driving the overall project, including its graphic design, with the student ‘variable’ being put at its very core. There are a number of different ID models, being directed either at a short-term activity (e.g. a single day activity) or at a long-term teaching plan. Also, ID can be addressed to a single individual or to a group of experts from different backgrounds. Eventually, different graphic options can exist referring to the same ID model. However, ID should be considered as an ongoing, evolving process with users’ feedbacks driving its continuous improvement. A further element that should be kept in mind when considering the challenging nature of interface design and ID processes is the affordance of interaction spaces [6]. Any given environment (physical and digital alike) provides individuals with opportunities. However, it is the individual who must grasp them, drawing upon his or her own experiences, values, abilities, perceptions, and cultural background. Individuals’ interaction through digital interfaces is predominantly driven by the graphic ‘space’ offering a set of activities and instruments to the user. This interaction is made possible through contextual self-learning mechanisms (e.g. I can learn how to move into a given space whilst moving), or through experience (I recognize the elements of a given environment from my past interactions in other similar environments). These aspects are characteristic of most information operating systems and interfaces which generally have similar methods of interaction (yet we expect apps of a touch device to work with a single ‘tap’ of our fingers while we know from experience that desktop-like systems require a double click of our cursor to function). Not incidentally, the interfaces of the very first operating systems would use the ‘desktop’ metaphor: a working space with recognizable tools from our daily life [2].

As for e-learning, generally most courses use a specific model of students support in their learning process. This includes a table of contents, with chapters/unities subdivisions, tests, and links to further courses of interest for the student, the objective being that of encouraging continuous education. Online courses present both content (information) and educational methods (techniques) through which students can learn [9]. However, while a general common learning structure characterizes most e-learning courses, there are several different interfaces models. The following sections are dedicated to comparing two models in particular and their differences in terms of interaction and learning opportunities.

2 THE MOOCS

Different subjects may require different instruments. Take the case of a HTML programming course. The platform of this course could provide the student with an integrated editor allowing him/her to practice while learning and to see the result immediately (this is the case of Codeacademy).

Multimediality and interactivity in learning processes have been at the center of several studies, most of which are supportive of their role in general [11; 12; 13; 14; 6]. In a nutshell, and drawing upon one of the multimedia principles, it can be stated that explanations with words and images are much more effective in terms of learning as compared to explanations based on words alone [6]. Images may
have a critical role when designed as an integration to the text’s content, rather than a simple visual representation of textual information or its substitution.

Also, multimedia learning cognitive theory maintains that individuals process information via two different channels [ibidem], one for visual representations and another for verbal representations (Figure 1).

![Multimedia learning scheme based on cognitive theory. (Mayer 2009:61).](image)

Having clarified the positive role of a multimedial approach in learning environments, we can now examine a number of cases of this kind. Online learning is currently dominated by MOOC, Massive Open Online Courses [15], and a number of providers, public and private, which host these contents. Online courses are constantly growing in numbers since 2011, with a peak of almost 4500 courses in different subjects being recorded in 2016 [16]. The major providers [17] in this sector and by number of courses provided are Coursera (founded by Stanford University), edX (MIT and Harvard University), and FutureLearn (Open University).

The majority of online courses are linked to existing university courses and are primarily produced by providers’ partners but there is an increasing number of work-oriented and professional courses (coding, design, music, photography etc.).

The main distinctive trait of MOOCs is their orientation towards their ‘massive’ diffusion component, first and foremost their emphasis on the co-participation of students in the learning process [18]. Discussion ‘rooms’ and peer-reviewing tools are included in these platform, the underlying idea (derived from the connectivist theory of Siemens, [19]) being that discussion among students can improve individual learning attainments. Courses are either free of charge or fee-based depending on the specific case while verified certificates of successful completion of the course are generally charged.

We now look at the interactive environments of these providers in a comparative manner. Home pages are designed so to suggest a number of courses (or learning plans) to their users. Available courses are listed as a ‘catalogue of products’, with the name of the provider (e.g. University of Michigan), the title of the course, and its current state (open, close, planned and future dates) being displayed. Searchability – a distinctive feature of the Web as well as of smartphones and tablets (as is the case for iOS’ Siri system or Google search options for Android smartphones) is also included in these platforms: a search box is added to the home page and users navigating through the web site can always find the search engine at the top of the page, together with the provider’s logo, a quick menu and control buttons to the main options.

Detailed information for a given course are also very similar regardless of the provider taken into consideration. Information includes contents, name of the instructor, whether a certificate can be requested. Further information on potential ‘pre-requisites’ can be displayed, as well as information on the expected level of commitment the course requires. Given their expected massive diffusion,
MOOCs allow users to review their experience with the course, something that can help prospective students to have an overall idea of its main characteristics (Figure 2).

![Figure 2 – Courses’ feedbacks and comments page on edX.](image)

However, only Coursera and edX have this sort of reviews while FutureLearn has none. Both in FutureLearn and Coursera a selection of courses is displayed and recommend to the user based on his/her interests. This is essentially a promotion strategy that should nevertheless be briefly discussed. Courses are generally offered free of charge, with sponsors and/or organizers investing in the project and profits being essentially derived from certificates of successful completion of the course purchased by users.

Incentivizing users to join other classes is therefore part and parcel of an economic strategy which is also pursued through ‘specialization’ suggestions (Figure 3; xSeries for edX), offering a ‘course package’ (between four and nine in the case of Coursera) at a special price.

![Figure 3 – Top Specializations and their categories on Coursera.](image)

We have concluded the tour of our virtual school’s hall. We have looked at notice boards, lists of planned courses (and their schedule), lessons’ plans, costs and teachers. We have also had a
glimpse into the course by watching its trailer, to use the movie jargon. Information has been transmitted through text, images (a course’s cover) and audiovisual elements (trailers). Now we must make the most important step for understanding interfaces and instructional design and join our class.

2.1 Coursera

Coursera’s graphic structure is tree-shaped. On the left side, there is a menu displaying the contents of our course (which are divided by Weeks), exercises, discussion forums and resources. By selecting one of these elements, the requested content is displayed (Figure 4). Vertical scrolling allows us to navigate through the page and we can access our learning space by entering our class.

On the left side, we still find our menu but it now displays the different types of contents for this specific lesson (again this menu has a tree structure). Contents’ categories are represented as icons so that user can become familiar with the graphic representation of these objects. A ‘written page’, for example, is used to represent textual contents; the ‘play’ icon indicates that a video is available; a ‘star’ icon refers to activities, such as a test (figure 7). Each of these icons also displays information concerning its duration. By accessing our video contents, the selected video is displayed on the right side of the web site (the main area of the site which occupies 4/5 of the browser’s window) together with its interactive transcript. Of particular interest for our discussion is the presence of a graphic/numeric element in the section ‘Course Home’ which summarizes the student’s learning schedule, divided into different categories: ‘videos’, ‘readings’ and ‘other’.

Figure 4 –Navigation interface of Coursera with the Course content menu on the left side which gives access to lessons, resources, and exercises.
Video transcripts allow students who do not speak the language used in the course to understand its contents. The user can click on a sentence of interest and jump to the relevant minute of the video track. Videos in the course are designed as *life-sharing* [20] elements; they can be appreciated (thumb-up icon) or depreciated (thumb-down icon). Videos and transcripts may also be downloaded. Once the individual content has been used by the student, he/she must click on the ‘mark as completed’ button so to signal that this part of the lesson is now concluded. This mechanism adopts the rules of *Gamification* [21]: by marking all sections as ‘completed’, the user may unblock a number of quiz and eventually complete the course (and possibly request its certificate).

2.2 edX

While Coursera is characterized by a vertical scrolling structure (you can access contents by scrolling the vertical menu), edX displays a double navigation structure (Figure 9). As in the case of Coursera, we find a tree content menu on the left side of the screen but there is also a horizontal navigation bar on the right side of the site (3/4 of the page) which gives access to different types of learning materials for the lesson. Also in this case quiz, texts and videos are represented as icons and the interactive transcription is provided.
2.3 FutureLearn

Among the different platforms discussed here, FutureLearn is the only one presenting a distinctive learning interface. Minimalist in its style, the site has a vertical navigation but the interface occupies a smaller area of the screen as compared to the other ones. The top navigation menu displays four different tabs: to do, activity, replies and progress (Figure 8).

The To do tab lists a number of learning elements and organizes the course by weeks. Unlike other platforms examined in this paper, here text is used instead of icons for referring to learning contents. Contents consist generally of a few texts, while most learning activities entail the use of videos, exercises, discussions, and tests. Videos are provided with a transcript but they are not interactive, possibly due to their short duration. However, videos’ playing speed may be controlled and adjusted from 0.5x to 2x (with 1 being standard reproduction speed). In terms of video lengths, MOOC
platforms’ videos are generally less than 10 minutes. Recent studies have indicated that the attention curve among an audience generally goes down after the ninth minute [22]. Therefore, it is not incidental that the duration of videos in these platforms rarely go beyond 10 minutes. However, a student can watch several videos for an overall duration of more than 30 minutes per single lesson. An interesting aspect of these videos is their shooting techniques. Typically, the instructor is filmed in a public space (an office, university classroom or other related places) and he/she speaks directly into the camera but a number of other techniques are also used. For example, post-production effects such as titles and graphs can be added, or motion-design animations may be used. This latter technique allows the instructor to be featured in the movie only as a voice-over, a successful method of coping with economic constraints: in-house production which requires no specific lighting or special effects equipment is a fast and inexpensive way for universities and instructors to create learning contents.

As was the case in Coursera, FutureLearn features a ‘mark as complete’ button. Also, users can comment on any learning content, something which attests to the importance attributed to students’ participation in this platform. At the same time, different colors evidence the sections that the student has completed (blue), partially completed (purple) and new ones (white, Figure 11).

![Figure 9 – Lesson’s title are complemented by colors indicating the stat of an activity (completed or uncompleted).](image)

3 FEDERICA WEBLEARNING

“Federica” is the WebLearning portal of the University of Naples Federico II. It was established in 2007 with European Structural Funds with the aim of developing an immaterial infrastructure and providing free access to knowledge, a sound structure and an innovative approach to online learning. Over the last ten years, Federica has produced more than 300 course and 5,000 lessons which have been transmitted through its portal www.federica.unina.it. 70 MOOCs have been also released on www.federica.eu.

Federica’s learning interface appears different from those of other platforms discussed in this paper. Years before the emergence of the ‘massive course’ phenomenon, the platform Federica.unina.it had created its own model of WebLearning, centered on Web resources (hence the prefix ‘web’ substituting the traditional ‘e’). Federica’s main distinctive trait, besides its contents, is a multimediatic, horizontal navigation. Contents can be accessed as ‘slides’ and users can browse them by ‘context’. Each slide features images, videos, or audio tracks, as well as links to further resources on the web. E-learning platforms designed in the 2000s and, more recently, MOOCs, both use multimediatic resources as ‘monads’, single elements that are not necessarily connected to each another. It is up to the user to construct the overall meaning of these resources and their potential interconnections. At the same time, Federica’s multimediatic contextualization provides users with a selection of learning ‘pathways’ which can help them through their learning experience. As far as MOOCs are concerned, the interface of Federica.eu has been further improved over the years together with its learning model. The learning space is represented by three ‘metaphors’, respectively the scratchpad, the tablet and
the smartphone (Figure 12). Metaphors, we have seen (section 1 in this article), have always been used in the informatic sector to facilitate users' learning processes, especially in the case of technological devices. Learning environments presenting familiar icons to the user are a valid strategy to simplify the overall learning process. With ‘classrooms’ being designed as familiar spaces, users are free to focus on the content of the lesson. In fact, we could say, the interface itself disappears. As Norman would say, we are now experiencing the ‘best interface’: the invisible interface which is so easy to use that it becomes ‘transparent’.

Figure 10 – Examples of learning interface on Federica.eu

Federica’s interface features a ‘tablet’ with a scratchpad inside it, listing textual contents and links to lessons. On the right side of the screen we find a ‘smartphone’ through which we can directly access these links and resources. Such a configuration allows users to remain in their ‘office’ (the learning space) while accessing external resources. Once again, contents can be accessed through horizontal navigation and users do not need to scroll up and down their page. Students accessing the home page are presented with a selection of courses and the search engine. Each course is represented as a smartphone with its own cover and features information on title, instructor, duration, and date of release. As soon as users enter a given course, they can find a detailed description of its contents, the list of scheduled lessons and the instructor’s bio. A video track (the trailer) of the course is also found in this section.

Another distinctive feature of Federica is that the first lesson can be accessed without registration (which is however always free of charge), so that users can be incentivized to see the content of the course before they decide if they want to join the course or not. Once the user has signed up to the course, he or she can access lessons and the several resources available according to his/her own preferences. For example, students can read texts only, or they can watch the instructor’s video before, during or after their readings. Also, links to external resources can be accessed at any time. This environment is designed to allow a flexible use of learning resources which can be adapted to the specific type of user (occasional user/student-professionals).

If we look at the different providers discussed in this paper, a number of common elements emerge in terms of learning objects. However, there are many differences concerning the specific organization of interfaces and the visual presentation of contents. Coursera, edX and FutureLearn are ‘ready to use’ platforms. Authors can activate their preferred functions from a set of options and load contents regardless of their specific familiarity with learning design. Although a common element can be found among these providers (i.e. users can navigate through the different platforms in a similar way), there are several different types of contents. Some courses have more video tracks than others, more text, less tests, some may have a direct role of the community or links to external resources. This may prevent students from identifying interconnections among different courses. On the contrary, while allowing instructors to load their own contents if they want to, Federica adopts the same structure for all courses with a standard number of slides, videos and links. Students who join more courses on Federica find the same familiar learning interface, the same functions, and instruments in all classrooms, that can help them take full advantage of the new learning environment.
4 CONCLUSIONS

In this article, we have compared two different learning models. The first one, used by the majority of global providers, adopts an advanced 'repository' model, with learning contents being designed as modules with a particular consultation order. The specific interface used in this model draws the student’s attention to texts, videos, or tests but simultaneous use of these objects is challenging (if not impossible). In the second model, used by Federica.eu, it is the student who must decide how to use the available contents, although he or she can follow a recommended ‘path’. Users can watch the instructors’ video-lectures before reading the text, they can access internal and external resources at the same time. Or, they can browse their slides and use the side PLEIN (Personal Learning Environment Interactive Navigator) if they want to reproduce a video track, so to read their text while listening to the instructor’s lesson. Needless to say, these two models are profoundly different especially in the diverse role attributed to multimediaility, understood as the possibility of using different types of media (videos, texts, links etc.) at the same time, rather than its simple availability. Their different interfaces mirror in a way their diverging underlying cultural assumptions on the role of multimedial stimulation as an instrument for improving the learning process. Our comparison can be further developed, for example by analyzing the main teaching techniques of these platforms’ interfaces. However, the analysis made in this article evidences an important aspect: that some of the major dedicated providers lack a specific orientation as far as the interface’s organization is considered.

Multimedial contents are provided as single learning elements. Apparently, there is only a minor effort among these providers in the identification of a teaching model that can facilitate the students’ interaction with learning contents and their familiarity with the learning environment and its affordance. In terms of user-interfaces interactions’ models, MOOCs do not seem to have introduced a new paradigm as compared to past generations of e-learning platforms such as OpenCourseWare or other web-learning experiences. Also, they are not qualitatively different from Apple’s podcasts released on iTunes U. These MOOC precursors would present videos, texts, tests and links but their interface only allowed a basic type of interaction with the platform and, surely, a much lower diffusion among students.

Today online learning as a discipline needs to be ‘re-thought’ again. A discussion on the ‘environment’ through which the learning process is conveyed is in order. Also, we should try and answer to a number of questions. What sorts of affordances are most appropriate in an online learning space? What metaphors could be used? How should interfaces be designed? As was the case at the time of the popularization of personal computers, when the graphic metaphor of the office desk first emerged, new metaphors should be invented today for the learning space. Federica, on the other hand, has been bringing quality contents and applied research together. Its distinctive learning space draws upon the multimediality of smartphones, tablets, podcast, and video enhanced, typical of its age, represented as visual metaphors in its interface. Defining ‘interfaces’ as a concept is not only a speculative task. Once we have defined our notion of interface we have defined how individuals will interact with the world. How they will access their society’s culture. How they will construct their identity. Defining learning interfaces is in fact defining the very identity of MOOCs [23].

REFERENCES


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