Digital resources for faculty development in e-learning: a self-paced approach for professional learning

Risorse digitali per lo sviluppo professionale sull'e-learning: un approccio self-paced all'apprendimento professionale

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ABSTRACT Since a growing number of universities have adopted e-learning or blended solutions, faculty development is increasingly seen as a crucial strategy to prepare faculty members for innovative teaching practices. However, a number of barriers prevent faculty from attending training programmes, including scheduling and logistic constraints. Offering a flexible online format for training should provide opportunities to fit user needs better. In this regard, while literature exists on on-site interventions, studies on self-paced online courses are still limited. This paper presents a self-paced online programme for faculty development on e-learning, and explores its correspondence with users' needs. The contribution starts with an examination of the literature and an explanation of the design strategies adopted for the programme. It then presents the methods used and analyses the main findings. The results show that, depending on their levels of experience and motivation, users demonstrated diverse patterns of use with regard to the contents and activities selected. From this point of view, the results confirm the importance of adopting design approaches based on self-paced principles.

KEYWORDS Faculty development; Higher education; Self-paced learning; E-learning; Online training.

SOMMARIO Dato il numero crescente di università che hanno adottato soluzioni e-learning o blended, lo sviluppo professionale degli accademici viene considerato sempre più come una strategia fondamentale per innovare le pratiche didattiche dei docenti. Tuttavia, numerose barriere, tra cui i vincoli spazio-temporali, impediscono ai docenti di frequentare programmi di formazione. Un formato online flessibile

dovrebbe adattarsi meglio alle esigenze degli utenti. A questo proposito, sebbene esista una letteratura sugli interventi in presenza, gli studi sui corsi online self-paced sono ancora limitati. Questo articolo presenta un corso online self-paced per lo sviluppo professionale dei docenti sull'e-learning e ne esplora la corrispondenza con i bisogni degli utenti. Si apre con un esame della letteratura e una spiegazione delle strategie progettuali adottate. Illustra poi i metodi utilizzati e l'analisi dei dati raccolti. I risultati mostrano che, a seconda dei livelli di esperienza e di motivazione, gli utenti manifestano modelli diversi di uso dei contenuti e delle attività selezionate. In tal senso essi confermano l'importanza di adottare approcci progettuali basati su principi self-paced.

PAROLE CHIAVE Sviluppo professionale dei docenti; Università; Apprendimento auto-gestito; E-learning; Formazione online.

1. INTRODUCTION

Nowadays e-learning is reaching a high level of penetration in the higher education sector. According to an international study carried out by ECAR in 2013 (Bichsel, 2013), almost all universities are interested in offering online courses, with 80% delivering a substantial number of programmes online and more than 50% providing a considerable proportion of digital course work. In Europe, the majority of academic institutions have undertaken e-learning initiatives: as Gaebel, Kupriyanova, Morais and Colucci (2014) found, 91% of Europe's academic institutions are providing courses in blended mode, while 82% are offering courses entirely online. Similarly, 92% of Italian academic institutions provide some form of distance education, including e-learning, tele-teaching and traditional teaching enhanced by Learning Management Systems (LMS); 73% have promoted the establishment of e-learning centres to support faculty members' use of platforms such as Moodle and Blackboard (Roberto, 2012).

With a growing number of university teachers entering the virtual world for the first time, concerns have arisen about their readiness to face digital teaching, particularly their technical skills and pedagogical knowledge. This is accompanied by a call from international organisations to improve university teaching through the development of new skills and specific professional development activities (Hénard & Roseveare, 2012). However, obstacles are still preventing faculty members from adopting e-learning or blended learning solutions, including lack of time due to the increased teaching load and workplace responsibilities, time conflicts, and low technical and digital skills (Elliott, Rhoades, Jackson, & Mandernach, 2015; Henning, 2012; Thomas, Karr, Kelly, & McBane, 2012). In this situation, attracting the interest of faculty members for professional development programmes is a real challenge, while mandated faculty development risks engendering negative attitudes and rejection (Weaver, Robbie, & Borland, 2008). Research has shown that the adopted training format plays a pivotal role in the success of any given faculty development programme (Elliott et al., 2015), especially for overcoming scheduling constraints. And yet, the majority of online courses for online professional development are facilitated or instructor-led (Fishman et al., 2013; Shattuck, Dubins, & Zilberman, 2011). Little research has been conducted into self-paced programmes, where the rhythm of learning is managed entirely by the learner, thus reducing the burden of time limitations (Rizzuto, 2017).

This study explores the extent to which a self-paced online course for professional development on e-learning methods and technologies meets the needs of faculty members. The context is provided by DIDeL ("Didattica in e-learning", Pedagogical methods for e-learning), a programme for professional development on e-learning established by the University of Florence in 2016-17. Firstly, the study presents relevant lit-

erature on faculty development and illustrates the design principles guiding the implementation of the programme's learning environment (LE). It then introduces the methodology adopted for verifying alignment of the design hypothesis with faculty members' behaviours. Finally, the results are presented and discussed, followed by recommendations for design and future research.

2. STATE OF THE ART

The literature on faculty development for e-learning can be framed within the broader research area of faculty development (Meyer, 2014), a topic that has been widely investigated over the last 40 years. In their extensive literature review, Amundsen and Wilson (2012) identified six key elements for effective design of development programmes for university teachers: 1) the definition of competences to be developed and a dynamic approach to their evaluation; 2) detailed content in relation to the teaching methods adopted; 3) a disciplinary focus; 4) the inclusion of training activities within an institutional programme; 5) an organisational development context that enhances professional learning; 6) methods for analysing the effectiveness of professional development. Another aspect authors consider relevant is the format (Elliott et al., 2015; Meyer, 2014). This may range from formal activities, like workshops or panel discussions, to informal opportunities for collaboration such as meetings to share views and practices (Elliott et al., 2015). Format definition may also take into account the mode (i.e. face-to-face, online, synchronous, asynchronous, etc.) in which the training programme is to be delivered and whether it is mandatory or not. For the purposes of this paper we will focus on the literature related to the format and associated implications for learning.

Looking at the literature, it should be noted that almost all the studies concern, mainly if not exclusively, programmes addressing campus-based faculty. Therefore, one should not be surprised by the fact that university teachers are reported as preferring face-to-face programmes (Felder & Brent, 2010). Face-to-face faculty development interventions usually encompass activities such as conferences, workshops, seminars, short courses and mentoring programmes. Steinert et al. (2010) point out that the success of such professional development initiatives, in terms of knowledge transferred into concrete teaching practices, relies on involving faculty in hands-on exploration and problem based activities. The pedagogical affordance that such learning opportunities offer in terms of reflection on one's own practices is not limited to face-to-face delivery, since information and communication technologies such as video conferencing, webinars, and online forums allow synchronous and asynchronous interactions fostering reflection, discussion and sharing of practices.

Although research on formats is still limited, several studies indicate that, despite the fact that faculty may prefer face-to-face sessions, they are more likely to opt for asynchronous development programmes, which allow them to overcome the scheduling issues typical of traditional faculty initiatives (Dailey-Hebert, Mandernach, Donnelli-Sallee, & Norris, 2014). Therefore, the most successful training projects are highly flexible in terms of place and time, letting faculty complete learning activities at their own pace and schedule. Nevertheless, the extant literature usually addresses online courses for faculty development supported by tutors with different teaching roles, ranging from moderation of online discussion to delivery of webinars and assessment of assignments (Fishman et al., 2013; Shattuck et al., 2011). Only a small number of studies investigate self-paced online courses that can be attended anytime and anywhere by university teachers who cannot participate in traditional face-to-face courses or deadline-driven online coursework (Rizzuto, 2017). Current research on asynchronous formats emphasises learner autonomy and situated formats and increased reflection time as crucial elements for intervention success (Kyalo & Hopkins, 2013; Rienties, Brouwer, & Lygo-Baker, 2013).

Other aspects indicated in the literature as being beneficial for online faculty development include supplementary time for deeper self-reflection or self-evaluation and self-regulation, augmented levels of flexibil-

ity and scalability, greater focus on learner autonomy, and varied levels of interaction with the instructor, content and peers (Henning, 2012; Kyalo & Hopkins, 2013). All these aspects reflect adult learning principles (Knowles, Holton, & Swanson, 2014) that ought to be taken into consideration for successful faculty development course design.

3. THE CONTEXT OF INTERVENTION

The DIDeL project adopted a multi-layered approach based on different types of training activities corresponding to diverse theoretical levels of professional learning, like individual, community and social dimensions (Ranieri, Pezzati, & Raffaghelli, 2017). The associated elements were: labs for the development of technical skills; environment and multimedia resources for self-paced learning; coaching; subject specific case studies; seminars; and a professional learning community. Each component chosen reflected an overarching vision of professional development, while each method required specific processes of design, development, implementation, monitoring and evaluation. This article focuses on the individual self-paced component and related activities, namely, interaction with digital learning resources.

Based on the background above, the leading design assumption was to promote flexibility in users' access, use of resources, monitoring and evaluation of their own personal and self-paced learning. For this purpose, different elements of diverse pedagogical granularity (learning environment, modules, learning units and learning activities) were implemented, facilitating alignment between the methodological approach and technological tools adopted. After a brief familiarisation with the interface of the learning environment, the user should be able to locate the type of content and activity to follow according to personal needs.

The *learning environment* (LE**)** was designed to incorporate two critical features: a) visual presentation of the conceptual structure of the pedagogical contents (i.e. modules on different e-learning solutions, good practices and e-learning developments) and b) making it evident that the various modules would trigger different ways of learning. The LE was implemented into the Moodle 3.0 platform and launched in March 2017. It was available to all the academics and specialised technical staff, such as librarians and linguistic experts, involved in DIDeL's activities. The LE presented the Modules (content-driven) and the Learning Units (LU) (activity-driven) within those modules. Each element was visually coded using a different colour and icon so as to help the learner locate activities matching personal needs. In addition, a progress bar showing activity status helped learners to monitor their individual advancement. Figure 1 shows the initial interface with the elements indicated above.

The modules were designed to present knowledge in a structured fashion, with an interface facilitating the choice of content and activities. Besides an introductory section on pedagogical challenges in higher education, the course offered three modules, each dedicated to a specific e-learning typology (Mason, 2002; Ranieri, 2005), namely Content & Support (CS), Wrap Around (WA), and Collaborative (Co). Each module incorporated four LU designed to support different learning approaches to the content, namely: 1) "Knowing", through information based on a video-lecture about the main topics, such as different types of e-learning solutions; 2) "Understanding", through interactive multimedia resources with embedded examples of design practice, including: guidance on factors influencing e-learning design; hints on how to design learning resources and activities as well as evaluation tools; two scenarios for technology enhanced learning, including blended learning and new trends in Open Education; 3) "Applying", through a set of simple Word files that they can customise and use as templates for planning and implementing e-learning courses (here learners activate forms of "design thinking" by considering their own professional problems and adopting the templates as mediators for developing solutions); 4) "Experimenting", through spaces such as an online forum and a database to showcase the learners' own practices to colleagues.
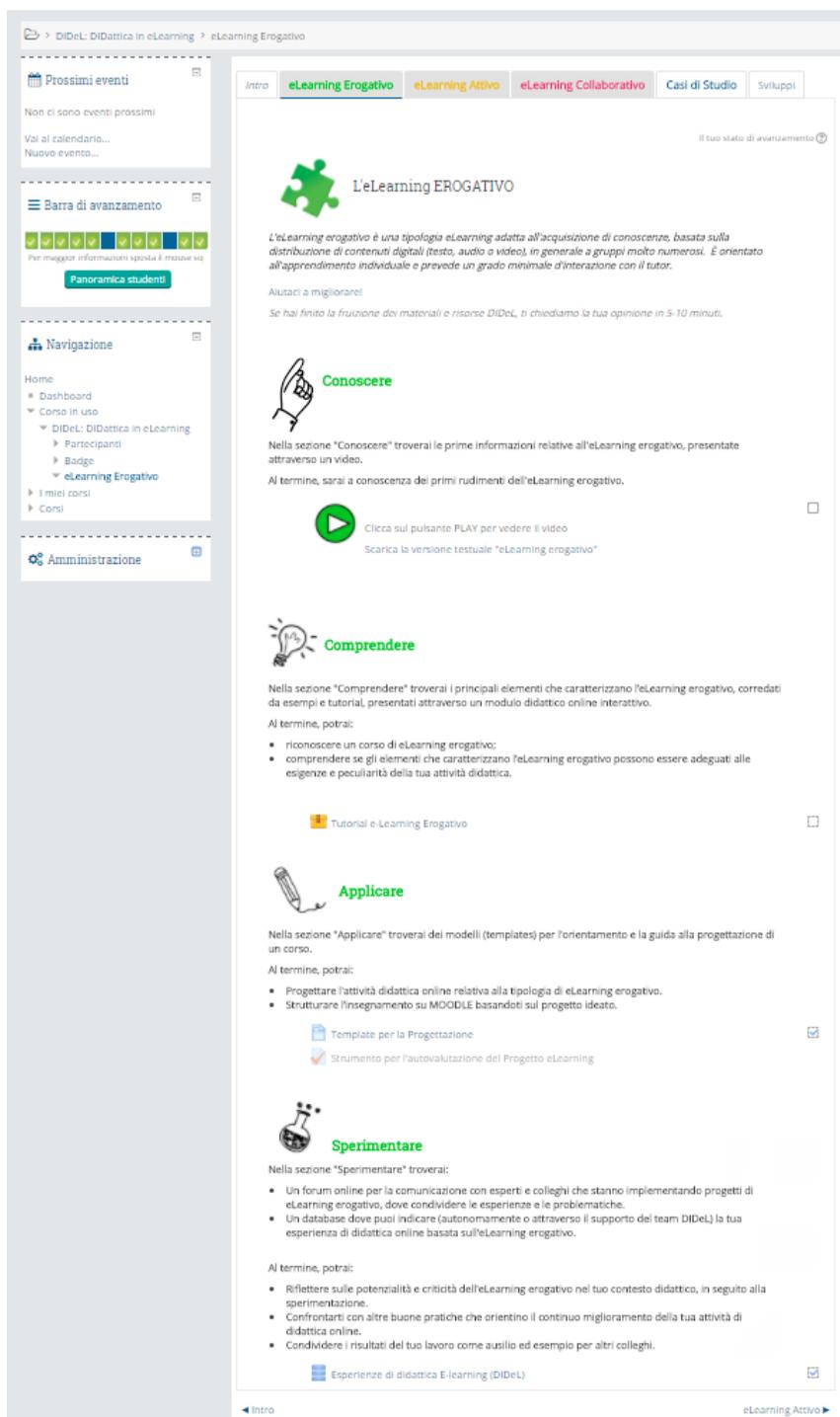
Figure 1. The DIDeL learning environment.

The *case studies* were elaborated according to a strategy of modelling effective practices across several disciplines. Seven cases representing five scientific areas (biomedical sciences, hard sciences, social sciences, technologies, humanities and educational sciences) were developed; they implemented a problem-based learning strategy and included both video interviews and online exercises.

4. METHOD

Given the aim of exploring how participants reacted to the online learning resources presented above, the research question of this study was: Are the design hypothesis and observed user behaviours aligned? Answering this would not only yield insights into the users' approach to online resources, but also provide indications for further design. The method adopted was typical of interaction design approaches applied to learning design (Mor & Winters, 2007), according to which theoretical and empirical pedagogical information guides designers through the initial design loop, and in the subsequent loop they interact with users, gathering information about design assumptions and reformulating the original design hypothesis. Successive loops encompass alpha User-Testing (UT), corrections, and Beta-Test Release (BTR). For brevity's sake, in this article we will present two sets of data collected during the UT and the BTR. The initial loops, including storyboarding, mock-ups, and the decision-making process involving both technical and pedagogical team members, are not reported here.

The participants in the UT phase were five female academics aged 45-60 who were selected for their previous experience in e-learning projects and for their backgrounds, which covered an ample spectrum of scientific areas (Humanities, ICT, Law, Economics). Their level of e-learning expertise spanned Basic (1), Intermediate (1), Advanced (2) and Highly Advanced (1)[1] levels and are presented in Table 1.

Variables	UT	BTR
X0 Most advanced course designed and made available, as proxy of participants' e-learning skills and knowledge. Values: "Null", "Basic", "Intermediate", "Advanced", "Highly Advanced"	Type of courses, in terms of Moodle resources and modules, designed by users within the University of Florence e-learning platform. Extraction = Automatic extraction through interoperable database (RDBMS MySql) with Moodle (Catelani et al., 2017). · Null: Course not opened · Basic: Resources OR (Resources AND Forum News) · Intermediate: Forum News AND Resources AND (AT LEAST 1 module as follows: Quiz, Assignment, other Forum, Teleskill, Glossary, Choice, Agenda) · Advanced: Forum News AND resources AND (AT LEAST 1 module as follows: Quiz, Assignment, other Forum, Teleskill, Glossary, Choice, Agenda, Chat, Wiki, Groups per Module, Database, Feedback, Attendance, Questionnaire, Group Choice) · Highly Advanced: Forum News AND Resources AND (AT LEAST 1 module as follows: Quiz, Assignment, other Forum, Teleskill, Glossary, Choice, Agenda, Chat, Wiki, GroupsxModule, Database, Feedback, Attendance, Questionnaire, Group Choice, Lesson) AND (AT LEAST 1 module as follows: Restrict Access, Activity Completion, Assessment/Scale, Assessment/Goals, Assessment/Competences, Assessment/Open Digital Badges)	

[1] These levels were derived from automatic assessment of virtual class design (range and type of functionalities implemented), which was performed using a system developed by the e-Learning Unit at the University of Florence. For further details, see Catelani et al. (2017).

X1 Modules Values: "Intro", "Cont_Supp", "Wrap-Around", "Collaborative", "Equal_pref" Y1.1. Module_Completion per User Y1.2. Module_Prefs Y1.3. Module_Order	Number of coded actions on UT form, for each user, on thematic areas.	Total completion of activities (all users) per Module Total logs per Module (25 random users) Extraction = 1- Participation in the course 2- Summary table 3- Platform Logs
X2 Learning Units Values: "Know", "Understand", "Apply", "Experiment", "Equal-Pref" Y2.1. LU_Completion per User Y2.2. LU_Prefs Y2.3. LU_Order	Number of coded actions on the UT form, for each user, in each activity.	Total completion of activities (all users) per Learning Unit. Total logs per Module (25 random users) Extraction = 1- Participation in the course 2- Summary table 3- Platform Logs

Table 1. The operationalisation of the research design.

The UT consisted of a semi-structured interview that included a self-guided browsing activity. The interview was conducted by the educational designer who contributed to the design of the LE, and was audio-taped. A protocol was adopted for observation of interaction with the LE and for the discourse. Observations were noted in a grid, with rows for the interactions and columns for observed behaviour, user comments, designer observations and coded level of difficulty. Following interaction with the LE, the participants were invited to express suggestions for improvement. The interviews, which ranged from 45 to 85 minutes in length, were subsequently coded according to the following categories: understanding and using the LE; attractiveness of the LE; types of preferred interactions; relevance of contents; accessibility; usefulness and transferability of learning.

The BTR was performed using the official release of the DIDeL learning environment in March 2017. A total of 181 academics used the platform for a period of ten weeks (March 9 - May 23, 2017) and during this period their activity was logged. While the user cohort might seem small by international standards, it should be remembered that e-learning uptake is very low within the Italian academic community and so the sample can still be considered significant (Formiconi, 2016; Ghislandi & Raffaghelli, 2012). For this group, the levels of expertise were the inverse of those for the UT users: out of the 303 courses that users launched, 123 were of Basic level, 31 were Intermediate, 12 were Advanced, 20 were Highly Advanced and 12 were Null courses. A high number of the courses (105) were rated by the classification system as Other; subsequent manual monitoring revealed that these had been implemented in a rather chaotic manner, with odd combinations of resources and activities. This might be due to the low level of expertise of the participants who had generated them.

The collected logs were processed according to the variables under investigation, thus transforming raw LMS platform information into learning analytics data informing professional learning (Ferguson, 2012).

For the descriptive statistics in the BTR, all 181 users were considered. For inferential analysis, given the difficulty in extraction and data transformation, Chi-Squared Goodness of Fit and Multinomial Test statistical tests for non-parametric distributions were applied to 25 randomly selected users.

Table 1 presents the two data-collecting moments, including types of observation, identified variables and their values, and type of analysis conducted. The design for learning, which is the experimental condition, was operationally based on flexibility of access to content and on learning methods. This dimension consisted of four independent variables: content, pedagogical, technological, and temporal flexibility. The design's flexibility was considered the independent variable, having a relationship with user type and order of preference for online resources (dependent variable). In addition, an initial classification of participants' technical skills was adopted, based on the types (in terms of resources and modules) of course implemented through Moodle.

5. RESULTS

5.1. *User test*

This section reports the results of the UT activities. Table 2 shows the perceived difficulty of use of online resources. Overall, few of the coded behaviours and comments corresponded to high difficulty of use (1/77 coded interactions). Instead, in an average 15.4 ± 2.41 interactions per user, 9.20 ± 1.92 average interactions were coded as Null or with no perceived difficulty. Low and moderate difficulty were rare, with an average of 4 ± 0.71 and 2 ± 1.87 interactions per user coded. Briefly, half of the time spent interacting with the online resources showed no difficulty, and (as emerged from comments) was also reported as pleasant; only a third of interaction time was rated as having low or moderate difficulty. As expected, the level of initial technical and pedagogical competence did not influence the ease of use. Unexpectedly, one of the users with higher skill levels showed some discomfort interacting with one particular learning object.

Observed level of difficulty	Users' behaviour and skills*										Mean	Dev
		U1-HA		U2-HA		U3-A		U4-I		U5-B		
Null	11	61.11%	6	42.86%	9	69.23%	10	71.43%	10	55.56%	9.20	1.92
Low	3	16.67%	4	28.57%	4	30.77%	4	28.57%	5	27.78%	4.00	0.71
Moderate	4	22.22%	3	21.43%	0	0.00%	0	0.00%	3	16.67%	2.00	1.87
High	0	0.00%	1	7.14%	0	0.00%	0	0.00%	0	0.00%	0.20	0.45
Total	18	100.00%	14	100.00%	13	100.00%	14	100.00%	18	100.00%	15.40	2.41

Table 2. UT results on perceived difficulty by user.

* Number and percentage of user behaviours indicating the level of difficulty experienced in interaction with digital resources. The top cell of the column also shows the level of courses (Highly Advanced, Advanced, Intermediate, Basic) that each test user designed and delivered; this refers to the level of technological and pedagogical skills required.

A brief report was made of the coded activities and this was then shared with the UT participants, whose suggestions led to specific changes in the LE, such as more text in multimedia content and short versions

of resources.

Figure 2 presents users' preferences per module (content) and by learning unit (method of interaction and learning). In about half of the interactions (49/73, with 4 discarded for being actions on the overall system) the users preferred the more pedagogically advanced topics (WA and Co imply more complex pedagogical practices). Instead, they equally preferred (16, 16, 18/76 interactions, only 1 interaction discarded) the first three professional learning methods offered, i.e. "Knowing" and getting informed about main topics, "Understanding" through demonstrations, and "Applying" knowledge through tutorials. The very few cases of interaction with the "Experimenting" method were due to the fact that this area relies heavily on socialised practice, while the database of practice to be shared with colleagues included very few actual examples. For the BTR, the database was enriched.
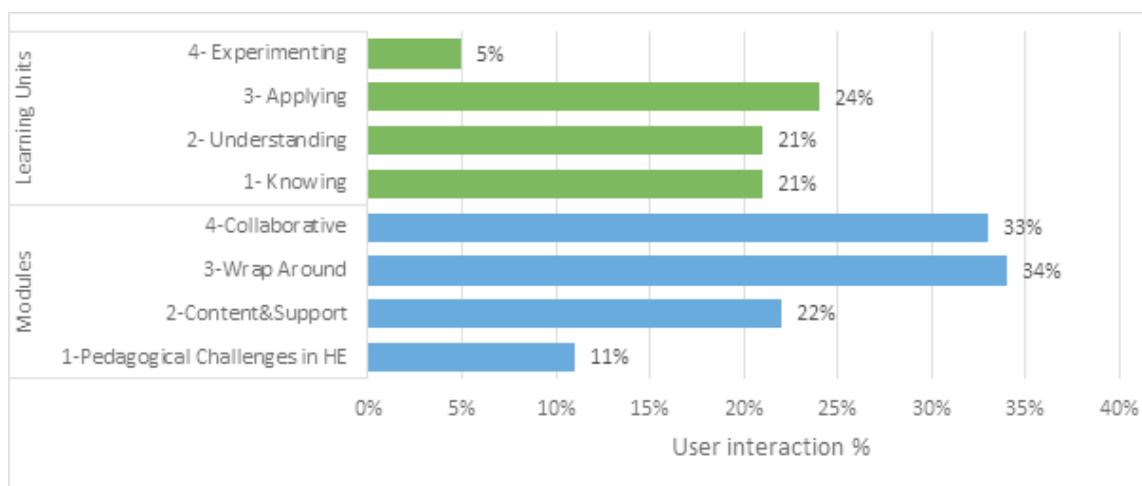

Figure 2. UT Preferences: Module and LU.

Figure 3 shows the order of preferences expressed by the five test users when selecting from the available modules and learning units. The X-axis indicates the order in which a given resource was selected, while the Y-axis concerns the frequencies of selection of a specific resource according to a certain order. The hypothesised order of fruition was generally respected both for content and for the learning units. Given that there are five choices in first place for the module's section on pedagogical challenges in higher education, and five in second place for the CS module, we can state that all users initially followed the expected path. Subsequently, a diversification is observed: some users focused on Co methods and others on the WA approaches. For LU, the pattern was four users started from the first LU "Knowing" and all five users went through the second LU "Understanding". Only two users followed the expected path by choosing the next LU "Applying"; one of the users decided to go directly to the fourth LU "Experimenting". Finally, only one user went on with the LU "Experimenting". As a result, the third and the fourth LUs remained unopened by two and three users respectively, while one user never accessed the first LU. These results suggest that participants go straight to the resources that appear to match their interest most closely, basing their navigation on a rapid self-evaluation and on calibration of what is offered and what they need to know. This means that the system supported a fast decision-taking process allowing users to self-evaluate and plan their activities.
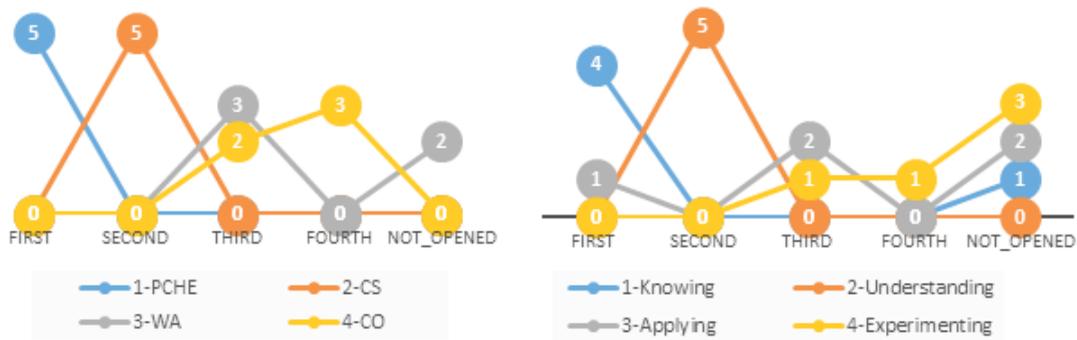
Figure 3. UT Order per Module (3.1) and Order per LU (3.2.).

Therefore, the UT confirmed both the quality of the platform design and the hypothesis relating to the expected type and order of interaction for modules and LU, with an initial time to familiarise with the system and a following personalised approach allowed by its flexibility.

5.2. *Beta-Test Release*

Let us now consider the BTR. Figure 4 provides a synthesis of activities undertaken by users (i.e. the level of visualisation or interaction with resources) by module and LU. This data was collected from the log information: each "click" on a specific resource entailed a specific coordinate in the combined matrix of module per LU. As we can observe, the participants tended to prefer activities related to the CS module, while they accomplished the WA and Co modules to a similar extent.
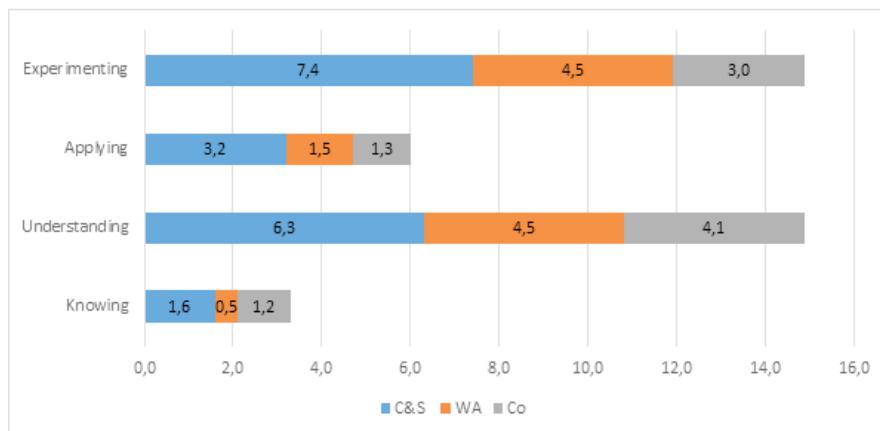

Figure 4. Users' preferred and completed modules (CS, WA, Co) per LU ("Experimenting", "Applying", "Understanding", "Knowing"). The figures show the clicks per user.

As for the professional learning approach, participants opted for different methods, although their preferences clearly fell with the LU "Understanding" with interactive demonstrations, and with the LU "Ex-

perimenting". This last result differs from those returned in the initial UT, and points out the appropriated assumption made after the UT, which entailed revisions of the online resources. Indeed, the richer examples available in the beta testing phase elicited more curiosity, although not more contributions (the project was in its initial stages). However, some users started sharing ideas through the online forum embedded in the fourth LU. Therefore, the patterns of module preferences are aligned with the design hypothesis (less skilled users will start from initial resources). Access to LU is less clear. However, it can be said that the tutorials with demonstrations guided the users in an initial approach probably based on a high motivation to learn, covering low-skill learning needs well. More skilled users found opportunities in the area devoted to the sharing of practices, but this assumption requires further analysis.

As for the inferential analysis, 12 females and 13 males were randomly selected from the overall group of 181 participants. The Chi-Squared GOF Test was calculated to determine whether the different modules and LU were equally preferred, and whether they were accessed in random order. Before implementing the Chi-Squared GOF Test, the Shapiro-Wilk Test was applied to observe the normality of the distributions under analysis. Where the criterion was not complied with, Multinomial Tests for non-parametric distributions were applied and the p-values corrected.

Variable	Descriptive Statistics N=25	χ^2 N=25	P-value
Course Level	"Highly Advanced" 12%, "Advanced" 20%, "Intermediate" 20%, "Basic" 28%, "Null" 20%	1.6 df = 4	0.8088
Preference per Module	"Pedagogical Challenges in Higher Education" 28%, "CS" 48%, "WA" 12%, "Co" 8%, "Equal preference" 4%	37.2 df = 4	0.002* < .01 Corrected 0.004
Expected order per Module	"Yes" 44%, "No", 56%	0.36 df = 1	0.5485
Preference per LU	"Knowing" 68%, "Understanding" 16%, "Applying" 4%, "Experimenting" 8%, "Equal preference" 4%	16.4 df = 4	1.638e-07* < .01 Corrected 2.317e-06
Expected order per LU	"Yes" 36%, "No" 64%	1.96 df = 1	0.1615

Table 3. Comparison of the observed sample distribution with the expected probability distribution.

In the case of the expected order per module, no significant difference was found between the actual distribution and the expected distribution (X^2(1, N=25)= 0.36, p =.55) and per LU (X^2 (1, N=25)=1.96, p=.16). We could not reject the null hypothesis and the assumption that the users followed a pattern of access according to our design, neither could we verify whether they generally adopted their own pattern. By contrast, in the case of the preferences per module and LU, significant deviation from the hypothesised values confirms that there were strong preferences both within the modules and LU. The Post-Hoc Binomial Comparison Test in the case of the module preferences showed a significant p-value for the level CS (p=.007). In the case of LU, the Post-Hoc Binomial Comparison Test resulted in all values being significantly deviated

from the hypothesised values ("Knowing" p<.01, "Understanding" p< .01, "Applying" p< .01, "Experimenting" p< .01, "Equal preference" p< .01).

6. DISCUSSION

Overall, our study shows that a self-paced learning approach to the design of online courses for faculty development may fit users' needs and motivations according to their experience of online learning and their background. In particular, the UT participants, who as users were more experienced and highly motivated, tended to prefer more advanced forms of pedagogical content, such as modules on WA and Co, which they apparently found to be more relevant to their own professional practice. Indeed, while – as expected - they started from the modules providing general information on the system (i.e. the "Pedagogical Challenges in Higher Education", which also introduces the DIDeL structure and contents as a strategy to intervene in this context), they quickly skipped modules other than those deemed significant for their own learning. With regard to the LU, the UT participants showed a similar pattern: they started with the more traditional forms of learning such as "Knowing" and then switched to more practical units such as "Applying". The latter requires the expert or highly motivated learner to create their own products; this entails deeper knowledge and creative learning and provides an opportunity to develop design thinking skills. "Understanding" also attracts a considerable number of hits, with a preference for tutorials showing procedures and solutions. By contrast, the BTR participants, who were less experienced but also well motivated users, opted for less advanced forms of pedagogical content focusing on the CS module. As for LU, they tended to interact with resources demonstrating "how to" (tutorials in the LU "Understanding") and showcase practices (examples of practice in the LU "Experimenting").

These findings led us to make some considerations. Firstly, although the UT and BTR participants showed diverse preferences in terms of type of contents, their behaviours converged in selecting content relevant to their current online teaching practices and skills. This suggests that they were able to self-evaluate their knowledge and competences, and benefit from the flexibility of the digital resources. On the one hand, in line with previous studies (Elliot et al., 2015), we can say that the focus of the programme played an important role in determining the participation of university teachers in our programme. On the other hand, our design decision to offer flexible training paths can be viewed as a means to directly value users' previous expertise and indirectly reinforce their motivations, aspects that are consistent with the principles of adult learning (Knowles et al., 2014) and with other research findings on the design of self-paced courses (Rizzuto, 2017). Self-paced online learning allowing users to select or skip contents according to their interest and skills, and to control the learning process without access limitations (learning anywhere and anytime), proved to fit the needs of our target. However, although no significant difference was found in the order in which UT and BTR participants selected the online resources, the former appeared to follow their own path, and this is an area that should be further explored.

Secondly, when examining the results related to adoption of LU, it should be observed that while UT and BTR participants opted for different topics, they both showed a preference for more practical contents, that is learning materials which can be used to transfer theory into practice or that show how this can be done. This tendency is consistent with other studies which find that faculty members are more likely to access contents that may be concretely applied in their classrooms (Felder & Brent, 2010; Steinert et al., 2010). In terms of course design, this finding indicates that, ideally, faculty development should allow university teachers to engage with authentic problem-solving situations, which stimulate them to reflect on how to apply knowledge to their professional contexts.

Finally, it is important to stress that no matter whether expert user or novice, the UT and BTR participants

appropriated the digital resources in accordance with their personal learning paths. One might have expected that less experienced users would have preferred greater guidance and therefore followed predefined, though flexible, paths. This was not the case. Somehow their motivations were stronger drivers than their previous expertise. Therefore, focusing on faculty members' motivations through incentives, recognition of time dedicated to innovation of teaching, and provision of relevant and flexible contents seem to be fundamental for the success of training initiatives addressing adult learners.

7. CONCLUSION

Online faculty development is a growing sector that is amplifying the training opportunities for professional learning in higher education. When based on flexible contents and a self-paced format, it may allow faculty members to better organise their learning processes, with reduced time conflicts and logistic constraints. Since the literature on self-paced approaches is still in its infancy, there are several aspects which still need consideration. In our study we focused on how different profiles of professional learners adopted the digital resources offered in a learning environment promoted by the University of Florence. We introduced a set of digital resources and analysed the diversified ways of adoption according to users' interest and self-perceived learning gaps. We found that both novice and expert users were able to self-evaluate their own learning needs, selecting more advanced or basic resources appropriately. Although interest mainly focused on a limited number of resources, and participants adopted resources in an order that differed from the one suggested, our results support the hypothesis of design for self-paced learning. Additional research investigating the learning outcomes and the impact of DIDeL programme is necessary, as well as a comparison between the DIDeL approach and similar courses to deepen our understanding of self-paced programmes for faculty development.

Although our study allowed us to formulate design recommendations, there are some limitations to be considered. As usual, studying user behaviours through non-invasive techniques is a challenge. We adopted a participatory approach through the UTs, but rather invasive, and a less invasive, but yet superficial way of understanding user behaviours, that is learning analytics. In the first case, interviews required participants to dedicate time to the UT and their opinions became "visible" to the system. This was not a problem in this study, but it is a constraint in a general approach, for academics are very busy professionals. Moreover, given interviewing is an invasive approach, few of the academics were able to participate, so the data gained could not be generalised to the whole population. In the second case, learning analytics proved to be an effective and non-invasive way of collecting data. However, processing this data in a significant way was an issue of concern for the authors. The data had to be reprocessed and transformed in several ways prior to identify the variables under analysis. Just as handling logs to build learning analytics is still a crucial issue for future research, learning analytics as a non-invasive technique could be the way forward in the future, but researchers should be aware of the challenge related to data transformation.

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