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Polychronicity and multipresence: a grounded theory of e-learning time-awareness as expressed by Portuguese academics' time concepts

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Abstract: - This paper makes an attempt to systematise and theorise the variety of time-bound terms and understandings used by academics for analysing and describing e-learning time properties. This temporal consideration has value in information systems development because, by taking into account polychronicity and multipresence as designated foci of academic processes and educational work rhythms, Higher Education Institutions will be able to implement e-learning systems which better fit academics' temporal behaviour. Recommendations are further advanced concerning the alignment of academics' time concepts with the properties of embedded e-learning.

Key-Words: - E-learning; Faculty time-awareness; Academic temporal profiles; Temporal performance management; Grounded Theory.

1 Introduction

This paper aims at understanding the temporal dimensions of e-learning as elements within unfolding processes of socio-technical interaction through an examination of (i) actual usage of technology enhanced education; (ii) the impact of e-learning systems in physical, technical and conceptual settings of academic work; (iii) academics' negotiation and reinterpretation of e-learning time-related features; (iv) time-sensitive instructional interaction and academics-defined temporal protocols for quality of service.

Such a research endeavour is motivated by the need to understand the sources of academics' time constraints in order to achieve improved performance, seamless interaction, manageable workload and safeguard against e-learning dissatisfaction. As academics' varying views on e-learning temporal features predictably affect the appropriation progress of different actors – including that of students' - it is important to focus on how multiple awarenesses interplay and appreciate their influence on the co-ordination and pacing of instructional activities. It is moreover of interest to map and reconstruct the time-based arrangements requested by the multidirectionality and sense of continuous engaging stream introduced by e-learning processes [1].

The relevance of being aware of a system's temporal attributes as ascribed by its intervenients is highlighted by Spillers and Loweus-Deitch [30], who purport that remaining in touch with differing rhythms of team members and collaborators “appears to be extremely important for maintaining the flow of pertinent and

contextual information, as actors rotate and transition through multiple task roles and functions”. It can moreover avoid communication breakdowns and trigger collaborative solutions whenever crucial opportunities allowed by the system's features are missed.

Previous research into social systems such as that conducted by Luhmann [16] had already concluded the criticality of handling time compositional elements, because “systems are especially sensitive to changes, and therefore for some systems time exists as an aggregate designation for all change”.

The elusive and pervasive nature of time as a concept is vividly debated in Information Systems research, with scholars documenting the difficulties in understanding time and organisational perspectives on time, in both perceptual and behavioural senses [23],[19]. The investigation of temporal conditions and its relation to management, planning, co-operation and synchronisation of activities is moreover related, in recent research, with culturally-informed time perceptions and work patterns [26],[12], many times bounded to specific socio-cultural contexts. This drive towards interpreting the social processes associated with temporality is summarised by Nandhakumar and Jones [21], who argue that “the management of time in project-based team working organisations may be understood as part of the organisational actors' ongoing active production and reproduction of their social context”.

In the case of e-learning, academics-assigned properties of temporal perception and judgement should

be considered at the intersection of contextual aspects that can hold constraints, create opportunities or shape adaptive tuning processes. Such aspects, advanced in this study as questions guiding the enquiry into compositional elements of academics' temporal behaviour, pertain to: (i) how e-learning systems are operated and controlled; (ii) what instructional activity goals are at stake; (iii) what logical sequences of task, tools and collaborators is set in motion; (iv) how personal performance characteristics influence planning, scheduling, interacting and assessing; (v) how procedures and heuristics developed in order to carry out instructional activities are handled.

By mapping and theorising the variety of time-bound terms and understandings used by academics for analysing and describing e-learning time properties, we hope to contribute with actionable knowledge to be used in future research for the design of suitable work structures and e-learning practices that effectively address the challenges raised. Such an endeavour is clearly in line with Orlikowski and Yates's [23] call for the implementation of "temporal structuring" processes, which act as frames of reference for time-aware planning, alignment and synchronisation of activities in an organisation.

The remainder of the paper develops as follows: the next section provides an overview of how the Grounded Theory Methodology informed the research design. Section 3 looks in detail at the proposed grounded theory of academics' polychronicity and multipresence. Section 4 contains a discussion on the findings, integrating them with relevant e-learning literature, and the paper closes with a call for the institutionalisation of time-aware protocols to regulate academics' online teaching presence [7].

2 Methodology and Research Design

The methodology chosen for this study was Grounded Theory [9], as the main objective was to map Portuguese academics' temporal structuring of online learning. This inductive approach, described by Martin and Turner [18] as a "methodology that allows the researcher to develop a theoretical account of the general features of the topic while simultaneously grounding the account in empirical observations data", was considered adequate to understand academics-defined temporal protocols.

Because the interpretive attributes of this research are concerned with academics' perceptions of e-learning temporal structural attribute, Grounded Theory emerged as the most adequate methodology to facilitate the collection and analysis of these actors' experiences and the establishment of associated relationships with other actors and situational factors.

The sampling technique employed in this research required selecting informants who were experienced e-learning practitioners in Portuguese HEI, willing to share their experiences with the researchers. A purposive sampling strategy [24] was therefore initially employed to select a group of information-rich respondents for whom the research topic would be of direct significance: lecturers, e-learning strategists and e-learning administrators.

As the study developed, theoretical sampling [10],[31] determined where to sample next, which informants to interview and which interview questions would be asked to explore emergent provisional categories, understand their interrelations and ensure fit and representativeness.

Data collection ultimately developed through conducting a total of 13 semi-structured qualitative interviews with 7 lecturers, 3 e-learning administrators and 3 e-learning strategists, including a former Minister of Science and Higher Education.

The analytical process involved open, axial and selective coding strategies [31], which translated into breaking down interview scripts into units of meaning, starting with descriptive categories, reappraised for sets of irradiating relationships and abstracted properties, ultimately condensed into higher order categories of holistic explanatory power, through the analytical steps of constant comparison, i.e. through the comparison of incidents and the "the identification of variations in the patterns to be found on the data" [31].

The process was lengthy and required of the researchers the capacity to integrate complementary and less corresponding strands of evidence under an "overarching theoretical scheme" [31], ultimately leading the analysts to develop "a set of relational statements that can be used to explain, in a general sense, what is going on" [31].

3 Towards a grounded theory of academics' polychronicity and multipresence

Grounded theory is concerned with the generation of "a set of well-developed categories (e.g. themes, concepts) that are systematically interrelated through statements of relationship to form a theoretical framework" [31]. The analysis in this study revealed that there was one central category to uphold and interrelate three main theoretical themes: (i) time-aware resources; (ii) time-aware processes; and (iii) time-aware linkages, as detailed in Fig. 1.

In the course of the study interviews, respondents expressed the belief that e-learning introduces a reshuffling of temporal dimensions: duration (amount of

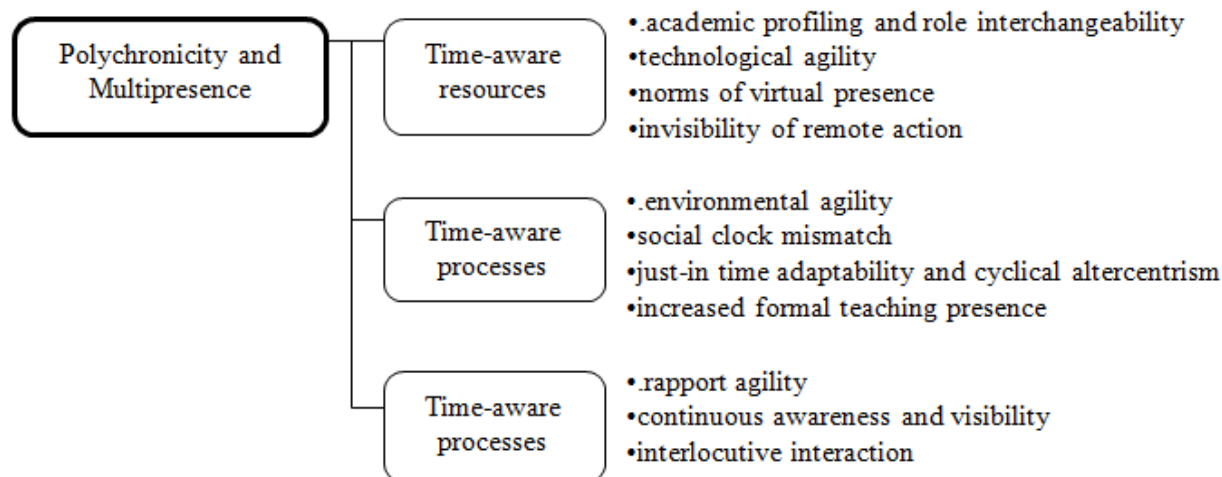


Figure 1 – Set of higher level categories

time dedicated to design learning activities and educational contents); location (activities and tasks take place over extended continuums of time, dilating temporal frames of fixed particular points); sequence (concurrent detachment of activities from temporal restraints and reification of uncontrolled restraints resulting from being tied up to activities spanning across unspecified points of time); and cycle (reappraisal of work completion periodic regularity and transition to cycles of limited rhythmic alternation, with prevalence of being intensively busy).

This perception, stretching along the three fundamental dimensions exposed above (resources, processes and linkages), found consolidation in the core category of polychronicity and multipresence, which translates the high demands of being able to adjust to simultaneous teaching and social rhythms, synchronise tasks for adaptive course generation, and decide just-in-time which contents, resources and tools best fit to students' needs. It moreover summarises academics' strategies to manage work constraints and cope with work overload by adaptively maximising control over the timing of teaching activities.

The following subsections contain an explanation of these findings in more detail, supported by an elaboration on categories and subcategories, accompanied by extracts of the interview transcripts which bring to life the issues experienced by academics.

3.1 Time-aware resources

The category of time-aware resources is a self-reflexive response of academics who have recurrently mentioned the interchangeability of academic roles, the technology-based agility necessary to meet educational goals, and the problems related both with the unrewarded

investment in e-learning and the lack of governing structures to guide virtual presence as time-bound issues (Fig. 2).

An absence of criteria or defining norms for virtual presence was indicated to be increasingly problematic with the transparency provided by developments in e-learning, which no longer offer camouflage for academics' desultory performance, opening up teaching as a public act and subjecting it to student satisfaction ratings and market competition for students.

Moreover, e-learning delivery brings along additional effort and unaccounted for workload, in comparison with traditional teaching. Academics reported that the effort put in the management of e-learning environments and in the preparation of high-quality educational contents does not come in proportion with how teaching times are credited, whereas time employed in online learning development is significantly larger. As one lecturer expressed, quantification of e-teaching times remains a problem because "it is hard to measure how much work is involved in e-learning development. Unless the criteria is a universal, equalising estimate for everyone, when in reality different faculty develop e-learning differently. The amount of time it takes to use an e-learning platform is so variable, depending on the type of use, that there can hardly exist a precise measure. Although it is possible to use time as an incentive without looking at it as a measurable trade-off" (Q:9:5).

Similarly, the current academics' compensation system is criticised for not being designed to foster the scholarship of teaching: it is inattentive to the core competencies and the nature of tasks at stake in e-learning; and it is insensitive to the fact that it is not possible to manage or improve something that is not subject to some kind of systematisation and evaluation. In the words of an e-learning strategist: "if governing

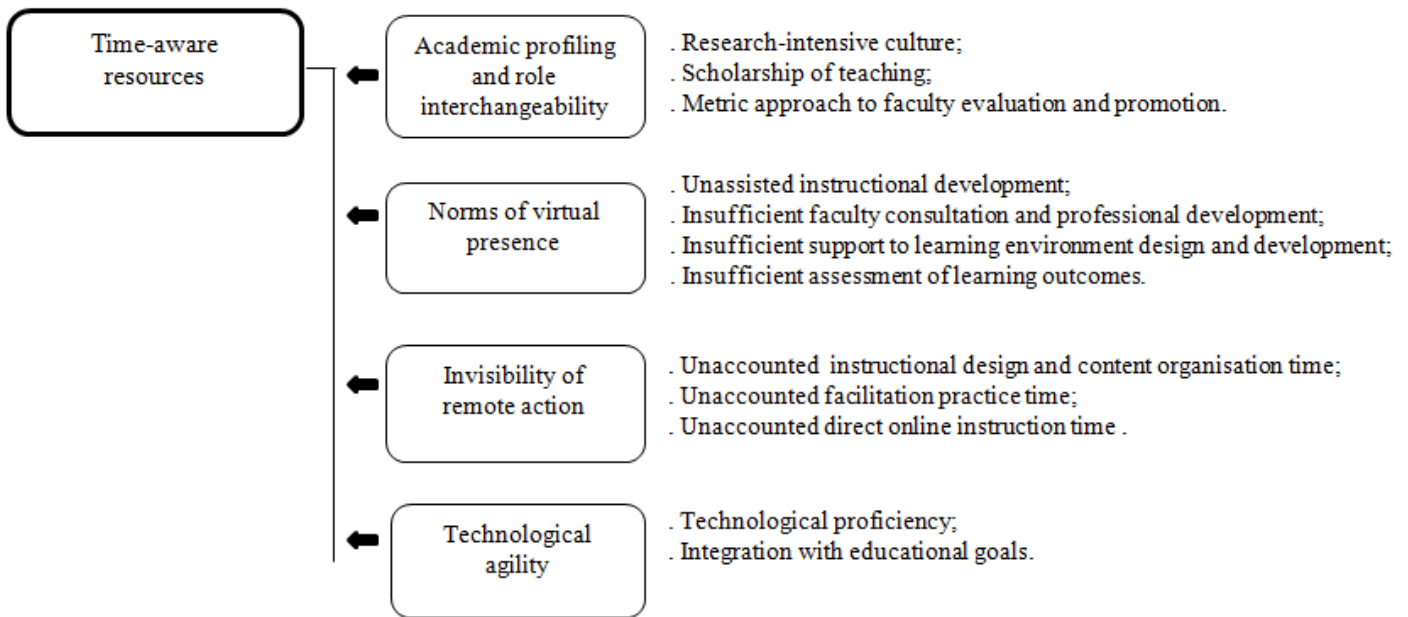


Figure 2 - Illustration of the emerging category of Time-aware resources from axial coding

structures at ministerial level acknowledged e-learning, that would work as an incentive, alongside with a reappraisal of how faculty are recognised and accredited in scientific curricula, how they are evaluated. Until date, what basically matters for evaluation is the number of papers published and the number of teaching hours. If e-learning enjoyed curricular recognition, half of the resistant staff would buy in into it. But there is no such policy in Portugal” (Q:14:15).

3.2 Time-aware processes

Academics’ ability to master time-aware processes, as depicted by Fig. 3 derives on the one hand, from an efficient development of methodological practices guiding the functional aspects of the online learning environment (such as contents, resources, assignments and interaction requirements). On the other hand, it is equally vital to perform environmental scanning (processes of administration and assessment) and sense-making routines to recognise and anticipate possible problems.

Respondents emphasised that to enhance the efficiency of time-aware processes, it is imperative that instructors and students have uniform work-practices and agreed-upon norms of interaction for developing a shared understanding of learning objectives and outcomes. This perception is evidenced by the account of an instructor who believes that the learning process related to adjusting to the online environment is bidirectional and valid both for students and instructors, despite students’ overexpectations: “they live permanently online and expect the instructor to be the same: always available. They are shocked when confronted with the fact that such permanent presence

online is not possible. Also, they tend to postpone their activities to weekends or for the night period and only realise that instructors are not remotely present when they don’t find them online” (Q:9:18).

The most critical factor raised is, however, the set of academics’ technical and educational expertise, which implies the ability to set collaborative learning agendas; moderate conferencing behaviour; provide leadership and guidance to individual learning needs; and organise delivery in such a way that learning objectives are aligned with methods, assessment and expected outcomes.

These new dimensions of the scholarly activity go well beyond traditional disciplinary knowledge and require a substantial investment of time, as indicated by a lecturer: “I have to be intellectually honest with you: it took me a huge personal time investment to feed contents into e-learning platforms. Contents are the core problem of e-learning. I cannot re-use them in the following year because they are not static and reality is changing. Updating is extremely time-consuming. For the first three years I spent most of the time, including weekends, answering queries, mentoring and monitoring students (Q:1:10)”.

3.2 Time-aware linkages

The importance of communicative and interactional alertness was acknowledged to be critical for distributed learning solutions and pertains to the seamless enmeshment of learners and instructors, in such a way that there is minimum disruption to mutual relationships, discussion and development of shared understandings.

One of the keys to successful time-aware linkages is

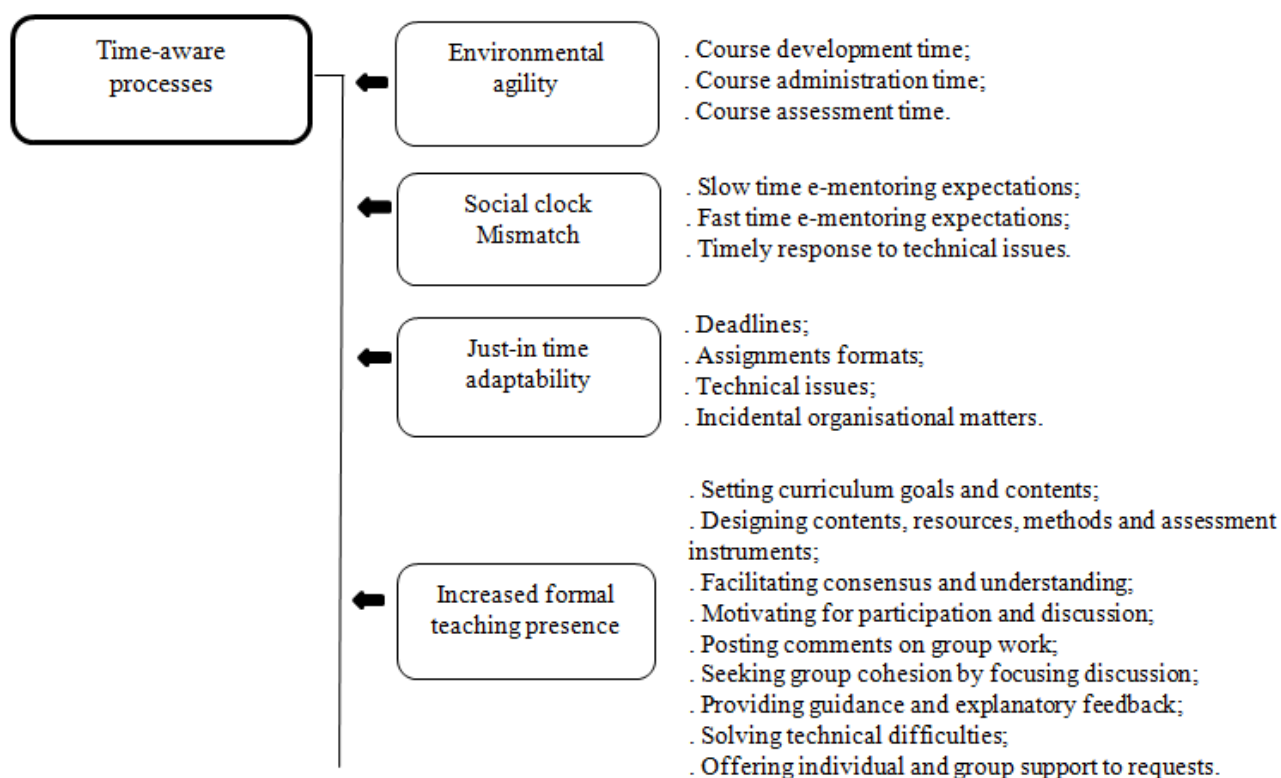


Figure 3 – Illustration of the emerging category of Time-aware processes from axial coding

the ability to ensure continuous relevant presence of both instructor and learners. In the absence of physical situatedness, academics have to adopt strategies to minimise possible feelings of uncertainty and suspicion, and to filter the noise created by activities that are not relevant for knowledge sharing, by ensuring enhanced visibility with regulatory and motivational functions.

This enhanced visibility is, as Fig. 4 details, enacted by the capacity to establish rapport, to explore the social functions of the learners' community, but also by the frequency of personal tutorials, the effective balance between academic and pastoral support and by regular monitoring of students progress by means of directive posting or interlocutive interaction.

In summary, academics must find the time to nurture trusting and empowering relationships, through proactively engaging students in discussion, critical thinking and in the requirements for pedagogical success and attainment, as expressed by an e-learning administrator: "something I have always stressed in academics' professional development courses is the importance of fora, sharing contents and making assignments and resources visible for everyone. This pedagogically open stance implies collaborative approaches to teaching and learning. One other practice that I consider essential is to provide students with examples of previous assessments with detailed answers so that students can confront their performance with quality standards but there is still a large number of

faculty who do not understand the pedagogical benefits of the simple exposure to what is right or wrong" (Q:3:22).

However, many times the response of instructors is reactive and insufficient, mostly because the demands of their roles are such that being simultaneously on top of teaching, research or tutoring activities becomes a difficult task. Online instructors feel, as one other faculty reported, inundated by queries: "for discussion forums I would define a weekly topic and stimulate students discussion. Many have asked me how would this impact assessment and grading: it wouldn't fail them if they didn't participate but I would grade them and this participation was undoubtedly important for those borderline students. Forums were weekly and about topics such as scenarios on interest rates, inflation rates, etc. Participation was so high I ended up collecting records of more than 60.000 students' entries. It is a colossal task for a single teacher and today I am much more selective (Q:1:8)".

4 Discussion

From a practical perspective, the proposed grounded theory of academics' polychronicity and multipresence reveals the critically of instructor availability and immediacy to an enabling environment, conducive of meaningful educational exchanges, such as those afforded by e-learning.

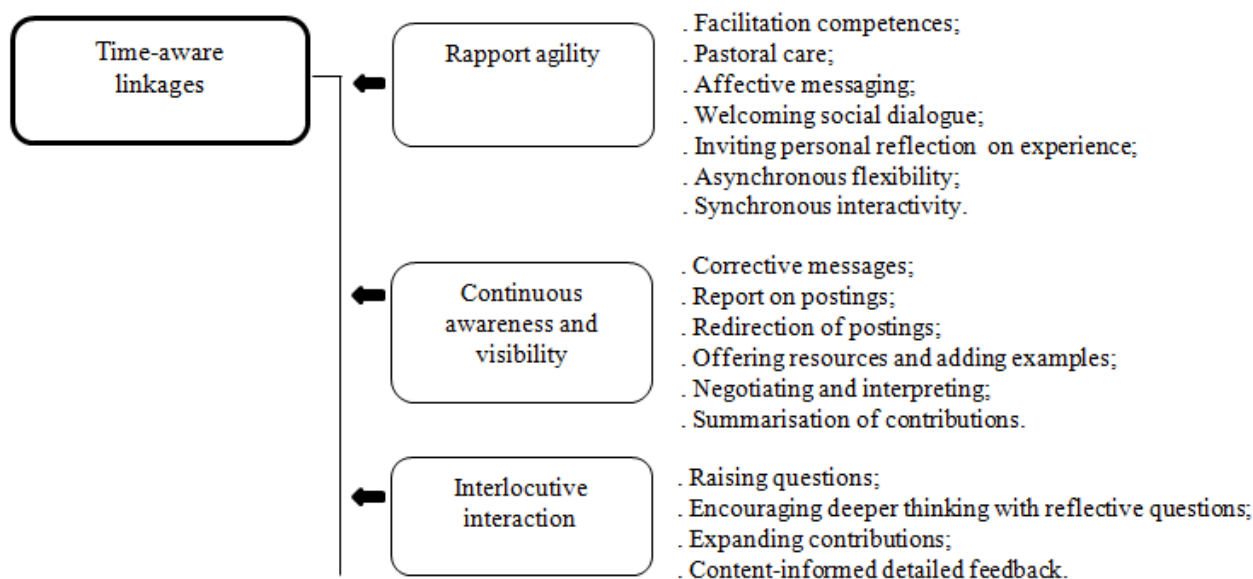


Figure 4 – Illustration of the emerging category of Time-aware linkages from axial coding

E-learning overcomes the predominant conventional transmissive pedagogy in Higher Education but this is not without costs to instructors, who need to tailor the teaching and learning settings online to adequately accommodate the flows of content and interaction, and to regulate students' behaviour against multi-perspectival data. However, only academics' understanding of the properties of technology and their congruence with educational and pedagogical goals – such as inquiry-based or self-regulated learning – can “help sustain effective research-led academic environments” [14] and “build sustainable educational communities of inquiry” [8].

The wider literature on e-learning and instructor's roles confirms academics' difficulties in (i) dealing with increased process-related demands of aspects such as making provisions for the negotiation of activities that best meet students' learning needs; (ii) dealing with the flow of content questions and answers from students, which can easily become overwhelming [6],[13]; (iii) and improving closeness and cognitive learning through mechanisms of instructor immediacy [22].

Such time-consuming tasks somehow contradict the rhetorical idea that e-learning can actually set faculty and learners free of temporal constraints [11]. A simple reality-check confirms that, as a result of the introduction of e-learning, a whole new set of responsibilities emerges, pertaining no longer exclusively to student's skills acquisition and construction of knowledge but also to moderating students' activity.

According to Goodyear [11], it is the very scattering of activity introduced by e-learning that “intensifies the need for co-presence among those who co-ordinate it”.

Therefore, more than acting as a major inhibitor to the adoption of educational technologies because of a perceived lack of time and increased teaching load [5],[32],[4], temporal constraints are additionally related to requirements of design, development and delivery of online instruction [29], and to the cost-effectiveness of ensuring “transactional presence” – the connected and continuous availability of academics to students' requests [28].

To counter the impracticality of permanent immediacy, Shi et al. [27] formulate tools, timeframes and time management strategies to be employed by academics to make online learning efficient and effective. Amongst these are (i) the need to increase the intelligibility of materials by designing easily navigable contents to “minimise student confusion and sense of being lost”; (ii) offering guidelines on how to use resources and making nonessential information optional; (iii) being emphatic about turn-around times for response, thus establishing expectations of tutor feedback and availability patterns; (iv) and being explicit about participation rules (how often, how focused) in asynchronous discussions.

However, the greatest challenge is, as Mansvelt et al. [17] argue, to overcome surface approaches to e-learning, which are the result of staff heavy workloads and insufficient institutional approaches to e-learning development, which fail at fully reflecting “the demands and constraints that working in a digital context impose”.

A lack of guidelines for evaluating online teaching and the absence of supportive institutional response makes online teachers “concerned about how their online teaching is regarded in the context of promotion

and tenure” [29]. Valuable time can otherwise be allocated to better rewarding activities such as research and publishing.

Because of this lack of institutional rewards and incentives, academics find it uninviting to think of the e-learning experience in terms of an equitable temporal structure [15], despite the evident need of establishing instructor presence through the definition of course process, evaluation and interaction elements [3].

However, e-learning’s overriding feature of forcing the community of teachers and learners to “handle multiple activities at the same time rather than handling individual activities one at a time” [1] is determinant in creating a culture of polychronicity amongst academics.

5 Conclusion

The findings of this research indicate that there is a limited understanding of time and its components in distributed educational settings such as those afforded by e-learning environments. This study attempted to bring some light to the topic, revealing the existent multiple dimensions of temporality as perceived by academics. Overall, the study indicates that polychronicity and multipresence translate academics’ capability to accomplish online teaching tasks, whilst adapting and reconfiguring resources, processes and linkages to changing environmental conditions in a fast-paced, agile manner.

Time emerges as a deep driver of system behaviour, manifested at different rates of linearity, continuity, synchronisation and entrainment, and this diversity impacts academics’ consequential temporal behaviour within the system.

The study does not claim to offer a definitive theory of temporality in a positivistic sense, but it uncovers tendencies in terms of the types of relevant temporality dimensions by recognising the practical challenges of simultaneously developing and maintaining critical aspects of time in e-learning, therefore contributing to the process of initial theorising on this topic, whilst uncovering contingencies under which particular aspects of time in online teaching become more salient in the Portuguese HEI context.

Moreover, the results from this study can inform managerial knowledge about the phenomenon of temporality, therefore providing a “linguistic medium of conceptual and symbolic discourse” [2], facilitating action in such ways that it influences practice and focuses e-learning practitioners’ attention on temporal concerns. This will enable more effective delivery and academics’ commitment to distributed educational settings.

Emergent temporal trajectories of academics indicate

unregulated and unaccounted for dynamics, mainly deriving from self-generated changes in the approach to teaching, resulting in (i) difficulties to synchronise their temporal behaviour with other actors with whom they interact and (ii) time-related consequences cascading across the system, such as disruptions to internal workload patterns and conflicts with dominant modes of delivery, reinforced by entrenched organisational practices or deeper institutional processes.

Polychronicity and multipresence are academics’ temporal responses to speedily accomplish educational tasks and to adapt and reconfigure the teaching and learning progress to changing delivery conditions by (i) coping with existent career and performance expectancies, which reward research over teaching and overvalue a metric approach to hours of teaching; (ii) setting in place educational methodologies and mechanisms for bridging temporal distances and establish routines and processes leading to understanding in the e-learning community of inquiry; (iii) forging linkages across communicative barriers existing among academics and students.

A combination of time-aware resources, processes and linkages consolidates polychronic teaching presence as the unifying force that triggers and sustains the learning process through the design, facilitation and delivery of direct instructional responsibilities.

As strategies for enhancing academics’ temporal efficacy the authors suggest the establishment of (i) university-wide norms of virtual presence, accounting for and adequately rewarding faculty’s time allocated to the scholarship of e-teaching; (ii) a shared framework or temporal protocol to sustain a coherent connection between tutors and learners – geographically and temporally distributed, yet sharing an electronic learning space. The alignment of temporal frames of reference should begin by taking inventory of participants’ expectations and levels of expertise, and move on to implementing agreed upon rules of conduct in messaging and communication, regulating teaching presence, and disciplining the sequence of delivery and interaction, in order to make the learning process more productive.

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