Designing for Distance Learning in Developing Countries: A Case Study

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Abstract

Teaching and learning in higher education are being transformed through complex configurations of people, tasks, and material and digital resources. Successful designs for innovative learning require us to understand how these complex configurations relate to learners' activity. This paper illustrates the application of a networked learning approach to frame the design of distance learning in higher education in developing countries. A case study based in a Bachelor subject offered at a Brazilian university is discussed. Its analysis unveils how design fits into a broader social context that influences structural elements related to learning materials, the learning management systems adopted, and the social arrangements for students in this case study. The paper shows how the networked learning approach allows us to explore the complexities of distance learning in developing countries, offering an analytical ground to identify, explore, learn and adapt key re-usable design ideas, with the aim of improving distance teaching and learning in higher education.

Keywords: design for learning; distance learning; learning design

Introduction

Democratic governments around the world are constantly investing in public policies and processes, with a view to increasing, expanding, and democratising access to knowledge. This is particularly important for developing countries that aspire to climb to new stages of scientific and technological development. In Brazil, technology and distance education brought new learning opportunities across a national territory largely marked by regional and socio-economic differences (Pereira, 2008). But educational practices need to be considered within their social context, in relation to, and as an expression of, issues and dynamics in a broader society (Bradshaw, 2017). There is global consensus about the increase in ICT use, but this growth is still unequally distributed across countries (OECD, 2017). Nevertheless, technology is constantly evolving, calling for new ways of rethinking and designing learning spaces and for evaluating the effectiveness of pedagogies that accompany these technology-rich contexts (Conole, 2010; Beetham & Sharpe, 2013; Sun, 2016; Adams Becker et al., 2017). If we accept that digital innovation is one of the key drivers of societal transformation and prosperity, it is important to understand the affordances and constraints related to distance educational programmes in developing countries, and how issues associated with technology may affect the design of these programmes. Contemporary modes of delivery in distance education rely heavily on the use of technology, hence requiring students' proficiency in generic and foundational ICT skills.

Teachers and educational designers inevitably make choices about the tools, learning tasks, and social organisation of students; and these, in turn, are likely to influence learning activity (Goodyear, 2005). To design successfully for these networked learning situations, teachers and educational designers need to recognise key structural design components—what works well and what does not—and understand how these components are, in turn, likely to influence the emergent activity of students. Educational design often involves finding solutions to competing tensions, or prioritising elements such as learning outcomes, policy guidelines, graduate attributes, and teachers and students' needs and expectations (Bird, Morgan, & O'Reilly, 2007; Ertmer et al, 2013; Bennett, Agostinho, & Lockyer, 2016). Theorising about the effect of technologies on distance learning activity is crucial, as is finding ways to disseminate theoretically informed practical approaches in design for networked learning across broader social contexts.

In this paper, we apply a networked learning perspective to the analysis of tasks, tools, and people involved in a subject of a distance course held at a Brazilian university. The networked learning approach helps to reveal relationships between designable components and the types of ensuing learning activity in distance education. The Activity Centred Analysis and Design (ACAD) framework (Goodyear & Carvalho, 2014; Goodyear & Carvalho, 2013) focuses on key structural elements in a distance offering, allowing the grounds to discuss, identify, explore, learn, and adapt key re-usable design ideas. Overall, this paper shows the application of the approach within the context of distance education in a developing country, revealing opportunities and affordances in design for distance education—but also the inherent constraints related to this particular scenario. Specifically, the research addresses the following research questions:

- How is digital innovation influencing teaching and learning practices in distance education in Brazil?
- What are some of the key affordances and constraints in a distance education course offering in Brazil—and how do these relate to design for learning?

Conceptual framing

Networked learning uses ICT to promote connections "between one learner and other learners, between learners and tutors, between a learning community and its learning resources" (Goodyear, Banks, Hodgson, & McConell, 2004, p. 1). Networked learning is often socially oriented, and emphasises participation, collaboration, and knowledge construction. In this paper, we examine structural elements that enabled learning activity (with a focus on online web-based technologies) through the ACAD framework. This approach focuses on identifying how created artefacts (e.g., course materials, resources), places (e.g., a webpage), divisions of labour (e.g., proposed arrangements for students to work in groups, pairs, etc.), and tasks (e.g., what students are asked to do) relate to one another, and how a combination of a particular set of elements influences learners' activity.

Although, these components often situate and influence activity, they do not determine it, as students are free agents and may add, change and re-configure what is proposed in many different ways. Thus, ACAD considers four structural elements. The first three are "designable" components, the last one is "emergent":

1. Set design – the digital and physical elements, tools and resources
2. Social design – social organisation of students
3. Epistemic design – proposed tasks, types of knowledge and ways of knowing

4. Co-creation and co-configuration activity – emergent activity, including ways that students may re-arrange and re-configure what is proposed.

The ACAD framework has been applied to the analysis and design of complex learning situations in a variety of contexts, including schools (Thibaut, Curwood, Carvalho, & Simpson, 2015; Yeoman, 2018); universities and MOOCs (Garreta-Domingo, Sloep, Hérnandez-Leo, & Mor, 2017; Sun, 2016); informal spaces such as libraries and museums (Carvalho, 2017); and to frame the processes of educational designers (Martinez-Maldonado, Goodyear, Kay, Carvalho, & Thompson, 2016). In this paper, our focus is on distance learning in higher education in developing contexts, specifically on how the framework helps to reveal connections between tools, tasks and social arrangements of students to a broader or macro context, and the ramifications of such a scenario for those designing and learning at distance modes at the meso (e.g., the university) or micro contexts (e.g., sequencing of a lesson). Carvalho and Yeoman (2018) highlight the importance of finding correspondence between pedagogy, place, and people, where dimensions of design and their manifestations at different scale levels express a coherent whole. And to work towards correspondence or coherence, it is necessary to first frame the learning entanglement, to identify elements that are open to design and those which are not. Only then does it become possible to bring pedagogy, place, and people together, as we conceptualise the relationships across scale levels and dimensions of design and see how elements connect with each other, and how the designable elements are likely to influence emergent learning activity.

In the next sections we describe the research design and methods, and our case study. We then analyse the case study within the ACAD framework to show how the approach opens up a way of exploring connections and finding possible areas for re-design.

Research design and methods

The study design is based on exploratory research methods (Creswell, 2003). The analysis focuses on learning materials, technologies, and social arrangements of a course subject at a Brazilian university. Our interpretation of the case study was grounded in ACAD, which offered the basis for the analysis of the learning design adopted at a particular course as the object of study—the teaching materials (epistemic design), the learning management system (LMS) and other tools (set design), and the social arrangements (social design)—thus enabling theoretical development and identification of potential improvement of techniques and processes in the learning design practices.

As a qualitative research strategy, case studies involve in-depth exploration of "a program, an event, an activity, a process, or one or more individuals. The case(s) are bounded by time and activity, and researchers collect detailed information using a variety of data collection procedures over a sustained period of time" (Creswell, 2003, p. 15). Our case study was purposely selected, after considering access to data related to a course subject from the Bachelor of Accounting, offered through The Open University of Brazil. Information related to course design was collected from the subject's LMS (Moodle), which offered us access to course content and description, log files of student activity, their course contributions (e.g., entries in a discussion forum). Our analysis also included perspectives from Brazilian policy documents, which ground part of the learning design and activity in distance education courses in Brazil.

The analysis reported in this article does not seek to exhaust all the attributes that could be checked among the practices observed; instead, it aims to illustrate how a networked learning perspective can support the understanding of the complexity of design components and their likelihood of influencing learning activity. The approach is not an end, but a means to study alternative forms of learning in the 21st century with references to practices.

Case study context: Distance learning in Brazil

In Brazil, investments in public higher education have intensified since 2005. These investments aim to increase the number of national enrolments and to facilitate access to education to students in the poorest sections of the population. Most public institutions of higher education in Brazil—including the university that was part of this study—have joined federal programs such as The Open University of Brazil (UAB), Restructuring and Expansion of Federal Universities (REUNI) and others, which have similar purposes and goals—the democratisation of the public higher education in the country. Between 2005 and 2014, the Brazilian university in this study experienced an increase of almost 15,000 students, reaching over 46,000 total enrolments and the creation of four new campuses, with over 10,000 new places opened in the distance modality. Distance courses were offered in eight Brazilian states.

Distance education in Brazil was first established in 1996, through a public education policy supported by the government's Law of Guidelines and Bases of National Education (LDB). Since then, there have been significant developments in public education, with many challenges but also advances, especially since the establishment of The Open University of Brazil (UAB) in 2005. UAB is a programme that brings together Brazilian public institutions in higher education, city council authorities, and state governments, all under the Coordination for the Improvement of Higher Education Personnel (CAPES). In the UAB's proposed distance education model, Local Support Centers were established for support and some compulsory course activities. These are physical spaces with an infrastructure for administrative support and teaching facilities, where students have access to a library and computer lab (e.g., from which they can access a course's LMS), tutors, classes (video conferencing), among other activities (Moraes & Vieira, 2008). The UAB Program aims to "promot[e] institutional development for the distance education modality, as well as research of innovative methodologies in higher education supported by information and communication technologies" (Decreto 5.800, 2006). Several Brazilian government bills were created with the aim of improving the quality of higher education. One of these is Ordinance N°. 1134/2016, which requires that higher education institutions introduce courses in semi face-to-face mode, when face-to-face does not exceed 20% of the total course load. Not surprisingly, it is expected that face-to-face and distance-learning modalities converge through the use of ICTs, enabling hybrid education with innovative and interactive practices.

Within this scenario, the Bachelor of Accounting at this Brazilian university is a degree offered under the UAB Program. Since 2008, there were 600 places offered in 15 cities in 6 Brazilian states, with 195 successful graduates. The degree is designed to encourage students' development of in-depth knowledge of theoretical ideas and technical practices in accounting. The course emphasises ethically and socially responsible norms, with students working through processes of analysis, generation, and reporting of accounting and management information.

Moodle was adopted as an open-source software that "is designed to be compatible, flexible, and easy to be modified" (Dougiamas & Taylor, 2009, p. 20), that facilitates students' access to educational resources related to their courses. In this case, the choice of LMS is crucial. Also specific to this university was the development of MoodleTests, a platform that provides a safe and stable alternative to conduct final exams electronically without interfering with any content other than that provided in a specific module/course. This choice was prompted by national Brazilian law (Decreto 5.622, 2005), that, at that time, required the physical presence of students at the exam venue. An online exam CD, which restricted students' access to certain resources and to the internet during an exam was developed, and the exam is performed via exclusive access to the MoodleTests platform (Vieira, Moraes & Fiala, 2013). Lecturers and instructional designers develop the test in a subject area, which is then deployed via MoodleTests.

Within the Bachelor of Accounting we selected the subject named *Accounting Research Techniques*, which was offered during the second semester of 2017, as a case study. There were 38 students. Its learning design and production process involved a 47-page book and 8 learning objects developed by the lecturer and produced as part of the instructional design. The course content is written and adapted to a dialogic language, acknowledging constraints given the space and temporal nature of distance education and based on course curriculum. At each new iteration of a course offering, the LMS and materials may be adapted, updated or re-developed, according to the context of use. Guerrettaz and Johnston's (2013) remind us that the "practice of the curriculum materials [have] a number of ecological consequences" and that "[p]rogress and success in the class [are] defined as 'moving through the materials'" (p. 785). Thus, there is baseline text that is put together as the main resource for course content, serving the development of distinctive features. This baseline text is adapted for each new version of the course, incorporating adjustments from lessons learned in previous versions of the course offering, and/or specific or updated content for the present version.

Importantly, the use of an e-book format provides access to these baseline texts to people in remote and rural communities, where an internet connection might not be adequate for downloading videos or streaming live. The initial material, produced by the lecturer, is then further developed with the addition of other educational resources, which are made available in Moodle. After the instructional design stage, the content is diagrammed, and converted to PDF and EPub. Given the popularity of mobile devices, it is also often necessary to test for "responsive" formats and layouts that might be qualitatively better, more flexible and suitable for different portable devices. In the course *Accounting Research Techniques*, the EPub format was adopted as the standard open source digital file, because it is widely supported on a number of platforms.

Within the ACAD framing (see Table 1), we see course design as also influenced by public policies on education, which guide some of the choices in terms of pedagogical approaches to distance learning (epistemic design) and in the disciplinary area of Accounting (epistemic design) as well as technological options (set design) that are made available. The unique combination results, in part, from contemporary training demands, in line with other OECD countries in an increasingly connected society (OECD, 2017). Connectivity and access to the internet in Brazil is, nevertheless, highly heterogeneous.

Accounting Research Techniques is offered in the seventh semester of an eight-semester course, and it comprises 72 hours of learner time. The subject covers scientific methodology, scientific research organisation and production of scientific articles (epistemic design). Although most of the course is offered in an asynchronous distance mode via Moodle, there are approximately 4 hours of synchronous activity, distributed across three virtual encounters during the semester, in which students participate in video conferences (epistemic and social design). These are key opportunities for students and lecturers to interact live. Although all students are highly encouraged to engage in these activities, synchronous participation is not mandatory, while participation in asynchronous learning activities, via Moodle, is compulsory. Four discussion forums and learning tasks scaffold students' ideas towards three specific assignments. Moodle houses all the educational resources for the course, and in the weekly forums, lecturer and tutor students are encouraged to participate in discussions, through prompted questions and suggestions for students' work. Forums are designed to stimulate communication and offer a space for addressing misunderstandings and clarifying issues (social and epistemic design). For example, although we identified 47 forum messages in one of our forums, these interactions have to be considered just as part of the "visible" emergent activity—as there are often silent readers, who do not necessarily actively participate in discussions, but have some form of engagement. The challenge in these scenarios is to get frequent and significant contributions. As often occurs in distance learning, some students are more tentative in voicing their opinions, and may refrain

from discussing ideas and concepts in "public" forums. Making sure a convivial space is created (social design) is crucial.

In *Accounting Research Techniques* students progressively elaborate their first individual monograph project for the course. This is a required major assignment task (epistemic design) for successful completion of the Bachelor of Accounting. This subject is a key component of the overall degree, as students must show their ability to successfully build on theoretical ideas and translate theme into an individually written production. Considering the nature of their main assignment task, social interactions are designed to support procedural and methodological goals, rather than aiming at collaboration or building on peers' contributions, with most interaction being instructor-centered.

Table 1 summarises the elements in the ACAD framework in relation to the case study.

Table 1 Elements described through the ACAD framework

	Set	Social	Epistemic	Co-creation and co-configuration activity
Concept	Complex mix of inter-dependent digital and material, artefacts and tools	Scripted roles Social arrangements/ organisation of students Broader cultural context	Knowledge-oriented structures of a network Proposed tasks	Emergent reshaping and reconfiguring of the proposed task
Format	Video conferences Discussion forum Moodle EBook Exam CD Local Support Centres	Distance learning mode Tutor and Lecturer Instructor-led interactions.	Scientific methodology assumptions Scientific research organisation Paper production in accounting research techniques.	Three synchronous meetings Asynchronous discussion forum Gradual individual textual production

Analysis and discussion

Learning is a subjective experience, often influenced by an individual's immersion in a complex mix of elements and interactions, which may be mediated or improved by using technologies. Although it is not possible to design someone's learning experience per se, "design can have an effect on activity indirectly, through the ways in which it creates tasks and through its shaping of the physical and social context in which activity unfolds" (Goodyear & Carvalho, 2014, p. 59). Being able to differentiate between "what is designed" and "what is the emergent activity" is crucial, because it is the first step towards figuring out how designable components affect learning, what is open to alteration and what is not. We use these ideas to theorise about our case study, linking aspects of the micro and meso levels of the design of the course—with a focus on tools, tasks, and organisation of people—to the broader context (macro level) of distance education in Brazil.

How is digital innovation influencing teaching and learning practices in distance education in Brazil?

The analysis of policy documents, and also observations of course design elements, via what is proposed that students do, and observations of what students did—shows a complex mix of inter-dependent components (Goodyear & Carvalho, 2014). Some of these elements may be more

easily adjusted than others. For example, alterations in a sequence of learning tasks are easier to achieve (micro level), than working to modify specific policy provisions (macro level). Making sure that the layout of a course is easy to navigate on a desktop, laptop, or handheld device may be easier to realise (micro/meso level) than assuring access to reliable online connections in remote locations (macro level). These, in turn, affect the choices about design, and the emergent teaching and learning activity. As pointed out by Hiller and Landis (2014) "for those who undertake the design of e-learning experiences, navigating through the multiple approaches and models can be daunting" (p. 200). While design of instructional sequences and learning materials are important, what our case study shows is that design for learning goes much beyond that, and also involves tools and other elements that may help someone learn, all interwoven in an assemblage of elements. Learning tasks, or the epistemic activities, that students are asked to do, are influenced by physical and/or digital settings, and these are also largely dependent on social structures at the micro level (where students are located and how they are grouped into tasks) but also at a macro level (how these relate to policy and government interests).

The course we analysed is part of a public institution and, as such, the learning design for the Accounting Research Techniques case study is greatly influenced by policies and public funding. These in turn, are reflected in variables of the design and the learning process enacted (e.g., the way teaching materials are made available in Moodle, or even the choice of Moodle as an open-source software. One of its main objectives of distance education —in line with The Open University of Brazil—is to reduce regional inequalities in access to higher education.

Offering broad access to printed materials is crucial, because it addresses the fact that online connections might not be always available (set design), or reliable; they might be intermittent or difficult for those accessing the course from remote communities. Selecting resources such as videos, or streaming live classes, might also not be ideal, if there is an unreliable infrastructure to support such practices. Learning materials can be carefully sequenced and organised (epistemic design) to facilitate students' potential misconceptions, but in our case study such design is also mostly organised with an emphasis on a knowledge-transmitting format or via activities that focus on individual learners. This procedural and teacher-centric approach to teaching and learning is enacted through design tasks that focus on students' individual participation, where learners work independently to complete guided readings or tasks, in a way that is more likely to be associated with behaviourist-cognitivist learning theories (Anderson & Dron, 2011).

What are some of the key affordances and constraints in a distance education course offering in Brazil—and how do these relate to design for learning?

One of the affordances inherently associated with distance learning relates to the ability to reach out to remote communities and to those who would perhaps not be able to otherwise have access to knowledge and information. Although such equitable access to education is a core issue in a large developing country such as Brazil, technology only partially helps to address this issue. As Czerniewicz and Brown (2014) highlight, technological literacies are intrinsically connected to other literacies and are not the only component in a dense array of experiences of students, particularly those remotely located.

If digital innovation is indeed one of the key drivers of societal transformation and prosperity (OECD, 2017), it is crucial that developing countries invest in the design of educational programmes in general, and in distance education in particular, with a view to helping to address ICT training priorities and upskilling the general population more effectively. Distance education fundamentally requires generic and foundational ICT skills, such as the use of ICT to problem solve and to communicate, given its very mode of delivery. But this is only one small piece of the puzzle, as digital literacies are interwoven with other literacies such as reading and writing. In addition, our case study shows an emphasis on a pedagogical model that still relies heavily on

teacher-centred practices (epistemic design), rather than emphasising collaboration, knowledge building, or creative thinking or other 21st-century skills. Practical constraints—such as broadband accessibility (set design)—also influence elements of design; for example, making the production of multimodal artefacts difficult, and turning written dialogic language into the preferred mode of communication, thus reinforcing the teacher-centred model (epistemic and social design). This is part of the context in developing countries, where a lack of reliable online connections in remote areas is more prevalent (set design). As we discussed, key materials and tools employed in teaching and learning in our case study involve using technologies to facilitate communication amongst students and lecturers, encouraging collective learning. But most of this interaction is still grounded in individual asynchronous communication in Moodle spaces, with little room for knowledge building and collaboration activity. Multiple elements are interacting in an architecture that favors students' particular social arrangements to study and learn.

Social inequalities in higher education contexts often translate into educational inequalities, raising important questions and additional challenges for those in developing countries about what it means to be part of a digitally mediated knowledge society (Swinnerton et al., 2018). Essentially, while universities and students across the globe may experience challenges when using technology for learning, developing countries such as Brazil have additional concerns associated with their own broader social context. Universities in developing countries are often positioned on the periphery of a knowledge society dominated by those in developed economies. While developing countries aspire to adopt pedagogical models and perspectives that are considered best practices in education, these models are often "inherited" and not necessarily "fit for purpose" as they have been developed for a highly distinct macro context. And yet developing countries have to find ways to adapt these models and practices to their own realities if they are to continue with their aspirations to climb to new stages of scientific and technological developments.

At a practical (micro/meso) level, distance education in developing countries may include having to find different solutions for video streaming and synchronous classes (set design), careful considerations about multimedia resources and tools (set design) that encourage collaborative work (social design) alongside an unreliable network (set design, macro level) to support these efforts. These choices are likely to affect distance students' emergent activity, as some will be unable to participate in a proposed task (epistemic design).

While all universities across the globe often need to deal with forms of digital inequality, such as inequality in equipment, autonomy of use, skills, social support and/or the purposes of use (DiMaggio & Hargittai, 2001), distance education in developing countries must deal with extra constraints and concerns. Universities may also struggle to find what it means to have correspondence between tools, tasks, and social structures in their own contexts. Analytical tools such as the ACAD framework help educational designers map the landscape (Carvalho & Yeoman, 2018) as a first step towards searching for innovative ways of enacting best educational design practices that fit their own realities, not only across different dimensions of design but also at the micro, meso and macro levels.

Conclusion

This study examined design for learning and the use of technologies for educational purposes in a specific context and country. We framed specificities of the case study through structural components in the ACAD framework, and expanded on how learning design can be influenced by the broader scenario of distance education in developing countries, such as Brazil. ACAD offered the basis for structuring our analytical ideas, grounded the discussion of the affordances and constraints related to the use of technologies for learning, and for the tools, tasks, and social arrangements. Overall, we examined how all of these elements align with the educational

purpose and goals of an institution and their broader socio-cultural contexts. This is particularly important in the field of higher education, where learning design decisions, which have roots elsewhere, are enacted in the classroom. Such understanding may be used to support decision-making processes of spaces for distance and blended learning. The ideas discussed could be useful to educational designers in developing countries, where design work involves conceptualising ways to improve learning design through particular features that are open to alteration and are likely to influence the emergent activity of distance learners.

Further exploration concerning how students perform and are affected by the design of components is required. Learner experience and feedback may reveal the effectiveness was the design, which may ground a path on where we go next in terms of re-design.

However, the conceptual issues outlined here are likely to provide guidance regarding ways to support decision-making processes of planning spaces for distance and blended learning.

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