

DISTANCE EDUCATION AS A SERVICE SYSTEM

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Abstract— Distance education (DE) is the teaching method that grows the most in Brazil, and as the enrolment number grows, the challenges expand with it, because the teaching organizations need to structure themselves to attend the increasing demand. In this scenario, DE should be viewed not just in the technology basis, but rather with a systemic view that is compounded by all teaching modality aspects such as learning, teaching, communication, creation and management. Due to this need, it aims to analyse DE as a service system, like it is defined in the Service Science perspective, as dynamic settings of resources (people, technologies, organizations and shared information) to generate a mutual value. In doing so, it proposes the conceptual model DE-SS that provides a holistic vision of relations among resources and stakeholders in a distance education system.

Keywords— service science, service systems, distance education.

I. INTRODUCTION

Distance Education (DE) can be defined as a type of education that is planned by the faculty and organizations and in which teachers and students are far from each other, spatially or temporarily, requiring several communication technologies and special administrative and organizational structures [1], [2]. This definition highlights the necessity of action planning related to distance education, once DE is built up by a set of systems, such as technology infrastructure, didactic material production and organizational and methodological aspects that need to be together to provide the processes of teaching and learning environment for DE. In this perspective of DE as a set of systems and comparing it with the conceptual model of education system proposed by [2] and the pedagogical model proposed by [3], it is emphasized the convergent conception of the definition of a distance education system composed by a set of subsystems, that despite the fact of being analysed separately, constitute the whole DE system, being indissociable in their construction. Hence, it is necessary to envision distance education as a system, in order to have planned actions for distance course offering. The term “system” used above refer to an organised set of elements (e.g., people, organizations, technologies, contents), that interact to reach the expected objectives for the system, in the context of Distance Education.

Based on the concept of DE as a system, there is the definition of a service system that is seen as the basic abstraction of a Service Science and can be defined as dynamic configurations of resources (people, technologies, organizations, and shared information) for the co-creation of

value [4]. On this definition, the central resources are vital because they include copyright resources (people and organizations), property resources (technology and shared information), physical entity (people and technology) and entities that are socially built (organizations and shared information) [4]. Therefore, distance education can be characterised as a service system, as well as it can be defined in the perspective of the Service Science, such as dynamic configurations of resources (people, technology, organizations and shared information) for the creation of mutual value.

Thus, this article aims to characterise distance education as a service system through a conceptual model named DE-SS, that analyses the relations between these resources (people, technology, organizations and shared information) for distance education in the scope of service system.

II. SERVICE SYSTEM

Regarding to the service systems definitions, they focus on the interaction among resources for co-creating value, as it is verified in [4], and it proposes the service system as the basic abstraction of the Service Science, defining the service systems as dynamic configurations of resources (people, technology, organizations and shared information) for the co-creation of value. Still based on the authors, these four types of resources are important because they include copyrights (people and organizations) resources as properties (technology and shared information), physical entities (people and technology) and socially established entities (organizations and shared information). In the same way, in [5] the authors point out four types of resources: people, technology, organizations, and information that people and organizations are functioning resources (actors) and technology and information are operating resources (used by actors).

Based on their context, resources are all types of useful things that can be named, and they might have four types: physical with rights (e.g., people), physical without rights (e.g., technology, environment), non-physical with rights (e.g., companies, nations, universities) and non-physical without rights (e.g., information). In this context, rights derive from laws, and laws are a type of physical resource without rights [6]–[10].

Resources can assume the role of entity within the service system, in which according to [10], the entities are complex resources configurations that can initiate the service actions. Still, according to the authors, all entities within the service systems are resources, however not every resource is a service entity, since entities are dynamic configurations of co-creation of value and they include people, organizations, shared information and technology. In this sense, the authors

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in [9] define entities as the dynamic configuration of resources that need at least one type of resource with rights and responsibilities and some type of access (direct or indirectly) to every resource inside the configuration.

In [11] we identify five types of entities: main service: is the administrator of a service; service producer: is the one responsible for the back-end production; service provider: responsible for the service application for the benefit of the client; service client: receiver of the benefits of the service application; service object: it can be the beneficiary direct from the results of the service processes.

The resources inside the entity's role can see themselves and maintain multiple perspectives on the service system stakeholders, in a way that they are actors that interact in a relationship for the co-creation of values. The four main types of stakeholders are: client, provider, authority and applicants [5], [9], [10], [12].

III. DISTANCE EDUCATION AS A SERVICE SYSTEM

According to [13], education is certainly a service and schools are service systems. The author describes that the educational systems (class attendance, online, semi-attending) must not have differences regarding the operational and organizational management when compared to any other service system, and, in complying with the principles of Service Science, the educational systems must be managed and operated to meet the educational needs of students attended by this system. Converging with the author, from the definitions of DE, his systemic vision in [2], [3], and in the service systems inside the Service Science, DE can be characterised as a service system, as defined inside Service Science, as the configuration of dynamic resources (people, technology, organizations and shared information) for the co-creation of values.

The above definition has as its central point the service systems as configurations of dynamic resource for the creation of mutual values. Therefore, the perspective of service systems will be used as an orienting structure through the concept model named DE-SS, as shown in Fig. 1, to analyse a distance education system concerning the main dimensions of resources, people, organizations, shared information and technologies, allowing to systematically derive possible enhancements for the distance education course offering.

The next topics(A-D) focus on each resource (technology, people, organizations and shared information) present in the concept model of DE-SS and how they are inserted in the DE context as a service system.

A. Technology

Technology is one of the pillars of distance education. It provides the necessary means for the teaching and learning processes so that they can happen in an environment where teachers and students are spatially and temporarily separate.

According to [14], technology has great importance in distance education. In the traditional education, technology may be a part of the process, whereas for DE, it is ever-present both for the students receiving didactic materials, as

well as for the interaction with the staff responsible for the process of teaching and learning.

According to [2], in education, there must always be communication between teaching organization and the students. For distance education, this process happens through some type of technology. In their works, the authors separate the terms "technology" and "media". Technology is the vehicle of communication (e.g., print, radio, television, video-conference, computer, web-based systems) and they are represented through medias. For example, text and image medias can be transmitted through print technologies as well as online via the web. Based on this distinction between technology and media, the authors state that there is not a right or wrong technology for distance education, and each media and each technology for their transmission have both strong and weak aspects, so, the mistake is categorically restraining to only one type of media. The choice of the technology must be done concerning the students' objectives and the learning environment, so, there must be a selection of media combinations to meet the diversity of the themes and the students' needs, as well as providing repetition and flexibility.

Having the same objective of separating technology and media, in [15], it is described that any activity of learning involves communication and this needs one or more types of media to be effective. The author defines that a certain type of media can be characterised by three elements: its technology (electronic or concrete) its symbol system (static or continuous) and its processing capacity (space, time, interactivity, type of reading and content stability).

Regarding the distinction between the terms "technology" and "media", it is important to perceive that media, according to Service Science, can also be classified as technology, whereas content (knowledge) represented by the media is better classified as shared information. For example, a book (digital or printed) about basic computing is a technology that is used by authors of the service system (e.g., students, teachers and organizations), but the content in that book is a source of knowledge that is shared by the organizations between the students and the teachers, therefore, the content (knowledge) about basic computing is a shared information in the service system. In this context, the technology, represented by a media, provides support to people and organizations involved in a distance education service system so they can interact and access sources of knowledge, which are the shared information inside the service system.

B. People

In the context of distance education as a service system, the main people involved are students, teachers, managers and the administration staff.

According to [16] the service of education is a process of transformation of knowledge centered on people and it provides beneficial values (values co-creation) for both service providers and students. In this context, students, through the perspective of Service Science, apart from being a resource, can be seen one entity of the service system or as a stakeholder, such as a client. Using the entity classification according to [11], students can be classified as the service client, i.e., the receiver of the application benefits of the service provider, having a complementary relationship of the

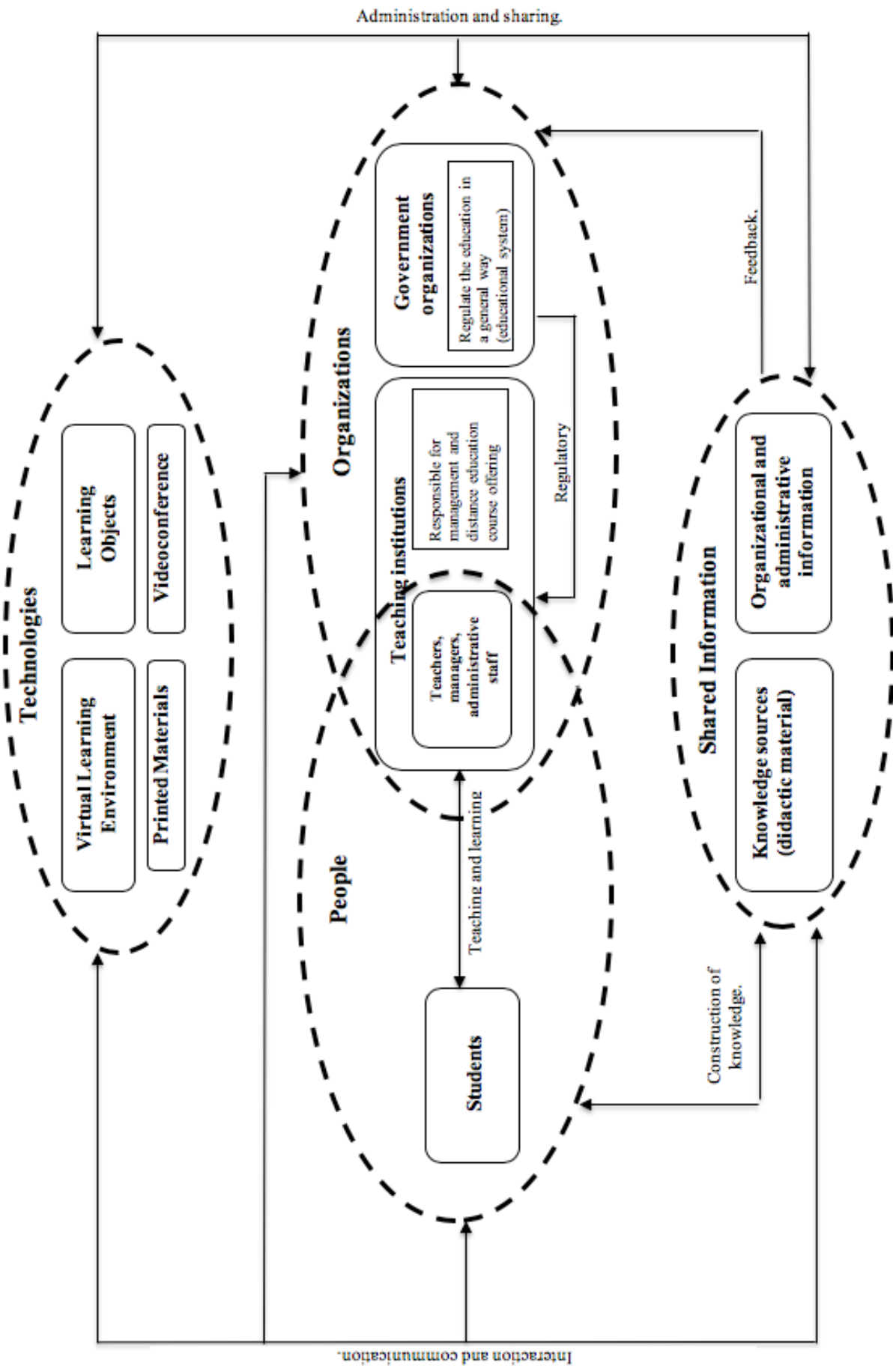


Fig. 1. Distance Education as a service system (DE-SS).

offered services with the provider. In certain contexts, the student can also be classified as a service producer entity, this happens at the moment he joins the knowledge production and become co-producer of knowledge, a theme that will be approached further on.

Regarding the role of the students as an entity and stakeholder of the service system of distance education, it is important to highlight the new role, in the current knowledge society that is demanded from the students, from both traditional and distance education. According to [17], students need to overcome their passive role that only listens to, reads, memorises and repeat their teachings. They must become creative, critical, researcher, and effective so that they can produce knowledge. Thus, beyond becoming a competent professional, they must be critical, autonomous and creative citizens, so that they can solve problems, question and transform the society on their own initiatives. In the same way, [18] points out that DE students must develop a fundamental and determining principle for their academic careers: autonomy. It is impossible for the DE teaching and learning process to occur without the development and balance between the capacities mentioned above, because they are the foothold of the process and one indispensable requirement for the development of interaction, which is an important factor for DE.

The same way a new role for the students has been demanded, teachers also need to modify and adapt to this new reality. According to [17], teachers must overcome their authoritarian role as truth holders and move on to a new role of a reflexive and critical researcher. Teachers need to be creative, articulating and, most important, partners with students in the process of teaching and learning. Teachers need to worry with learning, especially learning to learn as a way to promote the seeking and investigation of knowledge with their students in a collective way. The author points out that the main focus now is learning and not teaching.

Distance Education teachers need to be more attentive to this new role. They must be more creative, articulating and be students' partners for knowledge. According to [19], DE teachers are centered on promoting situations that provide the development of students' autonomy, cooperation and interaction. According to the authors, teachers must develop activities that keep students' interest, in order to support and encourage them during the entire process.

An important question for DE teachers is they can assume different roles in the distance and learning education process. According to [19], these roles can vary depending on the teaching institution, for example, there are the roles of training teachers and content teachers. Training teachers are responsible to follow and operate the course during all school term, besides being responsible for elaborating the exams and activities. Whereas, the content teachers are responsible for the production of didactic material for a certain course or discipline.

Analysing the role of teachers for DE, they can be seen as entities of the service system, better named as service providers, and in some cases as service producers, once they produce materials for the teaching and learning process.

Regarding the different roles for the teachers through the perspective of the Service Science, teachers can be seen from multiple perspectives by the students. In this way, students are actors that interact in a co-creation relationship through

multiple teachers' perspectives, such as training or content teachers. Regarding the students' relations, teachers' multiple perspectives can be classified as different stakeholders such as provider and authority, because they provide education service and have the power of authority with the students (e.g., penalise and failing).

Distance Education can be defined as a system that is formed by every process and component that operates when the distance teaching and learning happens, including learning, teaching, communication creation and management [2]. This way, apart from the students and teachers, other actors need to stimulate the process of teaching and learning so that they happen in a satisfactory way through DE. These actors are managers and the administration staff.

Managers (e.g., principals and coordinators) in DE are responsible for the administration of a program involving every main event and activities that support the whole process. According to [2], these activities include deciding which courses will be offered, administrating the process of creation and implementation, training, supervising the academic and administration staff and express continuously its quality, effectiveness and efficiency.

According to [2], the range and the complexity of administrative activities depend on the type of Distance education. Still, according to the authors, most of the times the teachers assume part of the administration of their courses. For the authors, one of the most important functions of the managers is to define (i.e., identify, recruit and train) every collaborator that are necessary for the creation and operation of an institution or program offering DE. The collaborators defined by the managers constitute the technical and administration staff, and it is formed by professionals with specific responsibilities within the DE service system, providing technological, pedagogical and administrative support for the production of didactic materials.

The definition of the main professionals inside the technical and administration team, that are necessary to manage the DE activities, is directly related to the institution purpose and how the DE is organized within the teaching organization administrative structure. According to [2], in a matter of organizational structure, DE exists in various levels, such as institutions with a single purpose, in which DE has one specific activity and in institutions with double purposes, in which they offer both traditional and distance education.

For both institutions having a special unity for the administration of the DE courses, the main professionals in the administrative staff are web designer, developer/programmer, computing technician, audio-visual technician, systems analyst, computer network administrator, illustrator, designer, video editor, camera operator, instructional designer, pedagogue, social worker, linguistic revisor, and administration assistants.

During this topic, we see that there are several people involved in a system providing DE, such as students, teachers, managers and the administrative staff. Depending on the perspective, they can assume certain roles, thus constituting entities and stakeholders on the service system. It is vital that these people act in a way to seek the co-creation of values for the offer of DE courses. Also, we highlight that there are other people in the DE process, such

as parents, community organized civil society and every other people involved in educational systems.

C. Organization

In the ambit of DE, the main organization refers to the education institution that is responsible for the management and offering of DE courses and they can be a single or double purpose institution, as mentioned above. The teaching institution is the provider and the authority of the service that needs to guarantee the co-creation of values in the processes related to teaching and learning in DE courses. Using the entities classification according to [11], the teaching institution can be classified as the service main's focus, i.e., the administrator of a service or a service system as a whole.

To reach their goals, the DE organizations, made by a set of systems, need to implement several actions. In this context, the works of [2] and [3], describe in a convergent way that the main actions that happen in DE involve methodological, management (organizational), technological and production aspects, which are present once there is teaching and learning through DE.

Regarding the methodological aspects, the organizations need to pay attention to the necessary and present elements in the actions of teaching and learning through DE, including activities to be carried out, ways of interaction and communication, evaluation and the organization of every element in a didactic sequence for the learning.

The managerial aspects are related to the entire management of the organization, such as planning (strategical, pedagogical and financial), administrative structure, evaluation and control, human resources (recruiting and training) and the political questions of the organizations.

The technological and content aspects (didactic materials) are related to the obligation of organizations to provide the technological support that is needed in order to allow the processes of teaching and learning to happen through DE. These processes are based in a program/course that is formed by a source of knowledge structured by didactic materials (contents) that must be taught and learned.

Besides the organization responsible for the distance learning course offering, other organizations are involved in DE. The main ones are governmental organizations that regulate the education in a general way, meaning that they constitute the educational system. These organizations are important due to the evidence that many elements presented in the organizations involved are determined by the most fundamental restrictions encountered in the educational system as whole, and the responsible organizations are supposed to operate within this context.

D. Shared information

For DE organizations, the shared information focuses primarily on making the source of knowledge available for students and teachers through structured didactic materials that will be needed in the teaching and learning processes. The contents (knowledge) of the didactic materials are one of the main shared information in DE. According to [20] the quality of DE course depends on the quality of the didactic material, and, the quality of the material depends on several matters such as the didactic quality of this material and the

use of different media. Thus, didactic materials must use different medias (technologies) to transmit knowledge (shared information).

Apart from the information related to the didactic materials, organizations also share information related to administrative, control and political and evaluation and measures questions, such as institutional regulations (e.g., subject credit transfer, test replacement and rules of institution access), evaluation questionnaires (organization and teachers evaluation) and quality measures (e.g., quality, productivity, conformity and sustainable innovation).

Regarding the students, they interact with the information shared by the organization and teachers in a process of their own construction and knowledge of the educational environment, producing information (feedback) that will be used by the organizations in the process of teaching and improvements on their various administrative aspects, in a process of co-creation of values (e.g., evaluations, discussion forums, reports and activities).

IV. CONCLUSIONS

In this article, we demonstrate the concept model DE-SS, see Fig. 1, that through a Service Science perspective, defines the Distance Education as a service system that is defined as a configuration of dynamic resources, such as people, technologies, organizations and shared information for the co-creation of values. In this context, the technologies are responsible for the interaction and communication among resources, providing the necessary means for the process of teaching and learning in DE. The organizations are responsible for the administration and sharing of the service system, in which they must consider all aspects (methodological, managerial, technological and content) needed to guarantee the co-creation of values in the process related to distance education course offering. People interact with other resources seeking the co-creation of values for the DE offering. Last, the shared information must provide sources of knowledge and other needed information for the construction of knowledge and feedback on the management of the service system.

From the resource named technology, we draw our attention to its importance as one of the most important pillars of Distance Education. Technology provides the necessary means for the processes of teaching and learning to happen in an environment where teachers and students are spatially and/or temporarily separate. Next, for the resource named people, we draw the attention for the main people involved in DE (students, teachers, managers and the administrative staff), who depending on the perspective, can assume certain roles, constituting entities and stakeholders in the service system. We highlight the necessary abilities for each of these actors within the DE service system for the creation of value. Right after, for the resource named organization, we point out that the main organization refers to the education institution, which is responsible for the management and the offering of DE courses, being the service provider and the authority that needs to guarantee the co-creation of value in the processes related to DE, which involves methodological, managerial (organizational), technological and content production (didactic materials) aspects that are presented when distance learning and teaching occurs. Besides the organisation responsible for the distance education course offering, we highlight the

government ones, which regulate the education in a broad sense, meaning they constitute the educational system. Finally, for the resource named shared information, we point out that they aim at making available the sources of knowledge for students and teachers, through structure didactic materials that are necessary in the process of teaching and learning and the information related to administrative, political and control, evaluation and measures matters.

This article contributes theoretically on the application of Service Science, more specifically service systems and its configurations related to the context of Distance Education. The conceptual model DE-SS is useful to provide a holistic vision of the relations among the resources, as well as the stakeholders in a DE system. Based on this holistic vision of a DE service system, the DE-SS model provides a structure that can facilitate the identification of several elements that make the Distance Education system, aiding on the identification of inadequacies and opportunities for the improvement of services and/or innovations.

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