Research Article

American Journal of Science Education Research

Construction of the Digital Pedagogy Triangle in Distance Education to Intervene in the Context of Comodal Teaching

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Citation: Lafleur F (2024) Construction of the Digital Pedagogy Triangle in Distance Education to Intervene in the Context of Comodal Teaching. American J Sci Edu Re: AJSER-177.

Received Date: 09 March, 2024; Accepted Date: 25 March, 2024; Published Date: 01 April, 2024

Abstract

The subject of this article is a part of a large research project deployed as part of the Digital Action Plan in Education and Higher Education of the Government of Quebec (Plan d'action numérique en éducation et en enseignement supérieur (PAN)). The problem stems from professional gaps identified by digital actors in education (teachers, trainers, educational advisers, students) when designing and planning their teaching-learning. This project has therefore initiated a reflection on the improvement of the pedagogical and didactic use of digital technology in terms of teaching and learning in the context of comodal education in particular and in distance education in general. In order to be able to build a relevant conceptual framework, we first referred to Houssaye's pedagogical triangle and Faerber's tetrahedron, to sharpen our reflexive analysis and to finally generate our digital pedagogy triangle model of distance learning (DL), as well as a framework concept of comodal education learning. Through the modeling of these theoretical devices, revisited and proposed in a new way, we want to update and invigorate the potential of these theoretical models for the currently lacking reflective analysis of scenarios and pedagogical and didactic devices throughout their design. We thus illustrate the ability of our models to dissect and shed light on the complex interactions between the essential poles of digital teaching-learning in a comodality context.

Keywords: Distance learning, digital pedagogy coherence, pedagogy triangle, didactic triangle, comodal teaching, communities of practice.

Introduction

This article is part of a broad research project deployed as part of the *Plan d'action numérique en éducation et en enseignement supérieur* (PAN) (Quebec Ministry of Education and Higher Education, 2018) [1] (QME). The project is entitled *Les pratiques émergentes à privilégier en contexte d'enseignement comodal* (Emerging practices to be favored in a comodal teaching context), and aims to initiate reflection on ways to improve the exploitation of digital technology from the pedagogical and didactic perspectives of teaching and learning. The project is divided into two phases.

Phase I of the action research training (ART) took place in spring 2021. Its first objective was to document teachers' and pedagogical advisors' conception of distance learning in a comodal context, i.e. in a context combining face-to-face and distance modalities, without free choice of modalities as is the case in bimodal teaching. The transition from comodal training to practice by the same research participants was also the subject of this first stage of the project, through a joint reflective analysis. Phase I of the study also underlined the vital importance that teachers and pedagogical advisors attach to the support offered to them during the transition from face-to-face teaching to distance learning and comodal teaching. Competency development enables them to ensure pedagogical coherence in their interventions. Pedagogical coherence includes the pedagogical and didactic dimensions specific to digital teaching, as well as the techno-pedagogical aspects linked to the range of technologies deployed. It is built through the integrated accumulation of thoughts and decisions, and their synergy, rather than through a linear process.

In the light of the findings of the first phase of the project, five key themes were identified as central to comodality training. As a result, a self-training course developing these themes was created to use in Phase II of the Research-Action-Training (ART) project. Research participants were invited to complete this self-training simultaneously with the project, and were accompanied as they put their new comodality skills into practice.

Problem

The project takes the form of an action research in training (ART) on a teaching practice in the context of DL in the Québec's youth sector. Its aim is to efficiently develop digital competency in a comodal context for the players involved (teachers, trainers, pedagogical advisors), and it is part of the Quebec Ministry of Education's pilot project. The evidence and knowledge co-constructed, as part of this research, contribute to identifying emerging practices in comodal teaching and enriching the various pedagogical practices. Given the lack of universal theoretical models expressed by participants to guide them in the construction of their teaching-learning in DL and comodality, our evidence and co-constructed knowledge will enable the ART team to formulate recommendations to support the foundations of the construction and development of digital competence for teachers and pedagogical advisors in Quebec's youth sector. The research team had the mandate to identify the most promising approaches and practices of co-modality teaching which beneficially combine an in-person mode for certain learners and a distance mode for others belonging to the same class. The approaches considered promising are those favoring the general improvement of learners' mastery of

targeted skills according to the individualized favorable impacts of one or other of the modalities.

The QME is giving the UQTR this mandate to support school staff by creating communities of practice (CoPs) that include researchers, and by making available a range of resources, both existing and under development. In addition, the QME wishes to gather evidence – in the broad sense of reliable data, based on proven practices and effectively producing the desired results – and knowledge from research to identify and consolidate emerging practices to be favored when it comes to enriching different pedagogical practices with comodal teaching.

As part of this ART project, we conducted reflexive analyses within communities of actors, in a socioconstructivist context, where they jointly made diagnoses on the components of the problem and participated in the development of corrective models. This article, while revisiting both Houssaye's pedagogical triangle (1988, 2000) [2,3] and Faerber's tetrahedron (2002) [4], focuses on our construction of the digital pedagogy triangle in distance learning (DL) to intervene in a comodal teaching context. Our conceptualization of this model appears to correct the modeling shortcomings identified by the actors who took part in the ART.

Towards the Construction of a Conceptual Framework for the Project

The project follows the four stages of action research training outlined by Charlier (2005) [5], which are defined as follows: 1) planned action; 2) construction of the research problem by making a conceptualization break; 3) construction of a new conceptual framework (or reconceptualization) and a congruent methodological device; 4) integrated three-dimensional communication of the ART for transferability and generalizability in practice.

In this article, we will focus exclusively on the third stage, which concerns the construction of the project's frame of reference. Firstly, this frame of reference offers the opportunity to construct, upstream, the conceptual framework of comodal teaching learning, since its socioconstruction is achieved through encounters with research participants. Secondly, this conceptual framework guides us in the extraction of emerging practices to be favored in the context of comodal teaching.

Finally, our article presents and discusses in detail the theoretical elements and models leading to the genesis of the digital pedagogy triangle in distance learning (DL) that we propose to intervene in a comodal teaching context in the youth sector. By extension, we also explain our conceptual framework for comodal learning, adapted from Houssaye (1988, 2000) [2,3] and Faerber (2002) [4].

Digital Pedagogy Coherence in Distance Learning

An ART evolves over the course of the research, as it enables data to be collected throughout the exchange process using a qualitative method (Fortin and Gagnon, 2016) [6] and discussion sessions during weekly CoP meetings (Leclerc, 2012) [7]. In addition, semi-structured interviews were

conducted before the first CoP and after the last one. In this way, analysis of the discourse of research participants enriches the constitution of the conceptual framework (Paillé and Mucchielli, 2012) [8]. In such manner, reflexive analyses are in constant progression throughout the ART process, and the resulting modifications are therefore continuous.

Considering this, let us recall that the construction of this conceptual framework began during Phase I of the present ART. The starting point initially chosen was to base the research on Beatty's (2019) [9] definition of comodality, which he calls $Hyflex^{1}$. According to this definition, comodality consists in a training activity that simultaneously combines face-to-face and distance modalities. The choice of modality at each session can, in principle, be determined by the learner according to what suits him or her, which then corresponds to bimodality. However, in the specific context of the *Prevention Pilot Project*, the choice of modality was not left to the learner, since it was the teacher who determined the functional conditions of the project. Under these circumstances, we established the foundations of a conceptual framework for learning to teach in a comodal context. It was with these specific conditions in mind that, as the process unfolded, we gathered data from the participants' comments, which indicated a possible change in their conception of comodal learning and teaching in order to extract the emerging practices to be prioritized.

At the end of Phase I, the results revealed the importance of digital pedagogy coherence (DPC) in DL. Indeed, this coherence needs to be deepened for both teachers and pedagogical advisors in the context of comodal teaching. It promotes pedagogy supported by digital tools by linking learning targets to DL modalities, teaching strategies and assessment activities.

Moreover, while Michelot, Poellhuber, Charrette and Gazerani (2018) [10] have recently focused on pedagogical alignment and Lison (2018) on technopedagogical alignment, Lebrun (2011) [12] was already stressing the importance of the principle of coherence and calling it a systemic approach. Digital pedagogy coherence (DPC), which is systemic in nature, thus proposes optimal use of the functionalities of the digital learning environment (DLE), judicious selection of pedagogical and didactic actions and greater cohesion between them, while placing the learner at the heart of the pedagogical space. PDC in DL also relies on comprehensive pedagogical, human and financial resources.

In addition, Lebrun (2011; 2015) [12,13] highlights the need to think about technology integration in order to ensure coherence between objectives, tools and methods, which require learning-centered and learner-centered teaching arrangements to achieve a positive impact from these technologies. Based on the findings of ART – Phase I, combined with a review of the various models of pedagogical and techno-pedagogical coherence, we have come up with a new, explicitly structuring model of digital pedagogy coherence in DL, correcting the conceptual vagueness and limiting its inconsistencies.

¹Noun composed of two English adjectives: hybrid and flexible.

DIGITAL PEDAGOGY COHERENCE MODEL (DPCM)

This model, illustrated on page 8, in figure 1, adequately represents coherence in the context of comodal teaching.

Figure 1 Digital Pedagogy Coherence Model (PDCM) for distance learning (DL) (Lafleur, F., 2021) [14]. See bibliographic list for full reference.

Source: Lafleur, F. (2021) [14]. Les pratiques émergentes à privilégier en contexte d'enseignement comodal. Action research training report prepared for the Ministère de l'Éducation du Québec: Gouvernement du Québec.

Legend: Digital pedagogy coherence (DPC) in distance learning (DL) promotes pedagogy supported by digital tools by linking learning targets to DL modalities, teaching strategies and assessment activities. Secondly, optimal use of digital learning environment (DLE) functionalities enables cohesive pedagogical actions, while placing the learner at the heart of the digital pedagogy space. Finally, digital pedagogy coherence in DL also relies on the accessibility of resources.

This is why, during the first two CoPs, a discussion was started concerning, on the one hand, the results of Phase I, and, on the other, the Digital Pedagogy Coherence Model (DPCM) in DL. Thus, we wanted to ensure a clear decoding of the importance of digital pedagogy coherence in DL in the context of comodal teaching. In addition, it was interesting to be able to observe whether the transition between training and practice was incorporated into the various experiments carried out by the participants. Indeed, for the latter, learning materializes in the experimentation itself with emerging practices of comodal teaching. It is also improved, in socio-construction, by sharing knowledge and experiments with their peers or other professionals. This is how the research participants contribute, through reflective analysis of their practices, to the collaborative construction of the conceptual framework for Learning Comodal Teaching.

Houssaye's Pedagogical Triangle

The conceptual framework of our research focuses first and foremost on the pedagogical relationship, which illustrates the relationships established in training between teacher, learner, and knowledge. It is a construct illustrated by the interrelation between the didactic, pedagogical, and relational fields (Houssaye, 1988, 2000; Lombard, 2003) [2,3,15]. We refer to Houssaye's model, which defines the learning situation in terms of what he calls the "pedagogical triangle". In his schematization of this triangular relationship, we find ourselves here in the pedagogies of exchange, in the pedagogies of relationship, pedagogies in which the relationship is primary and the content somewhat secondary (Raynal and Rieunier, 2012, p. 489, free translation) [16].

It's worth noting that, back in 1988, Houssaye was already putting forward the idea of the pedagogical space in its threedimensional dimension, in view of the possibility of a fourth vertex, the triangle then becoming a tetrahedron. Houssaye's focus on the relational plane, which he calls the "relational field", reflects the importance we attach to the human relationship between teacher and learner.



Figure 2: Houssaye's Pedagogical Triangle.

In his work developing the model of the pedagogical triangle, which has become famous in education, Jean Houssaye (1988) writes:

The pedagogical situation can be defined as a triangle made up of three elements: the knowledge, the teacher and the students, two of whom constitute themselves as subjects, while the third must accept the place of the dead or, failing that, play the fool [...] To constitute a pedagogy, to perform a pedagogical act, is, among knowledge, the teacher and the students, to choose to whom one assigns the place of the dead" (p. 233, free translation).

Houssaye thus points out that, as a rule, any pedagogical situation factually privileges the relationship between two of the three elements of the pedagogical triangle. Consequently, the third element is, according to the author, either the fool or the dead man.

- Take the case of traditional teaching, which places the emphasis on knowledge or the curriculum, and on teachers as the bearers and transmitters of knowledge, with their teaching workloads to be met. Students are not heard and can become disruptive or passive subjects.
- Similarly, in non-directive teaching, the teacher-learner pedagogical relationship is paramount and prioritized, and knowledge can become non-existent, improvised, or reinvented.
- Finally, in teaching using information and communication technologies (ICT), teachers may feel excluded or useless, or even instrumentalized and overloaded with work in favor of pedagogical resources, as there is a risk of prioritizing the knowledge-learner relationship.

Houssaye's model highlights the three, not necessarily complementary, poles of a non-systemic pedagogical environment, where knowledge is personified, becoming a third actor. The unfolding of a pedagogical sequence can then be analyzed in terms of bipolar interaction, excluding one of the three poles, along one of the three edges of this triangle, and rarely revealing triangular-type interactions (Lombard, 2003) [15].

Thus, as Figure 2 specifies, each of the three edges can be defined as involving a specific field of education:

- the didactic field, specific to the "teaching" process, which focuses on the teacher and knowledge axis;
- the learning field, specific to the "learning" process, which focuses on the learner and knowledge axis;
- and finally, the pedagogical field, specific to the "training" process, which focuses on the axis of teacher and learner (Houssaye, 1988) [2].

Conceptual update required for the Houssaye triangle

Several authors, such as Mai Huy, Samson and Lafleur (accepted), propose adjusting the pedagogical triangle to suit the dimensions of distance education, including DL in general, and digital in particular:

In the absence of the student(s), the teacher prepares his lesson by choosing to integrate digital tools to varying degrees. In the absence of the teacher, the students learn, thanks to digital technology, which provides them with new ways of learning, memorizing knowledge and organizing their work. In the absence of knowledge, the relationship between teacher(s) and student(s) is negotiated through digital intermediation (p. 136, free translation).

Faerber's Pedagogical Tetrahedron

For his part, Faerber (2002) [4] has considerably extended Houssaye's model by proposing the three-dimensional addition of a fourth vertex, which he has named "group". The inner space of this tetrahedron is now referred to as the virtual environment.



Figure 3: Faerber tetrahedron.

This author (2002) thus employs a tetrahedron, defining the fourth pole as the group and the center of this volume as the mediating context: "By group we mean an instituted set of interacting learners and teachers, sharing common goals. The mediating context is the material or virtual environment in which or through which these interactions occur." (p. 109) For our DL project, we are focusing on the idea of the virtual environment in which the interactions of the actors in the poles take place.

Faerber (2002) [4] has proposed exploiting Houssaye's pedagogical space with the addition of the virtual environment, adapting the model for DL (Lombard, 2003) [15]. It then responds to the geographical dimension inherent in DL, i.e. the need to reach dispersed learners scattered all over the place. The tetrahedron thus contains four vertices: knowledge, learner, teacher, and group; between these lie the actions of facilitating, participating, learning, teaching, training, and sharing.

Examining the work of Faerber (2002) [4], Cissé (2008) [17] notes, *ipso facto*, that Houssaye's (1993) [18] pedagogical

triangle is weakening, indeed "unable to account for the whole of this pedagogical situation, which no longer places the two protagonists in a situation of face-to-face interaction" (p. 2). He observes that the bipolar relationships of this triangle (learnerteacher, learner-knowledge, and teacher-knowledge) are transformed to incorporate new ones.

Indeed, in addition to the three classic poles, the group, as defined by Faerber (2002) [4], adds its own relevance to the other poles of the triangle. Its introduction as the fourth pole of a tetrahedron gives it a role in its own right, where interactions within the group are projected in all directions, and where the mediating function is deployed and reflected in all individuals.

Digital Pedagogy Triangle for distance learning

Inspired by these classic models, and keen to include the pedagogical component as a solution to enriching the digital competence of teachers and advisors, we propose a new model of the pedagogical triangle, which we call the " Digital Pedagogy Triangle for distance learning ".



Figure 4: Digital Pedagogy Triangle for distance learning (DL).

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Our schematization consists of a three-cornered figure featuring the same components as Houssaye's classic pedagogical triangle: teacher, learner, and knowledge. Faerber's (2002) [4] proposal to add a fourth vertex, enabling the creation of the virtual environment, encourages us to use it to add an essential component in the context of DL: the digital pedagogy space, which identifies and explains the systemic dimensions and components of the digital learning environment.

Next come the relationships between the three components of the triangle that are brought together by the pedagogical digital space: Web Relationship, Web Learning and Web Teaching. We associate relationship, learning and teaching with the cybernetic principles of a rudder, which reciprocally induce the synergy of relationships between teacher and learner, learner and knowledge, and knowledge and teaching. These relationships play a key role in the systemic understanding and apprehension of the digital pedagogy space. Our model also responds to the diversified and differentiated modalities of distance learning, giving it the flexibility to respond to the multiple realities of distance teaching and learning practices. The circular arrow represents this kinetic aspect of adaptability. This is reminiscent of Beatty's (2019) [9] Hyflex concept, applicable to comodality.

In the digital pedagogy space, teaching and learning continue outside the classroom, using the different modalities offered by DL. In this case, the teacher is no longer strictly seen as a mediator². The absence of a physical intermediary means that learners have new needs for regulation and feedback, which were previously met in the classroom by the teacher. One thing is certain, the integration of the digital pedagogy space into teaching substantially modifies the teacher-learner relationship

and the modalities of mediation. In this sense, DL teachers must take into account the variations due to the use of technologies in and out of the classroom and must adapt their teaching strategies to these increasingly present changes.

Thus, our digital pedagogy triangle of DL puts the emphasis on the human element, to foster a more egalitarian relationship between teacher and learner. This is why we position them on the upper horizontal axis. This relationship is established through the pedagogical space, which has become a *sine qua non* structuring component of DL.

A Conceptual Framework for Comodal Learning

Following the example of the evolution of the models of the pedagogical triangle and, above all, the specificities of the digital pedagogy triangle of DL, we proceed to the schematization of the conceptual model of comodal learning. To this end, we propose a conceptual framework for comodal learning that is adaptable to all the potential variations of comodality. To this end, our pedagogical triangle of DL, inspired on the one hand by Houssaye's pedagogical triangle (1988, 2000) [2,3] and on the other by Faerber's tetrahedron (2002) [4], merges with the other six components of the conceptual framework.

The four successive stages in the construction of Charlier's (2005) [5] ART framework have enabled us to build, in a coherent model, our conceptual framework of comodal learning. We agree that the conception of learning lies in the relationship created by the individual and his or her environment: it is in this constructivist perspective that Charlier accords a central place to the individual, his or her history and project (*Ibid.*).



Figure 5: Conceptual framework for learning comodal teachning - inspired by Houssaye (1988, 2000) [2,3] and Faerber (2002) [4].

²In an interview with Cathia Papi (2018), Daniel Peraya, a researcher in information and communication sciences as well as educational sciences, explains that "in the field of teaching and learning, didacticians, who make the pedagogical

relationship explicit with reference to Houssaye's triangle, assign the teacher the role of mediator: the latter interposes himself as a facilitator between the learner and the content that is the object of learning." (p.104, free translation)

Our approach involved planned action, the breakaway construction of the research problem, the development of a new conceptual framework and a differentiated methodological device, as well as communication integrated into the three components of action research training (ART).

The research participants were therefore at the heart of the ART, which was updated thanks to their commitment and exchanges. At the end of the ART, the results of our analysis of the participants' comments led us to adopt the approach adopted by Charlier (2005) [5]: identify the conditions conducive to a change in practice, determine how to support learners' learning and shape the transition from training to practice. This trio of components forms the framework of our schematization.

Logic of our Schematization of Comodal Learning

First, a triangle entitled "Conditions conducive to a change in the teacher's practice" is inserted at the top of the figure. These conditions can be broken down into two parts: institutional conditions and learning conditions. The institutional condition is expressed by flexibility and availability. Learning conditions, for their part, translate into three elements: training, application and the trainer's sense of self-efficacy. These conditions, which are conducive to a change in practice, are based on the boundary defined by the "Web Relationship", which concerns the relationship between teacher and learner.

Secondly, in the bottom right-hand corner, we present the "Learning support" triangle. This comprises three elements: resource accessibility, professional networks, and communities of practice (CoPs). These elements involve technological and pedagogical support. Learning support is adjacent to "Webbased Learning", which defines the relationship between learner and knowledge.

Thirdly, we present the triangle entitled "Training-practice transition". This deals with the transition from the theory of comodality to its implementation by the teacher. It is illustrated by two elements: the professional posture and the relational link. On the one hand, professional posture dictates pedagogical and digital coherence in DL. The relational link, on the other hand, implies the distance presence of the trainer with his learners. The transition from training to practice is adjacent to what defines the relationship between knowledge and the teacher, i.e. "Web Teaching".

Fourthly, this trio of peripheral triangles, described above, itself defines the outline of the pedagogical triangle of DL, which is positioned at the heart of the conceptual framework of comodal learning. Finally, the pedagonumeric space is described as the cornerstone of the comodal learning conceptual framework.

This geometric figure, made up of four components, activates comodal learning. This activation of learning takes place in a context of hybridization of pedagogical, digital and physical spaces, since this schematization of complex relationships confirms the adaptability of the comodal learning model. This hybridization is illustrated by a circular arrow touching the three structural components of our conceptual framework, giving our model its systemic, cybernetic, and synergetic dimensions.

Discussion and Conclusion

Already at the beginning of the 2000s, current uses of ICT emphasize the need to lead to a new paradigm based on learner/knowledge/teacher relationships that are diversifying and differentiating. In particular, taking into account the group of learners means that the classic educational triangle evolves towards a regular tetrahedron inducing a broader context of mediations.

In short, the project framework broadens the spectrum of possibilities for comodal learning and teaching in the youth sector. It is distinctive, because comodality requires the combination of two spaces, physical and digital within the same educational space, its flexible approach refers to "mobility" as described by Cristol (2018) [19]: "neologism combining the words mobility and ubiquity. It refers to the ability of an individual to connect anywhere, at any time with any device" (p. 142, free translation).

An update of the training offered to teachers is necessary so that comodal teaching is better adapted to the youth sector and thus puts learning into practice in a real comodal context. With this in mind, our model proposes to support teachers in this change of practice using a collaborative approach. In order to better understand the complex (didactic and pedagogical) relationships in the context of DL, we first revisited Houssaye's pedagocial triangle and Faerber's tetrahedron, to draw inspiration from it and propose our digital pedagogical triangle of DL as well. as a conceptual framework for learning comodal teaching.

We think that it is necessary to understand that the evolution of Houssaye's triangle was controlled by a new synergetic and cybernetic conception of knowledge, whose role as an actor in Houssaye's model was frozen in a passive binary mediation going, to one direction, either from the learner to knowledge, or from the teacher to knowledge, with the effect of crystallizing in education the paradigm of teaching and the crucial role of the teacher-trainer as a conduit.

The paradigm shift in education occurred in parallel with the advent of constructivism and socioconstructivism in international education reforms and this shift was accompanied by the expansion of digital technology and new information technologies. and communication (NICT). According to Tardif (2001) [20].

When we are in the teaching paradigm, our conception of learning is that learners are essentially photocopying machines," he believes. We then focus on memorization, the accumulation of knowledge and the association of this knowledge with each other. "We divide, we piece together, we work from simple to complex because we want to help learners gradually enter areas of knowledge, disciplinary areas. »

While at the other end of the continuum is the learning paradigm which primarily focuses on the ability of learners to transform the information and knowledge made available to them into viable and transferable knowledge. "The knowledge that students develop, and construct are tools that must be useful to them to understand the world and act in the world," specifies the professor. It is not the quantity of knowledge that counts, but the quality. The knowledge is then integrated into a cognitive schema. "We are concerned about the relationships, links, and structuring of knowledge that young people develop thanks to the interventions of teachers. (p. 2, free translation)

This profession of faith undoubtedly resonates with postsecondary students, at least those who are empowered to "transform the information and knowledge made available to

them into viable and transferable knowledge". However, it is and continues to be questioned regarding its generalizability. The questions that remain are: are all learners able to construct or co-construct their skills? Are they all capable of becoming capable of doing it or acquiring it? And, for what concerns us here, two questions are added: can distance learning in comodality be or become a promising way of developing the learner's influence over the acquisition of their knowledge? Can the digital educational space be activated in this sense?

We believe that through the exhibition of our theoretical device, revisited or proposed in an innovative way, we were able to show how our model is potentially effective for analyzing scenarios and devices being designed, not for presenting examples of analysis themselves, since, in our ART project, these examples are necessarily linked to the particular context of the DL, but to illustrate the capacity of this model to dissect, illuminate and energize the complex systemic interactions between essential poles of a device in a comodal teaching context.

Acknowledgement

I thank the following individuals for their assistance throughout our study and for their help in writing the manuscript : Marilène Lemay, Master's student Distance Learning education profile, Université du Québec à Trois-Rivières (UQTR), Graduate of the short graduate program in distance learning (UQTR); Julie Gravel, Research Assistant (UQTR), Student in the short postgraduate program on the pedagogical uses of digital technology (UQÀM), Graduate of the short graduate program in distance learning (UQTR); Pier-Alexandre Doré, Research Assistant (UQTR), Qualifying Master's student (UQTR), Graduate of the short graduate program in distance learning (UQTR).

Conflict of Interest

The author has no conflicts of interest to disclose.

Author Contributions

No contributions to declare.

Source of Funding

The research leading to these results has received funding from the Conditions et pratiques favorables à la poursuite des apprentissages en formation à distance (FAD) – secteur des jeunes in the frame of the program Recherche-action dans le cadre du projet pilote provincial en formation à distance au secteur des jeunes – Volet Innovation under the Grant agreement number 350048616 between the Québec Ministry of Education and the Université du Québec à Trois-Rivières.

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