Revista Internacional Educon, Volume I, n. 1, e20011012, set./dez. 2020
*ISSN: 2675-6722 | DOI: https://doi.org/10.47764/***e20011012**

Use And Development Of Information And Communication Digital Technologies In The Undergraduates Formation

Uso E Desenvolvimento De Tecnologias Digitais Da Informação E Comunicação Na Formação De Licenciandos

Uso Y Desarrollo De Tecnologías Digitales De Información Y Comunicación En La Formación De Alumnos De Licenciamiento

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***RESUMO**: O objetivo do presente trabalho é analisar como os participantes de grupos interdisciplinares, estudantes de Instituição Pública de Ensino Superior (IPES) integram as Tecnologias Digitais da Informação e Comunicação (TDICs) e Docência ao desenvolver Materiais Autorais Digitais Educacionais (MADEs). Considerando-se a subutilização das TDICs no contexto da formação de licenciandos, a pesquisa qualitativa se caracteriza como Estudo de Caso realizada com 30 participantes da disciplina Tecnodocência no primeiro semestre de 2019. A análise de dados utiliza a triangulação metodológica ao comparar os resultados do questionário de sondagem, dos roteiros dos Materiais Autorais desenvolvidos e do referencial teórico. Os participantes saíram da compreensão de docência vinculada à centralização do saber no professor para outra compreensão que envolve os alunos em trabalho colaborativo.*
TECNOLOGIA DIGITAL DA INFORMAÇÃO E COMUNICAÇÃO. FORMAÇÃO DE PROFESSORES. LICENCIATURA. INTERDISCIPLINAR.

***ABSTRACT:** The objective of the present work is to analyze how the participants of interdisciplinary groups, students of Public Institutions of Higher Education (PIHE) integrate the Information and Communication Digital Technologies (ICDT) and Teaching when developing Digital Authorial Educational Materials (DAEM). Select an underutilization of TDICs in the context of undergraduates training, qualitative research is carried out as a Case Study with 30 participants in the discipline Technoteaching in the first semester of 2019. Data analysis uses the methodological triangulation when comparing the results of the survey questionnaire, the developed MADE scripts and, the theoretical referential. Participants moved from the understanding of teaching linked to the centralization of knowledge in the teacher to another understanding that involves students in collaborative work.*
INFORMATION AND COMMUNICATION DIGITAL TECHNOLOGY. TEACHER FORMATION. UNDERGRADUATE. INTERDISCIPLINARY.

RESÚMEN: *El objetivo del presente trabajo es analizar cómo los participantes de grupos interdisciplinarios, estudiantes de Instituciones Públicas de Educación Superior (IPES) integran las Tecnologías Digitales de Información y Comunicación (TDIC) y la Enseñanza al desarrollar Materiales Autorales Digitales Educativos (MADEs). Teniendo en cuenta la subutilización de las TDIC en el contexto de la formación de graduandos, la investigación cualitativa se caracteriza como un estudio de caso realizado con 30 participantes en la disciplina Tecnoenseñanza en el primer semestre de 2019. El análisis de datos utiliza la triangulación metodológica al comparar los resultados del cuestionario de la encuesta, los guiones de los MADE desarrollados y el marco teórico. Los participantes pasaron de la comprensión de la enseñanza vinculada a la centralización del conocimiento en el maestro a otra comprensión que involucra a los estudiantes en el trabajo colaborativo.*

TECNOLOGÍA DIGITAL DE INFORMACIÓN Y COMUNICACIÓN. FORMACIÓN DE PROFESORES. LICENCIAMIENTO. INTERDISCIPLINARIDAD.

Introduction

The interpersonal relationships have changed with phenomena related to the expansion of communication with the advent of the internet. Although the school and its community are immersed in a society embedded with cyberculture concepts, only little is contemplated regarding the use of the Information and Communication Digital Technologies (TDICs) on their learning, teaching, and assessment activities. Critical thinking about TDICs is essential for today's society as affirms Kerchove (2009). According to Lemos (2013), the phenomena of the penetration of the digital technologies in the society expands to the educational environment as hegemonic, but not as a phenomenon of the majority.

Taking into consideration the teaching practices, Coll (2009) affirms that the use of the TDICs becomes coherent to the understanding possessed by the teachers about teaching. The transmission of content routinely done is also done by making use of the TDICs. Creative and exploration activities usually applied in the teaching context, are the same when making use of the TDICs. According to the author the pedagogical transformation expected from the teachers does not occur simply by inserting the TDICs in the school environment, the current practice remains.

Loureiro, Lima, and Soares (2014) corroborate the results of Coll (2009) when researching the utilization of TDICs by higher education teachers. Although the teachers are concerned with technological innovations and seek its use in their teaching practices, they still insist on using them to expose the content, even facing different possibilities for methodological changes. Therefore, it is noted the fragility of the teacher training process for the use of the TDICs.

The inclusion of the TDICs in a critical way in teacher training can be done in different formats and different proposals. The Technoteaching concept brings together ideas that make it possible to break the current thinking about the connection between digital technology and teaching. The Technoteaching concept is defined by the integration between Teaching and the TDICs epistemologically based on the interdisciplinary and transdisciplinary models through the utilization of the learner's prior knowledge for the development of critical thinking about the processes of learning, teaching, and evaluation (LIMA; LOUREIRO, 2019).

One of the pillars that sustain the Technoteaching concept is the Interdisciplinarity based on the theoretical assumptions of Japiassu (2006). There is a need for conceptual exchanges and mutual learning between specialists from different disciplines based on the sharing of knowledge and joint discussions. Another pillar is the concept of Meaningful Learning developed by Ausubel, Novak, and Hanesian (1980). It is considered essential to use the student's prior knowledge in a substantive and non-arbitrary way to develop the senses and meanings of the concepts that can be established in their cognitive structures.

In research developed about the topic, it is observed that the TDICs help in the development of interdisciplinary activities enabling the use of methodologies and didactics that benefit learning unconventionally through the interaction between the participants, the exchange of information, and the integration between the different pieces of knowledge. According to the problem presented and considering the need to integrate the TDICS with teaching in an interdisciplinary context in the undergraduate teacher training, it is asked: How does the use of the previous knowledge of interdisciplinary groups in the construction of the Technoteaching concept influence on how they seek to integrate TDICs with Teaching?

Therefore since 2015 the Universidade Federal do Ceará (UFC) [Federal University of Ceará] implanted in partnership with public schools the Technoteaching discipline, offered to students of different teacher training undergraduate courses and the Systems and Digital Media Bachelor degree (SMD) that work together for the development of the Materiais Autorais Digitais Educacionais (MADEs) [Digital Authorial Educational Materials]. The undergraduates have the opportunity to create their digital materials considering the applicability to their teaching practices in the face of interdisciplinary experience. The MADEs are defined as any learning material "developed by a learner utilizing digital equipment connected or not to the internet with creation, planning, execution, reflection and evaluation made by the learner himself individually or in a group[...]" (LIMA; LOUREIRO, 2016a, p. 630).

The research described in this context aims to analyze how the participants of interdisciplinary groups, enrolled as students of the UFC in the first semester of 2019, integrate the TDICs with Teaching while developing the Digital Authorial Educational Materials (MADEs). The methodology used was the Case Study with data collection performed in two phases through the investigation of the participants' previous knowledge about teaching and technoteaching, and on how they develop the MADEs. The analysis utilized a methodological triangulation, using the survey questionnaire, the MADEs script developed by the undergraduate students, and the theoretical framework, with strategies based on the Textual Discourse Analysis (MORAES; GALIAZZI, 2016).

The subjects of the research moved from understanding teaching as a process centralized in the teacher role to another understanding that values the development of collaborative work between learners and teachers.

1 The Information and Communication Digital Technologies in Teacher Training

The proposals of teacher training that include the integration between TDICs and educational aspects are presented in many ways through research and government policies from countries that consider the use of digital technologies as a form of global, social, and cultural communication. The insertion of the use of TDICs is linked to the professional development process, also designed for initial training.

Unesco's proposal (2002) is presented in four stages. Initially, there is a need to develop the skills and knowledge of teachers in technological aspects. The performance of personal and professional tasks using the resources available on the Internet and common software helps to understand the possibilities related to the use of digital technology.

In the second stage, the teacher must learn how to apply the TDICs to improve the learning of his students and his learning. It is only after these two initial steps that teachers contemplate the pedagogical transformation. They should learn how to integrate the characteristics of digital technology with the didactic-methodological objectives given a collaborative work based on the construction of knowledge. However, the results obtained must be shared, discussed, and reflected collaboratively with their peers, colleagues, and specialists, so that the changes are effective and incorporated into the pedagogical action (ALMEIDA; VALENTE, 2011).

According to Ricardo (2007), the idea of working with technology in the educational context is possible when it is seen as a product to be developed by students and teachers. Bearing in mind the assumptions of the CTSA Movement (Ciência, Tecnologia, Sociedade e Ambiente)[Science, Technology, Society and Environment] essentially based on two basic thoughts: scientific and technological knowledge leads humanity to a better future; this same knowledge must be oriented towards action based on social, historical, political and economic analysis, the great challenge in integrating technology to the educational context is to overcome the privileged way in which technology is seen concerning the social conception of science. The author introduces a proposal for teacher training that enables the technological literacy of the students through the reorientation of the taught knowledge, the overcoming of the difficulties by the teachers in abstracting their experiences making the practical knowledge less discursive, and the changing in the routine of actions of teachers and students imposed by the school.

The author's proposal is possible to be achieved in the TDICs context by facilitating resources that allow exploration, investigation, and discovery. According to Baranauskas, Martins, and Valente (2013), the technological systems used must be similar to the physical systems. Without teaching or instructing, they allow the learner, whether student or teacher, to act like a scientist applying principles to a system of experimentation. Environments that allow the development of simulations of scientific situations, models, basic programs, and small authoring software are examples of instruments that can help the learner to assimilate scientific concepts integrated with technological knowledge reflexively and critically.

The authors mentioned above also emphasize that when working within this constructionist perspective of learning, some relevant aspects become evident. Learning becomes effective through the construction of knowledge, freedom of action, and reflection based on mistakes made in the process. The feedback provided by the system in use, considered important for the learning process, is generated according to the learner's choices and actions within the system. The computer must be used as a machine to be taught. From his premises, the apprentice must insert his set of ideas to obtain the answer to his actions (PAPERT, 2008).

Internationally the use of TDICs in Teacher Training is not seen differently from what is aimed at the Brazilian proposals. Studies carried out in Quebec on the benchmark of professional competences for future teachers emphasize that the appropriation of TDICs for planning, conducting classes, and teaching management are essential for teaching practice. The teacher must know how to communicate with the help of TDICs, as well as plan and teach with them, encouraging their students to use them to improve their learning (KARSENTI; VELLENEUVE; RABY, 2008).

According to Ramos and Struchiner (2009) for the involvement of a student in investigation processes that allow the expansion of his learning, it is necessary to gather different information resources, predict the results through experiments, discuss these results, evaluate the gathered information and disseminate the results obtained. To make this possible it is essential for the teacher to know how to work these aspects with a methodological basis, allowing within technological environments, a decentralization, timelessness, and deterritorialization of the knowledge that starts to be shared among all, teacher and students. Hence the need for initial and continuing training that allows the teacher to be aware of the use of TDICs currently available in teaching, learning and assessment situations that enable the creation and reflection of all those involved in favor of greater engagement and meaning that can guarantee a better quality of learning for student and teacher (LIMA; LOUREIRO, 2019).

2 Methodology

The research presented is characterized as qualitative and uses the Case Study as a methodology. This is justified by the fact that the research investigates a contemporary phenomenon, that there is no control over behavioral events, and uses sources of direct evidence to understand the studied phenomena (YIN, 2010).

The results of the research from the CNPq Universal Project 2016 are presented, composing one of the works developed by the Technoteaching Research Group. It is important to highlight that the subjects of the research signed the Free and Informed Consent Term (ICF), as the research was approved by the UFC Research Ethics Committee. The unit of analysis is composed of five (5) interdisciplinary groups formed by a maximum of four (4) students, who were undergraduate students of different teacher training undergraduate courses and the Systems and Digital Media Bachelor degree (SMD) in the Federal University of Ceara (UFC). All the students were enrolled in the Technoteaching discipline in the first semester of 2019, offered, with 30 vacancies.

A total of thirty (30) students were enrolled in the discipline, twenty (20) men, and ten (10) women. They are students of teacher training undergraduate courses in Science Biology, Physics, Music, History, Languages, Mathematics, Pedagogy, and Chemistry. The average age of the group is twenty-four (24) years old. Two (2) members are studying the initial semesters of their respective courses, five (5) members are in the intermediate semesters and twenty-three (23) are studying the last semesters. All subjects use computers and the internet every day. They mainly use it to access social media and to browse websites about the profession, academic work, games, and entertainment.

The Technoteaching discipline aims to train students who want to act as teachers using an interdisciplinary methodological proposal integrated with TDICs based on the theoretical-practical study of Ausubel's Theory of Meaningful Learning [13], of the Philosophy of Difference [14], of concepts of Interdisciplinarity [15] and Constructionism [7]. The appreciation and use of the participants' previous knowledge, the construction of engagement and the meaning of concepts, and the development of critical-reflective thinking about teaching practices are essential elements for the development of activities in the discipline.

The research was developed in three (3) stages: planning, data collection, and analysis. In the first stage, the strategies, the protocols, the instruments, and the information storage policy were prepared for data collection and analysis. The equipment for the development of the MADEs were also prepared. In the second stage, the data collection was carried out in two (2) phases. Initially, through the investigation of the previous knowledge that the undergraduate students had about the relationship between teaching and technoteaching; then through the investigation of the ways the undergraduates conceive, develop, and propose the MADEs. It is important to highlight that two (2) data collection protocols are utilized.

In the first phase, the students answered via the internet the survey questionnaire which contains conceptual and personal questions. In the second phase, the discussions and theoretical understandings about the study contents began. The interdisciplinary groups were formed and each one defined its theme, the contents involved and the objectives to be achieved for the development of interdisciplinary teaching work. The subjects created the MADEs development scripts, as well as carried out the necessary actions for their realization in the face of the articulation of the contents.

The data analysis was performed, based on the interpretation of the speeches used by the groups, explicited in the undergraduates' responses to the survey questionnaires and compared to the MADE scripts, from the theoretical framework specified. Methodological triangulation was carried out, favoring the comparison of information in the research instruments, together with the theoretical framework, to verify the convergences and divergences of the interpretations in a linear way (STAKE, 2010). Data analysis was subdivided into two (2) categories: the understanding of aspects linked to interdisciplinarity; the understanding of aspects related to digital technologies.

To assist this process, the procedures proposed by Textual Discourse Analysis (MORAES; GALIAZZI, 2016) were utilized with the use of a recursive sequence composed of five (5) phases: unitarization, categorization, description, interpretation, and argumentation.

In the unitarization phase, the units of analysis were defined, with selection and definition of the corpus used, beginning to disassemble the texts. The units of analysis were coded and defined, based on the emerging aspects of the readings and re-readings of the selected texts. Subsequently, the units were rewritten with a title, representing their central idea.

In the categorization phase, similar elements were grouped by comparing the units of analysis. An inductive method was used, building the emerging categories from the information captured from the corpus. At this initial moment, the units of analysis were compared and grouped to assign meaning. With that, the categories were created, defined, and named.

In the description phase, the emerging elements from the analyzed texts were presented and represented by the constructed categories. New readings and direct interpretation of the texts were made, using clippings produced by the research subjects. In the interpretation phase, a theoretical reading of the empirical facts was developed in a deep and complex way, establishing a relationship between the interpretative descriptions and the theoretical aspects that compose the bibliographic research.

In the argumentation phase, the emerging theoretical statements from the analysis process were presented, with the elaboration of a descriptive meta-text, formed by introductory elements, by the production of a centralizing argument that explains the whole from the relations of the arguments produced for the categories and by a closing that makes the text as clear and precise as possible.

3 Results and Discussion

The results are presented from two (2) data collection stages. The interdisciplinary groups investigated are named G1, G2, G3, G4, and G5 to avoid misuse in the language used in the text.

3 .1 Previous Knowledge about Teaching and Technoteaching

The survey questionnaire contained thirty (30) questions. To analyze the concept of teaching two (2) questions are used: "What is teaching?" and "What is Technoteaching?" None of the groups cited the term interdisciplinarity in the definition of the concept of Teaching. However, concerning the term Technoteaching, only two individuals of the group G3 explicitly linked the relationship between teaching and technology with interdisciplinarity: "Interdisciplinary area that mix technology and teaching in favor of better education" (G3); "It is a teaching-learning-evaluation method that uses technologies based on the interdisciplinarity concept in the act of teaching" (G3). Despite this result, the undergraduates have not mentioned the fact that teachers work together in the teaching practice. The teaching action seems to be unique, specific to a teacher, and his area of knowledge, even when inserted in the context of TDICs.

The ideas that the undergraduates possess about Teaching are marked by the understanding of the isolated teacher's performance, characterizing an education based on the fragmentation of knowledge as stated by Tardif (2002), in the separation between theory and practice as Charlot (2005) denounces and in the experience of classrooms led by only one teacher that owns a specific knowledge. These formative experiences, as well as the curricular requirement of schools to have a teacher acting in a single discipline, attending to different classes within a defined, closed space and with a predetermined schedule, help in the construction of what it means to be a teacher, linked to a soloist work, individual and centered on their knowledge.

This perspective is also reflected in the construction of a new concept such as Technoteaching that brings explicitly in its definition the teaching role as being interdisciplinary or transdisciplinary, therefore decentralized and based on partnership and mutual learning between teachers. According to Ausubel, Novak, and Hanesian (1980), when a concept is anchored in concepts previously consolidated in the cognitive structure of the learner, it becomes quite difficult to achieve the conceptual disconnection. For undergraduates, it is possible that disconnecting the idea of teaching from an isolated action to open space for a new perspective in which teachers work collaboratively is complex, agreeing to the profile mentioned by the authors.

Concerning the definition of Teaching, none of the groups mentioned the use of digital technologies as needed. However, digital technologies were explicit in all the answers about the Technoteaching concept. For G1 the digital technologies can be used for the transmission of knowledge: "Just as teaching is a planned and capable way of passing on knowledge through dialogue, interaction, and dynamics, but it uses technology as a tool for this to happen or be facilitated." (G1). For G2 the digital technologies are used in favor of teaching: "It is the utilization of the digital technologies to mediate knowledge" (G2). In the case of G3, digital technologies are considered tools connected to the student's learning aspect: "It is the use of current and faster tools and that dialogue better with young people, aiming to improve the learning process." (G3). For G4, digital technologies are linked to the idea of improving the teaching process: "To make use of technology to improve teaching processes" (G4). For the G5, the idea of technologies is related to its usefulness for teaching: "Teaching or the act of teaching that uses technologies as tools of education" (G5).

According to Coll (2009), the way teachers think about the use of TDICs in their practices reveals how they think about the teaching action. Teachers who make use of expository classes will also do so when using TDICs in their teaching practice, as evidenced in the response of the group G1. Thus, the fact that undergraduate students do not realize the need for the use of digital technologies explicit in the concept of teaching may denote that they do not perceive the methodological importance of using this type of technology in teaching. However, by extrapolating this idea strictly linked to teaching, they can expand the importance of using TDICs, emphasizing not only the improvement of the learning process but also of teaching although in a non-specific way.

3 .2 Development of MADEs and understanding about Teaching and Technoteaching

Five (5) MADEs with their characteristics were developed by the undergraduate students, members of interdisciplinary groups, and hosted on the Technoteaching website accessible at http://tecnodocencia.virtual.ufc.br/made-2019-1/.

G1 developed a podcast in the fantastic journalism format, interconnecting the content of color psychology, prehistory, and musical timbre from the theme "The planetary universe". The presenter of the fictional program narrates news about the Planet of Colors and interviews experts and citizens of the planet to explain the history, religion, and customs of the place, whose particularity is the rocks that emit sounds and light provoking emotions in the inhabitants of the planet, making them a peaceful people. They hosted the podcast on the SoundCloud platform, for posterior use with high school students in the teaching practice, working in an interdisciplinary way on the contents of History, Music, and Psychology.

The G2 group developed interactive slides using Google Drive, working in an interdisciplinary way on the contents of Biology, Chemistry, and Physics. With the theme "Dance in pairs" the proposal aimed at an interactive MADE in such a way that students could use it during the teaching practices, to add information by writing. When presented with a video or an image about certain types of dance (tango, forró, contemporary, zouk) students are invited to reflect on the relationship between the hormones and the emotions released during the dance, observing mathematical graphs in addition to geometric figures formed by dancing bodies during the action of physical forces with an explanation of their constructions and specifications.

The G3 group developed a gamebook having as theme "The Lord of the Rings" covering Human Physiology, Art Noveau, and Free Fall as content, working in an interdisciplinary way on the areas of Biology, Art, and Physics. Faced with the use of a non-linear narrative, the students (players) can use the contents of the MADE to continue the story developed by the undergraduates in the way that is most convenient for them, studying the contents presented and participating in the narrative by writing texts in specific spaces using the software Twine.

Having as a theme the "Brazilian Folklore" the G4 group developed a video covering the contents of Environmental Education, Ethnomusicology, and Socialization, working in an interdisciplinary way with the areas of Biology, Music, and Sociology. By watching a video showing the traditional June folk celebrations, folk dance, the social interaction, and the Curupira legend, the student can contribute with his previous knowledge about the content and observe the interactions between the different areas of knowledge. At the end of the MADE students have to complete an activity by creating a legend inspired by a song written by the students themselves, based on an environmental issue.

G5 created a profile on the social network Instagram, having as theme "Music" covering Anatomy and Physiology of the Auditory System, Nouns in English, Parody, and Corrosion as content, working in an interdisciplinary way on the areas of Biology, English Letters, Pedagogy and Chemistry.

Faced with the creation of a profile on the social network Instagram called Tecnomúsica, the members of the group sent posts about the recognition of music patterns in the English language allowing the student to identify in these patterns the nouns of the English language; the chemical process of corrosion of the strings of musical instruments for the recognition of the frequencies captured in a specific application for this function, promoting experiments for interaction with students; the capture of sounds in instruments such as guitar tuners and its relationship with the capture of sounds by the human ear; and, the recognition of parodies with the development of students' parodies that can be shared with others because of the profile available on the social network.

Each group of undergraduate students, given the use of themes that distanced themselves from the specific contents, addressed, managed to establish interconnections with the knowledge of each specific area, in such a way that each one became essential for the understanding of the whole. The undergraduates were able to show that the dialogue between members and mutual learning in favor of an effort to combine knowledge becomes essential for the production of interdisciplinary materials, as well as teaching actions that allow the developer and the user of MADEs to actively participate in the process through innovation and creation.

Thus, as explained by Japiassu (2006), interdisciplinarity can become a way to rethink the fragmentation of knowledge, through the establishment of partnerships between the actors who work collaboratively to connect the different knowledge in favor of a single project capable of explaining daily life more holistically and closer to human reality. Therefore, it is possible to observe that the undergraduate students, even without initially conceiving Teaching and Technoteaching as a possibility for more than one teacher to act at the same time, managed to demonstrate, in the development of MADEs, possibilities for joint collaborative action for mutual learning and to hand over spaces. This corroborates with Japiassu's (2006) statement given overcoming an idea about teaching that has been built throughout Basic Education and in the formation of Higher Education, characterized by Tardif (2002) as knowledge applicationist that escapes the reality to be experienced later in the classroom practice.

Regarding the aspects of TDICs, the undergraduates sought in their MADEs the development of actions that would allow the construction of knowledge by the user. The five groups investigated manifested a concern with developing materials in which users could insert information from perceptions and research in the MADEs elaborated from the use of digital technologies online or offline. For Andalécio (2009), when inserting TDICs in the teaching reality, there is a process of collaborative construction of knowledge that shows a joint work not only between teachers, in the case of interdisciplinarity, but, above all, of a partnership that can be established between teachers and student, corroborating the theoretical perspectives of Lima and Loureiro (2019).

Given the development of MADEs, the undergraduate students experienced teaching experiences using digital technologies in such a way that they came closer to the concept they brought of Technoteaching than the one they brought of Teaching in the survey questionnaire. However, the production of MADEs by the undergraduates may have contributed to re-signify the idea constructed until then about what it means to be a teacher and how to act methodologically in the face of the use of TDICs in teaching. This aspect becomes evident when the undergraduates share the responsibility for the construction of the MADEs with the users, leaving free and open spaces for the materials to be finalized when used in the classroom.

Therefore, the MADEs are receptive to the users' ideas, indicating that the undergraduates hand over space, leaving the role of the unique owner of knowledge. The undergraduates reached another level of resignification of Teaching, internalizing the meaning of Technoteaching, differing from the results presented by Lima and Loureiro (2016b) in which, even in the face of the development of MADEs, the undergraduate students remained with the understanding of teaching centralized in the teacher's action and their acquired knowledge.

Considering the perspective of Coll (2009) that the way how a teacher thinks about the use of TDICs in teaching is the same he thinks about his teaching practice, it is possible that, given the development of MADEs, the undergraduate students are building the concept of Technoteaching with new elements capable to re-signify mainly what they conceive about Teaching. Therefore, they came out of an understanding about teaching linked to the centralization of knowledge in the role of the teacher, who acts alone in charge of the classroom, using methodologically limiting resources, to an understanding that expands their horizons towards the student's participation as an agent of knowledge from the use of resources that open opportunities for the creation and development of different teaching methodologies.

Final Considerations

Seeking to analyze how UFC undergraduate students integrate TDICs with Teaching when developing Digital Authorial Educational Materials (MADEs), in the first semester of 2019, some relevant transformations were noticed in the relationship they establish between teaching, interdisciplinarity, and TDICs.

It was possible to notice with the development of MADEs that the undergraduates hand over spaces for the participation of the students as co-participants in the production of the material in the moment of the application of the MADEs in the teaching practice, allowing the students to build knowledge within the presented proposals. For this, they used different types of digital technologies, in the face of a work that presents itself in an interdisciplinary way and tries to materialize in that format. Therefore, they came out of an understanding of teaching focused on the centralization of knowledge in the teacher who acts in isolation, even within the context of Technoteaching, to a new possibility of teaching performance that welcomes students and teachers for the development of a collaborative and contextualized, closer to a broad understanding of the studied phenomenon.

Therefore, innovating in methodologies and didactics that allow the construction of MADEs by undergraduates at different times and spaces within the initial training process may be relevant for the teacher training of undergraduates, considering that the response presented by the interdisciplinary groups was positive in adapting to the challenges presented in the development of MADEs, thinking about classes that contemplate the study of more than one formal content and making use of TDICs in different contexts.

It is understood that the development of research with a group of thirty (30) undergraduates does not claim to be generalized and is limited to describing and explaining a specific phenomenon of a group with specific characteristics. Therefore, it is intended to continue the research in subsequent semesters with students who participate in the Technoteaching discipline, deepening conceptual studies on the

theme, as well as on the practice of interdisciplinary teaching in the school context, given the development and application of MADEs with public school students.

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Submitted: 6 August. 2020
Approved: 21 September. 2020