The relationship between ICT and Didactics: perspectives of teacher trainers in Master's programs in Education at the University of Aveiro.

The Relationship between ICT in Didactics: Perspectives of Teacher Educators in master's Programs in Education at the University of Aveiro

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Abstract

This study analyzes the relationship between Information and Communication Technologies (ICT) and Didactics, from the perspectives of teacher educators in Master's programs in Education at the University of Aveiro. The research aims to understand how ICT influences Didactics and Curriculum Development (CDD) in the context of Higher Education. Through semi-structured interviews with professors responsible for the ICT and Education course unit, and document analysis of the Master's programs, it was observed that ICT is perceived as an essential tool for pedagogical support and not as a substitute for teaching practice. The results point to the need for a reflective and critical integration of ICT in training processes, reinforcing the role of technologies in promoting innovative methodologies.

Keywords: Didactics. Curriculum Development. Teacher Training. ICT. University of Aveiro

Abstract

This study analyzes relationship between Information and Communication Technologies (ICT) and Didactics from the perspectives of teacher educators in Master´s Programs in Education at the University of Aveiro. The research aims to understand how ICT influences Didactics and Curriculum Development (DC) in the context of Higher Education. Through semi-structured interviews with lecturers responsible for the curricular unit 'ICT and Education' as well as documentary analysis of the Master's programs, it was observed that ICT are perceived as an essential pedagogical support tool rather than a substitute for the teaching practice. The findings highlight the need for a reflective and critical integration of into training processes, reinforcing the role of technologies in promoting innovative methodologies.

Keywords: Didactics. Curriculum Development. TeacherEducation. ICT. University of Aveiro

1. Introduction

The epistemological origin of the word didactics goes back to the Greek term didaskein, which means "To teach" or "to instruct." Initially, didactics was conceived as the theory of instruction, being defined as the science that regulates teaching. Later, Comenius (1962), in his work Didactics Magna gave it a more comprehensive pedagogical character by defining it as the art of teaching.

Over time, the concept of didactics has evolved, expanding its object of study. From From a Comenian perspective, which emphasizes the artistic and human dimension of education, it is recognized... also the active role of the learner – one who not only receives knowledge, but

It participates in its construction. Thus, didactics ceases to be seen merely as techniques or prescriptions.

of methods and becomes a field of critical reflection on the teaching process and

learning.

Curriculum designs serve as a guide for teaching practice, since they contain...

They embody the training objectives defined by the governing bodies. As Alarcão points out.

(2020a), the curriculum and didactics maintain a macro-micro relationship: while the curriculum expresses the

In addition to general purposes and guidelines, didactics concretizes these purposes in the classroom setting.

transforming intentions into pedagogical practices.

The evolution of curricula and teaching methods themselves has followed the technological and social

transformations of recent decades. As society becomes more permeated by technology...

Digital technologies, in turn, require education to integrate them in a critical and creative way.

Information and Communication Technologies (ICTs), in this context, emerge as tools that expand the

pedagogical possibilities and challenge traditional conceptions of teaching. Thus, the curriculum

Contemporary design takes into account the potential use of these technologies in the educational process.

In higher education, the increasing incorporation of ICT creates new opportunities and challenges.

Understanding the relationship between technologies and teaching practices is therefore fundamental.

not only for the improvement of teaching methods, but also for development

curricular and professional development of teachers.

Starting from this framework, this investigation seeks to answer the following question: How

The relationship between ICT and Didactics in Master's programs in English and Language Teaching is characterized.

Foreign Language, Physics and Chemistry Teaching and Mathematics Teaching at the University of Aveiro? For

Thus, the following specific objectives were defined: (i) to understand how the relationship between is conceived

ICT and the Didactics of subjects, from the perspective of the course unit (CU) instructors.

ICT and Education; (ii) characterize how this relationship is realized, based on the analysis of

curricular programs of the respective UCs.

2. Theoretical Context: Didactics and ICT

When discussing the concept of Didactics, it is common to encounter professionals who associate it with...

to a technocratic conception, reducing it to a set of teaching techniques that are learned and...

They apply them mechanically. However, this view proves to be limited, since Didactics must be...

understood as a disciplinary field that aims to teach the various areas of

knowledge, considering its contents, practices, processes, conditions and factors

influencers (Alarcão, 2020b; Libâneo, 2012).

According to Libâneo (2012), Didactics constitutes the core articulation of pedagogical training.

Insofar as it integrates the theoretical and practical domains of teaching, it is not limited to guiding methods.

and teaching techniques, but it proposes a critical reflection on educational practice, favoring the

development of a transformative pedagogical awareness.

From this perspective, Pimenta (1999) reinforces that Didactics should be understood as a space

of the articulation between scientific knowledge, pedagogical knowledge and teaching experience,

contributing to the training of reflective teachers committed to learning

significant of its students

Authors such as Andrade et al. (1993) define curricular didactics as a discipline.

theoretical-practical, integrating multidisciplinary knowledge, of an interpretative and exploratory nature,

which should promote analytical and reflective teaching. Thus, Didactics, as a field of

knowledge is constantly in dialogue with social and cultural transformations.

Technological trends that shape the contemporary educational context.

The 21st century is widely recognized as the era of the expansion of ICTs, whose presence is

It extends to all areas of social life, including education, health, and the economy, among others.

The influence of technologies on educational systems has profoundly modified the processes of

teaching and learning, especially in the way interaction occurs between teachers and students.

According to Cabero (2007), ICTs decisively influence personal, social and

professional skills of students, transforming their perception and analysis of the world.

Currently, ICTs offer multiple possibilities for communication and sharing.

Information: text messages, email, access to news, legislation, products and services.

as well as the publication and consumption of multimedia resources – photographs, music, videos and columns

opinion. In addition, they allow for the collaborative writing of documents, participation in forums and

Video conferencing, conducting financial transactions, and interacting with people anywhere.

of the world.

This set of possibilities highlights the breadth of the transformations caused by

The emergence and constant evolution of ICT, especially in the way individuals learn,

They teach and build knowledge.

Therefore, the relationship between Didactics and ICT should not be limited to the mere insertion of resources.

technological aspects in the educational context, but it implies an epistemological transformation in the way of

To think about and organize the teaching and learning processes. From this perspective, Didactics, as

In the theoretical and practical field, it should reflect on the ways in which digital technologies can act.

as mediators of knowledge, promoting innovative pedagogical practices that go beyond

A simple replacement for traditional methods.

According to Kenski (2003), the use of technologies in education is not limited to the adoption of

New tools are needed, but it requires a new perspective on the curriculum, methodologies, and roles.

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tasks performed by teachers and students. The integration between Didactics and ICT therefore allows for

developing more interactive, collaborative, and student-centered practices, promoting the

Autonomy and protagonism in the learning process.

These ideas converge with the thinking of Andrade et al. (1993), when they argue that the

Teaching should be not only transmissive, but also reflective, analytical, and exploratory.

enabling the active construction of knowledge. Thus, the use of technological resources, in itself,

It does not guarantee meaningful learning; good teaching methods are essential to guide the construction of knowledge.

of knowledge in a critical and contextualized way.

On the other hand, the incorporation of ICT in Didactics challenges teachers to rethink the

their teaching practices, since these require the continuous development of skills.

digital technologies, and the ability to coherently integrate technologies into lesson planning.

In this sense, Perrenoud (2000) states that teaching competence involves the ability to mobilize

resources to deal with complex situations, which, in contemporary times, includes appropriation

A critique of digital technologies.

Almeida (2011) adds that the pedagogical integration of ICT implies a change.

cultural aspects in schools and in teaching, guiding the teacher to assume the role of facilitator of learning.

promoting collaboration, authorship, and the collective construction of knowledge.

Thus, the role of Didactics in this new scenario consists of integrating the dimension

integrating technology into curriculum planning and teaching strategies, without neglecting the fundamentals.

theoretical, ethical, and social factors that underpin educational action.

It can be concluded, therefore, that the theoretical contextualization between Didactics and ICT goes beyond the simple...

The introduction of technological tools into the teaching and learning process requires a

a reconfiguration of the very concepts of teaching and learning in a digital, globalized society and

in constant transformation.

3. Materials and Methods

This study is characterized as a qualitative, interpretative investigation.

with a case study approach (Yin, 2015), since it aimed to analyze, in a contextual way

and deepened, the implementation of the Information and Communication Technologies course in the programs

Master's degree in education from the University of Aveiro (UA). The aim was to understand the relationships and

Influences of ICT on Didactics and Curriculum Development (CDD), based on the analysis

documentary evidence and perspectives from the trainers responsible for the ICT and Education course.

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3.1. Type and design of the study

Given the nature of the problem investigated, a qualitative approach was adopted.

which makes it possible to understand the perceptions, experiences, and meanings attributed by the participants

to the phenomenon under analysis (Bogdan & Biken, 1994; Paton, 2002). The study takes the form of a Study

This is a multiple-case study, given that it focuses on the analysis of different master's programs, seeking...

to highlight convergences and specificities in the way ICTs are articulated with Didactics.

3.2. Context and participants

The study was developed at the University of Aveiro, involving four professors who

They teach the ICT course unit in Master's programs in Education, in the areas of English and Language teaching.

Foreign Language, Physics and Chemistry Teaching, and Mathematics Teaching.

Of the four participants, three are professors at UA and one is a visiting researcher at the Center for

Research in Didactics and Technology in Teacher Training (CIDTFF). The selection was

This was intentional, as the researchers sought to include only professionals with direct experience in...

teaching the ICT and Education course, thus ensuring the relevance and depth of the information.

obtained.

3.3 Data collection procedures

Data collection was carried out through semi-structured interviews, conducted in a manner...

Synchronous Zoom Meetings, with audio and video recording, subject to informed consent from...

participants. Before the interviews, the teachers received an explanation via email.

detailed information about the purpose of the study, the nature of participation, and the ethical conditions of

confidentiality and voluntariness.

Each interview lasted an average of 45 minutes and included the three participants.

The authors of the investigation. However, the interview was conducted by one of the authors, the

Portuguese researcher, which facilitated linguistic and cultural interaction with the participants,

fostering an environment of greater comfort and spontaneity.

The interviews were guided by a script (Table 1), constructed based on the objectives of

investigation, which included questions about the teachers' professional background and experience.

with ICTs and the relationship between them and DDC. The first questions were introductory in nature,

designed to create an atmosphere of familiarity, while subsequent ones addressed directly

the central themes of the study

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Table 1: Route guide

Number	Tell us a	Specific objective
1	little about your background as a lecturer at the University of Aveiro.	To learn about the professional biography of the professor at UA.
2	During your career as a teacher, have you ever taught didactics subjects or curricular units exclusively dedicated to didactics?	To find out if the teacher has previously taught courses specifically related to teaching methodology.
3	When, how, and why did the teacher begin to develop an interest in ICT in the educational context?	Identify the moment and the reasons that led the teacher to become interested in ICT in the educational context.
4	How is the relationship between ICT and teaching conceived?	Understanding how the teacher establishes the relationship between ICT and teaching methods.
5	How do ICTs influence DDC (Disciplinary, Competency, and Development) in Master's programs in Education?	Understanding the influence of ICT on DDC in Master's Program
6	Is there anything else you'd like to comment on regarding ICT and DDC? Observations, criticisms, difficulties.	Professor's free comment

Source: authors (2025)

3.4. Data processing and analysis

The interviews were transcribed in full and sent to the participants for validation.

content *(member checking),* ensuring interpretative accuracy. Then it was submitted to

a thematic content analysis (Bardin, 2011), which consisted of three stages: (i) pre-analysis, (ii)

exploration of the material and (iii) treatment and interpretation of the results.

During the coding process, units of meaning related to the concepts were identified.

Didactics, the role of ICT in teaching practice, and its integration into curriculum development.

The categories emerged both deductively, aligned with the theoretical framework, and inductively.

based on the teachers' own narratives.

With the goal of guaranteeing the anonymity of the participants and speeding up data analysis, it was assigned-

a code is given to each of the interviewees, consisting of the first three letters of the word.

interviewee, followed by the number in order in which the interviews were conducted (e.g., the first

Interviewee: ENT1). See table 2.

Table 2:

Interviewee	Code
First interviewee	ENT1
According to the interviewee	ENT2
Third interviewee	ENT3
Fourth interviewee	ENT4

Source: authors (2025)

Immediately after coding the respondents in order to keep their data anonymized.

and safeguarded, in accordance with the General Data Protection Regulation (GDPR), Regulation (EU)

No. 2016/679, of April 27, 2016, we continue with the analysis of the data obtained from the

interviews.

4. Data Analysis and Discussion

The data analysis was based on the content analysis method, as recommended.

by Bardin (2011), who defines it as a set of techniques for analyzing communications,

guided by systematic procedures with the goal of describing the content of the messages,

in order to infer knowledge regarding the conditions of production and reception. This technique allowed

to rigorously identify and interpret the recurring themes and meanings expressed in the interviews.

carried out with the four lecturers (didacticians) who teach the ICT and Education course in the Master's programs in

Teaching at UA.

Thus, based on the transcripts, the information was coded and categorized.

emerging, which were organized into three main categories (figure 1)

Figure 1: Categories of analysis.
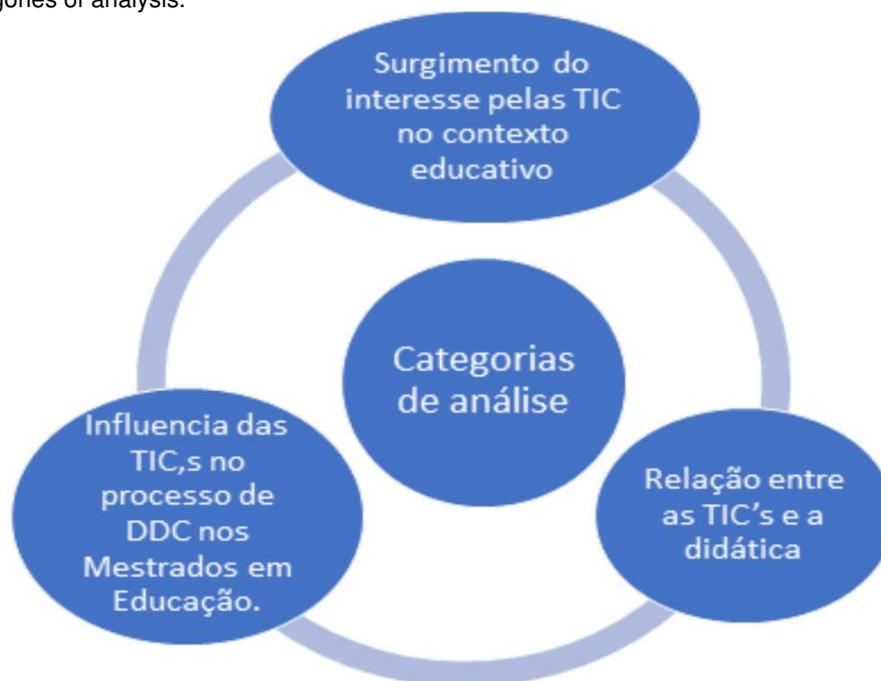
4.1. Emergence of interest in ICT in the educational context

The first category refers to the emergence of interest in ICT in the educational context.

A significant convergence was observed in the participants' narratives: they all acknowledge that

His interest in technology emerged during his academic career, and was later developed.

transferred and deepened in professional life.

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This finding reinforces the idea that engagement with ICT does not occur in a way...

whether spontaneous or instrumental, but it results from a formative and experiential journey that goes

consolidating the understanding of its pedagogical potential. As Perrenoud (2000) points out, the

Teacher professional development involves mobilizing skills that enable

to face complex and dynamic situations, which, in the current context, includes mastering and critically using...

of digital technologies.

The testimonies therefore indicate that the teachers interviewed do not view ICT as

It's not an educational fad, but a structuring resource for contemporary pedagogical practice.

This finding is echoed in the reflections of Kenski (2003), who highlights that the insertion of

Technology in education demands a review of teaching practices and roles, requiring new approaches.

Ways of thinking about teaching, learning, and curriculum.

4.2. Relationship between ICT and Didactics

The second category concerns the relationship between ICT and Didactics.

The interviews reveal a strong consistency among the participants regarding the perception that the

ICTs are an integral and inseparable part of the educational process. ENT3 states that "talking about education

"It currently integrates the technological dimension," while ENT4 reinforces that "it is obvious and natural that the

"Technologies should be linked to education, as they are two sides of the same coin."

These statements reveal a conception of Didactics that goes beyond a purely technical understanding.

and instrumental, approaching the view defended by Alarcão (2020b), according to which Didactics

It should be understood as a theoretical and practical field that guides the teaching process and

Learning in its entirety, including technological mediations.

ICTs are thus conceived as mediating tools in the teaching process, capable

to support teaching, learning and assessment, but without replacing the active and reflective role of

Professor ENT4 emphasizes that "technologies must emerge as facilitators of the path that is followed."

"It intends to do so, based on the objectives and competencies outlined." This vision converges with the

TPACK *(Technological Pedagogical Content Knowledge)* model by Misra and Koehler (2006), which

emphasizes the need for a balanced integration between technological, pedagogical, and...

content.

The relationship between ICT and Didactics therefore manifests itself as a dialectical interaction between

Technological innovation and pedagogical intentionality. As Perrenoud (2000) emphasizes, the challenge lies

in transforming information into meaningful knowledge, which requires planning, mediation and

critical reflection.

In summary, the interviewees acknowledge that the connection between ICT and Didactics is productive.

as technologies are employed to expand and diversify opportunities for

Learning, respecting the student's leading role and the teacher's guidance.

4.3. Influence of ICT on DDC in Master's Degrees in Education

The third category highlights how teachers perceive the influence of ICT on Didactics and

Curriculum development.

The participants' statements indicate that, although universities are incorporating

While technologies are gradually being incorporated into training programs, significant challenges in interaction remain.

Effective integration between theory, practice, and pedagogical innovation. ENT2 emphasizes that "innovating in any area is

very complicated" and that often the skills developed in ICT courses "are forgotten"

when students arrive at school

This finding suggests a gap between initial training and professional practice, which,

According to Lowman (2004), this is a recurring challenge in higher education institutions that seek

To align with technological transformations without losing pedagogical coherence.

For ENT3, the connection between ICT, Didactics, and DDC is "inevitable." The influence of ICT on

DDC is a reality that cannot be avoided, as it feeds into pedagogical practice itself. ENT1

He adds that the proper use of technology allows students to...

develop more complex cognitive, communicative, and creative skills, tailored to their

learning styles

These perceptions resonate with Kenski's (2003) perspective, which understands technologies

as structuring elements of the contemporary educational process, capable of transforming not

not only the methods, but the very curricular logic. Similarly, Alarcão (2020b) emphasizes that

The curriculum is a dynamic and contextual construct, whose realization depends on mediation.

teaching methods, and in this case, the technological skills of the teacher.

The analysis suggests that, in the Master's programs in Education at UA, ICT plays a role.

relevant in the renewal of the DDC, provided they are understood as mediators of the process.

formative and not as a substitute for the reflective and interactive practices that characterize teaching.

superior.

4.4. The ICT and Education Course Unit in the Master's Degrees in Teaching at UA

Documentary analysis of Master's programs in Teaching (English and Language).

Foreign Studies, Physics and Chemistry, and Mathematics) highlights that the ICT and Education course assumes a

cross-cutting nature, highlighting the importance attributed to digital technologies in initial training.

of teachers.

The common goals of the three groups include:

• To master concepts and processes relevant to the pedagogical integration of technologies;

• To understand contemporary educational issues mediated by digital resources;

• And to develop critical and creative skills in the use of ICT in formal and non-formal contexts.

    teaching.

Furthermore, the teaching methodology of these course units prioritizes collaborative learning,

developing autonomy and using project-based strategies. This approach is

aligned with the proposal of Mishra and Koehler (2006), who advocate a teaching practice centered on inter-

The relationship between pedagogical, technological, and disciplinary knowledge.

Thus, a coherence is observed between the curricular objectives of the course and the conceptions.

expressed by the interviewees, confirming that the relationship between ICT and Didactics is a dimension

structural aspects of the Master's programs in Teaching at UA. However, challenges also emerge, such as the need

to strengthen the link between what is taught in the UC and what is actually practiced by

future teachers in schools.

5. Discussion of the results

The relationship between ICT and Didactics is perceived by the trainers interviewed as a

An essential and inseparable dimension of the contemporary educational process. Analysis of the interviews.

reveals that the participants' interest in ICT arose during their student careers.

extending and consolidating itself in professional teaching practice. This continuity demonstrates that the

The use of ICT in education is not merely an imposition of current demands, but rather the result of a...

natural evolution of pedagogical practices towards innovation and technological integration (Kenski,

2003; Moran, 2018).

Participants emphasize that ICTs should be designed as tools to support...

teaching and learning, and not as a substitute for teaching. This understanding reinforces the

concept defended by Ponte (2012) and Selwyn (2011), that technologies, when integrated with

Intentional and critical approaches broaden didactic possibilities, promoting more effective methodologies.

participatory, reflective, and student-centered. Thus, the role of the teacher is transformed: from

From a mere transmitter of knowledge to a mediator and curator of learning experiences.

supported by digital resources (Mishra & Koehler, 2006).

Regarding the influence of ICT on DDC in Master's programs in Education, the results

They suggest that technologies should be seen as complementary to the educational process.

Trainers acknowledge, however, the need for greater monitoring and practical integration.

these skills during training, so that the learning achieved in the ICT course units

"and Education" can be effectively applied to the real classroom context. This gap

The gap between theory and teaching practice is a recurring concern in studies on teacher training.

teachers (Zeichner, 2010; Imbernón, 2011), revealing the urgency of strengthening the links between

The knowledge acquired at university and school practices.

The vision expressed by ENT3 reinforces the link between ICT and Curriculum Development.

highlighting that technologies cannot be dissociated from Didactics. For this participant, ICTs

They constitute a structuring axis of pedagogical training, contributing to understanding and

reshaping educational practices. ENT4 emphasizes the relevance of ICT for diversifying the

teaching strategies, adapting them to the different learning styles and paces of students – the

which engages with the socio-interactionist and constructivist approaches of Vygotsky (1978) and Bruner

(1997), which value the student's active role in the construction of knowledge.

An analysis of the curricula of Master's programs in Teaching (Mathematics, English and Languages)

Foreign Languages and Physics and Chemistry) reinforces this integrated vision. The UC "ICT and Education" vision does not

not only technical mastery, but above all, the development of critical, creative and...

reflective approaches to the pedagogical use of technologies. This approach aligns with the notion of

digital teaching competence, understood as the ability to mobilize technological knowledge,

pedagogical and content-related in an articulated way (Mishra & Koehler, 2017).

It is also worth highlighting that the methodologies favored in the courses – collaborative work,

Autonomous learning and problem-solving – foster innovative pedagogical practices and

Contextual factors, especially in the teaching of Mathematics and Languages. However, the effectiveness of these...

The proposals depend, as the interviewees indicate, on an ongoing evaluation of the impact of ICT.

in teaching practices, especially after the completion of master's degrees. Thus, a future line of

The investigation could focus on observing the actual practices of former inmates, analyzing in what ways...

The extent to which initial training contributed to the effective incorporation of ICT in the classroom.

In summary, the results suggest that the relationship between ICT and teaching is intrinsic and constitutive.

of contemporary teacher training, but the consolidation of this integration requires a culture of

Monitoring, reflection, and continuous innovation. The presence of ICT, when guided by

with solid pedagogical foundations, it reveals itself not only as an instrumental resource, but as

a transformative element of the curriculum and educational practices.

Final considerations

The analysis showed that the relationship between ICT and Didactics is inseparable, being essential.

to contemporary teacher training. ICTs, when integrated in a critical and contextualized way,

They favor more dynamic, collaborative, and student-centered teaching methodologies. However, for

To consolidate this integration, it becomes essential to promote continuous training that encourages...

The pedagogical and reflective use of digital technologies in teaching and learning processes.

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