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DIGITAL APPLICATIONS FOR INCLUSION. THE EUROPEAN PROJECT DEPIT

APLICACIONES DIGITALES PARA LA INCLUSIÓN. EL PROYECTO EUROPEO DEPIT

Pilar Colás-Bravo[1]: Sevilla University. Spain.
pcolas@us.es

Pier Giuseppe Rossi. University of Macerata. Italy.
pg.rossi@unimc.it

Juan de Pablos-Pons. Sevilla University. Spain.
jpablos@us.es

Jesús Conde-Jiménez. Loyola University Andalusia. Spain.
jconde@uloyola.es

Patricia Villaciervos Moreno. Sevilla University. Spain.
pvillaciervo@us.es

DEPIT (Designing for Personalization and Inclusion with Technologies) is part of a project co-financed by the Erasmus + program of the European Union, in which different European universities participate. Project website: http://depit.eu

ABSTRACT

This article discusses the relevance of personalization and inclusion as key aspects of teaching planning and emphasizes the suitability of technologies to support this perspective. An app, called DEPIT (Designing for Personalization and Inclusion with Technologies), whose purpose is to support teacher planning and programming, is presented and evaluated from the perspective of the teaching staff. The information is collected from teachers regarding their attitude towards the DEPIT app, as well as its usefulness in teaching practice. The applied value of the app is collected through a discussion forum. The quantitative analysis of the data carried out by means of the statistical program SPSS v.24, identifies positive attitudes of the teaching staff in relation to the use of digital tools to elaborate the teaching programming. The

[1]**Pilar Colás-Bravo:** Professor of Research Methods and Diagnosis in Education. He teaches at the University of Seville (Spain) in Bachelor, Masters and Doctorate degrees. He has directed more than twenty doctoral theses and coordinated multiple Research and Innovation Projects. Collaborate as an expert in different international agencies.
pcolas@us.es

qualitative analysis, carried out through the software Atlas.ti v.8, records aspects that teachers value in the application of DEPIT, among others: "Its adaptation and versatility to diverse educational contexts", "It facilitates interaction and communication" and "It promotes freedom, independence and autonomy".The results allow us to conclude that teachers assume a proactive and positive attitude towards the incorporation of technological tools for their teaching and put in value the potential of the DEPIT App for teacher programming.

KEY WORDS: teachers – ICT – programming – inclusion – personalization - teaching and learning.

RESUMEN

En esta aportación se plantea la relevancia de la personalización y la inclusión como aspectos clave de la planificación de la enseñanza y se incide en la idoneidad de las tecnologías para apoyar esta perspectiva. Se presenta y evalúa desde la perspectiva del profesorado, el potencial de la herramienta DEPIT (Designing for Personalization and Inclusion with Technologies) cuya finalidad es apoyar la planificación y programación docente, atendiendo a la inclusión y personalización. Se recoge información del profesorado sobre su actitud hacia DEPIT, así como sobre su utilidad en la praxis docente. El valor aplicado de DEPIT se recaba a través de un foro de discusión. El análisis cuantitativo de los datos llevado a cabo mediante el programa estadístico SPSS v.24, identifica actitudes positivas del profesorado en relación al uso de herramientas digitales para elaborar la programación docente. El análisis cualitativo, realizado mediante el programa Atlas.Ti V.8, registra aspectos que los docentes valoran de la aplicación DEPIT, entre otros: "Adaptación y versatilidad a contextos educativos diversos" "Facilita la interacción y la comunicación" y "Potencia la libertad, independencia y autonomía" .De los resultados obtenidos se concluye que el profesorado asume una actitud proactiva y positiva hacia la incorporación de herramientas tecnológicas para su docencia y ponen en valor el potencial de DEPIT para la programación docente.

PALABRAS CLAVE: profesorado – TIC – programación – inclusión – personalización – enseñanza y aprendizaje.

APLICAÇÕES DIGITAIS PARA A INCLUSÃO. O PROJETO EUROPEU DEPIT

RESUMO

Nesta aportação se propõe a relevância da personalização e à inclusão como aspectos chave da planificação do ensino e se incide na idoneidade das tecnologias para apoiar esta perspectiva. Se apresenta e avalia desde a perspectiva do professorado, o potencial da ferramenta DEPIT (Designing for Personalization and Inclusion with Technologies) cuja finalidade e apoiar a planificação e programação docente, atendendo a inclusão e personalização. Colhendo informação do professorado sobre sua atitude com DEPIT, assim como sobre sua utilidade na práxis docente. O valor

aplicado do DEPIT se consegue através de um fórum de discussão. A analises quantitativa dos dados estudados mediante o programa estatístico SPSS v.24, identifica atitudes positivas do professorado em relação ao uso de ferramentas digitais para elaborara a programação docente. A analises qualitativa, realizada mediante o programa Atlas.Ti V.8, registra aspectos que os docentes avaliam da aplicação DEPIT, entre outros: "adaptação e versatilidade a contextos educativos diversos" "Facilita a interação e a comunicação" e "potência a liberdade, independência e autonomia". Dos resultados obtidos se conclui que o professorado assume uma atitude proativa e positiva para a incorporação de ferramentas tecnológicas para sua docência e põe em valor o potencial do DEPIT para programação docente.

PALAVRAS CHAVE: professorado – TIC – programação – inclusão – personalização, ensino e aprendizagem.

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1. INTRODUCTION

The current society seen as a globalized and liquid reality, as described by Bauman (2018), is characterized by its complexity and diversity. In that context, educational systems are obliged to provide responses adapted to this heterogeneous reality, where interculturality is today a relevant component. As a consequence, the concepts of personalization and inclusion become main references for educational institutions and therefore for teaching planning work. This horizon permanently generates new educational requirements to which teachers of all educational levels must respond through a work of constant updating and the consequent development of appropriate skills.

When we talk about personalized learning, we refer to those teaching strategies, solutions and interventions that fit the needs of each student, taking into account how they learn, their aspirations, abilities and perceptions, as well as their previous cultural differences, interests and knowledge (Bosada, 2018). Accordingly, we speak that it should be based on a pedagogical model focused on students, which has gained strength in recent years, especially with the support of information and communication technologies (ICT), which have allowed us to customize teaching in a more attractive, motivating and effective way for students to become protagonists of their own learning. Technologies facilitate the creation of personalized itineraries for students based on different profiles and needs, thus providing a flexible personal environment through which each one can advance at their own pace by acquiring an active role in their own education.

On the other hand,

> "educational inclusion is a process aimed at guaranteeing all students the right to quality education on equal terms, paying special attention to those in situations of greater exclusion or at risk of being marginalized. The development of inclusive schools that welcome all students, without any discrimination, and favor their full participation, development and learning, is a powerful tool to improve the quality of education and move towards fairer and more cohesive societies" (Organization of Ibero-American States for Education, Science and Culture (OEI) s.f.).

The inclusive culture aimed at guaranteeing equal opportunities for all in the field of education becomes the main objective to be achieved in the classroom and in a global challenge. In this regard, UNESCO, in the Framework for Action for the realization of the Sustainable Development Goal 4 of the 2030 Agenda for Education, emphasizes that inclusion and equality are the foundations of quality education, highlighting the importance of "Guaranteeing inclusive and equitable quality education and promoting lifelong learning opportunities for all".

The presence of technologies at school facilitates this task by allowing us to develop new learning strategies that contribute directly to the development of inclusive classrooms. The Information and Communication Technologies (ICT) are considered flexible and highly motivating learning tools and, therefore, tools that can benefit a large number of students with different cognitive levels, learning abilities and origin (Siu, and Lam, 2012; Grande and González, 2015). In this sense, integrating innovative methodologies and digital tools can offer us a wide range of possibilities to reorient traditional educational practices by thinking about building cooperative environments for inclusive education.

The technological endowments that are being made at the institutional level aim for the school to incorporate the advances of the Information Society. Digital tools and interactive materials are a source of teaching resources that provide a motivational component added to school activities, favoring attention to diversity and the creation of dynamic and flexible learning environments. In this line, European research programs are committed to supporting projects aimed at designing, experimenting and evaluating digital applications that support teachers in their functions and facilitate quality education, based on inclusion and sustainability.

1.1. The importance of programming teaching

The preparation of an educational project, implicit or explicit, has always characterized teachers' action also because it identifies each human action and derives from the need for anticipation (Berthoz, 2011) and foresight. Dewey already declared that deficiencies in this aspect are very often the origin of the failure of educational practices:

> The absence of sufficiently reflective beforehand planning in advance. The causes of such failure are varied. The only one, which is particularly important to mention in this regard, is the idea that such advance planning is

> unnecessary and even that it is intrinsically hostile to the legitimate freedom of the educated. (…) On the contrary, it is the duty of the educator to institute: much more intelligent and, consequently, more difficult, the task of planning. You must examine the capabilities and needs of the particular group of individuals with whom you are dealing and, at the same time, you must organize the conditions that provide the theme or content for the experiences that meet these needs and develop these capabilities. Planning must be flexible enough to allow free play for the individuality of the experience and yet firm enough to give a direction towards the continuous development of knowledge. (Dewey, 1938, p. 46).

Today, almost a century after Dewey's words, design requires more attention due to the complexity of the classroom where different cultures, skills and knowledge intersect. This complexity requires, in particular, explicit planning shared with both the teaching community and the students. In this sense, we talk more and more about joint planning.

1.2. Use of digital technologies to program inclusive teaching

Technology is currently a key to create spaces where students and teachers share their day to day. Technological and virtual media are proposed to the teacher as scaffoldings in the teaching-learning process, and it begins to be more than the tool or the medium (Gámiz and Gallego, 2016).

ICT support teachers in their teaching from different perspectives, one of them is to allow and facilitate the design and planning of their work (Onrubia, 2016). Educational inclusion is already a reality in the current education system. In addition, the concept of personalization of learning begins to take shape and prominence, where the achievement of each student depends on whether the teaching-learning model used is motivating and according to the expectations and training needs of learners. Technological elements useful for this purpose are virtual platforms, interactive Apps, forums, debates, or participatory and collaborative activities in a pedagogical framework designed a priori by the teachers themselves. These management and planning tools improve the possibilities to choose from (De Pablos, Colás, López and García, 2019).

To execute personalization, according to Touron (2019), the teacher can use the help of technology. One of the main reasons that explains the interest in recent years for personalization is the strong development of information technologies. ICT currently help the education system to give a participatory and active role to both teachers and students. Therefore, the use of new technologies provides a further step to generate change in education. This change is evident in the personalization and adaptation of the teaching-learning process to both the teacher and his students. Proponents of personalization through technology mainly hold two arguments: the importance of contemplating the itinerary and rhythm. If the student is respected and given the possibility to control what he learns and at what speed and at what time he learns, learning will be greater and of better quality. To many,

personalization, be it a learning design or a content to be learned, is currently linked to technological devices and data or information. Its main strength lies in the ability to have multiple resources and information, which makes it possible to improve the individual and collective learning process.

So the role of ICT in this context focuses on the creation, distribution and adaptation of flexible resources to the user, in this case student and teacher, providing mechanisms to solve problems and issues that occur in the school day to day. The latter incorporates personalized access to educational content, adapting to rhythms, styles and learning needs. This way, the student can access a variety of educational resources while finding reinforcement and support in cases of poor performance or a slower level of learning, as well as expanding knowledge without limitations to those who can and want to go further (Fernández, 2017).

Designing in terms of personalization of learning is a mechanism for building contents and skills mediated by new technologies that also includes the generation of specific educational situations. This model that leads teachers to create curricular and training itineraries adapted to their competence level, to their group-class, to the subgroups that exist in it, or even to each of the students that compose it, is a necessary strategy for the world educational system (Pineda and Castañeda, 2013). Therefore, it is key to understand technologies as tools and at the same time mechanisms that help create spaces, resources and personalized processes, enhancing the relationship between teachers and students (Cubeles and Riu, 2018).

One of the technological means that most versatility admits in these terms is the virtual platform or virtual space shared between students-teacher (Caminal and Puigcerver, 2017; De Pablos, *et al.,* 2019). On the other hand, Apps also provide diversification of stimuli and resources that encourage the development of students' competences with different learning rhythms (Caminal and Puigcerver, 2017; Molano, Sánchez and Castillo, 2012).

But all these resources must be selected, organized and structured by the teacher to achieve the training objectives. This task takes shape and is visualized through programming. Therefore, programming is the first link in the educational process that involves and reflects the pedagogical model that guides teachers. In this sense, the European DEPIT Project involves the creation and experimentation of a technological resource designed to facilitate teaching programming from an inclusive and personalized perspective.

1.3. The European DEPIT Project. A Pedagogical Reference Model

The European project identified with the acronym DEPIT (Designing for Personalization and Inclusion with Technologies), developed from 2017 to 2020, is an example of synergy between teaching practice, educational research and didactic innovation. It is a project co-financed by the Erasmus + program of the European Union, in which different European universities participate (Università di Macerata of Italy; University of Seville of Spain; University College London of the United Kingdom

and Università Cattolica del Sacro Cuore of Italy), international associations of teachers and trainers (Center of Professors Seville in Spain and AEDE-IT Association of Italia); school networks related to educational innovation projects (Association Network DEPIT and Consortium Red CRESCENDO of Italy); and software development companies (Infofactory SRL of Italy). All of them provide different fundamental competences to achieve the objectives that have been set.

Its main purpose is to develop and implement in the schools an emerging didactic methodology based on the inclusion and personalization of teaching and provide teachers with a digital tool (the APP DEPIT) created to facilitate the design and planning of their teaching, while allowing students to get a clear view of their individualized learning itineraries. So, the general objective of this project is to develop, test and transfer an interactive learning design methodology and application in the participating school and university systems of the partner countries, and then promote its adoption in other countries of the European Union through an APP.

The specific objectives of this Project are specified in:

1. Develop a teaching planning methodology that supports teachers in attending to both diverse and complex classroom realities and the different needs of students.
2. Create a simple and intuitive digital application (for PC and mobile) that can be used both in the classroom and at home, to help teachers design their learning activities and thus nurture programming.
3. Experiment and validate this digital tool (DEPIT) at different educational levels, in the countries participating in the project.
4. Disseminate and promote the use of this tool through the implementation of open and massive online training (MOOC).
5. Transfer this application and its results to training spaces at local, national and European level.

The theoretical reference of the teaching model of DEPIT is based on the theory of the "Conversational Framework" of Professor Diana Laurillard (2012) who, taking into account the recent results of research in the field of teaching-learning with ICT, understands the figure of the teacher as a planning professional who needs pedagogical help and digital support to build a learning environment that allows him to handle and learn with technologies in an adaptive way.

This technological learning environment plays a crucial role in the motivation of teachers and students. On the one hand, it acts as a guide for the organization and didactic management of the teacher and, on the other hand, it guides the curricular management of the student. The benefits materialize in saving time and resources to the institution, providing interactive learning spaces and promoting the use of technologies in classrooms, especially in teachers without extensive training in ICT.

This approach also advocates collaboration among teachers in the development of teaching contents, allowing the processes of reflection, comparison, discussion and adaptation of educational practices and promoting an active role of students in their

learning process, favoring individualized teaching for the benefit of students with different skills.

In the following illustration we can see a summary of the main characteristics and benefits that Professor Laurillard gives to the creation of these technological learning environments.

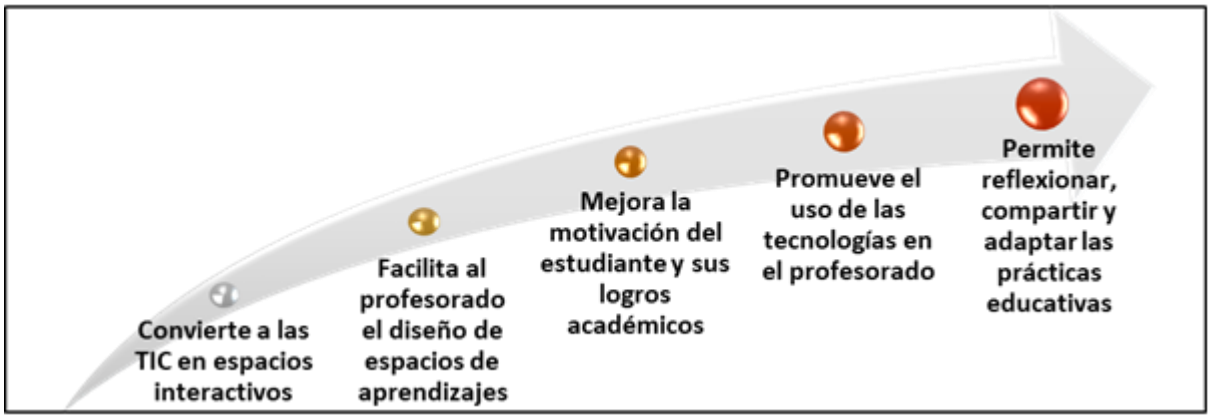


Image 1: *Characteristics of the Technological Learning Environments according to Laurillard et al. (2011).*
Source: Self made, 2019.

The DEPIT project involves the following phases of action:

1. **First.** Methodological Design Phase: the methodological approach on which the project was based was defined and adjusted.
2. **Second.** Tool Design and Piloting phase: the application for learning planning was developed with the basis of the pedagogical reference model and tested in schools and teachers belonging to networks and associations participating in the project.
3. **Third.** Teacher Training: the teacher training process was carried out to consolidate the use of the Methodology and Application. This training was developed through different strategies:
   - Training of teachers of the associations and networks participating in the project: training course for teachers of the schools involved in the pilot phase.
   - Training of future teachers and trainers: introduction of specific content on the DEPIT methodology and application in some related subjects of university degrees. This content was included in the curricula of the education degrees of the Universities participating in the project.
   - Online, massive and open training: development of the first MOOC (distance, free course accessible via internet to which anyone could sign up and practically without limit of participants). This course was the first of a series of MOOCs already planned, which guaranteed direct and permanent access to the methodology and the APP DEPIT to other colleges, universities, teachers, students and any other interested person.
4. **Cuarta. Fourth.** *Transfer and Generalization of Results:* finally, the last stage was dedicated to the dissemination of the results of the project at local,

national and European level. This action involves the publication of monographs, communications or articles in specialized journals; congresses or seminars related to the subject; and the organization of science-disseminating events.

1.4. The Digital DEPIT Tool

The APP DEPIT constitutes a new technological resource designed to facilitate the teaching planning process for teachers. This planning oriented to the development of training projects is carried out both at the macro level and at the micro level:

1. Macro: The annual planning that the teacher decides at the beginning of the year. This is where the teacher describes the way forward of each subject and for all its students. This planning is developed throughout the academic year.
2. Micro: The planning of teaching units or each work session that describes the activities related to the different classes on the same topic.

Teachers need, therefore, to organize the content, topics, activities and different and progressive tasks before they start their classes, it is the prelude to the educational activity. This planning task conceives the teaching performance not as a set of unpredictable and disconnected actions but as the implementation of a well thought out and articulated plan. That is precisely why planning is one of the most important commitments that teachers must assume, and it has now become a highly qualified process of pedagogical design, based on the production of well-anchored, orderly and useful teaching material, not only for the class in general but also adapted to specific groups and specific needs.

This responsibility of the teaching staff in particular and of the school in a general way supports the importance of providing all the possible help from the institutions, and this is the commitment assumed from the DEPIT project, providing the teaching staff with both didactic strategies and multimedia resources that favor new ways of designing, managing and organizing teaching and enable the creation of personalized itineraries and educational materials adapted to the particular needs of students.

The DEPIT application, which comes to meet these needs, is a flexible instrument that facilitates both teaching planning and its subsequent restructuring during the didactic action. The pedagogical design created by teachers is represented graphically by a clear and visual structure that takes the form of parallel formative itineraries or personalized learning paths. To facilitate their use and dissemination, these structures can be viewed from any PC, Interactive Whiteboard (IW), or mobile device (Tablet or Smartphone).

1.4.1. Functionalities of the APP DEPIT

The main purpose of DEPIT is to help teachers in their teaching work in terms of:

1. *Facilitating to the teaching staff the design of learning itineraries (didactic programming) in a flexible, inclusive and personalized way:* The application allows teachers to think and make integrated and global planning of all

educational situations present in the classroom. This vision is concretized realistically in time, space and educational resources adapted to the variety of teaching-learning processes (hereinafter EA) that can occur.

2. *Organizing and managing the didactic programming created at different levels of curricular concretion:* The APP is conceived as a space where the teacher materializes his designs at different levels of deepening: he can carry out a general programming articulated in modules and a concreter one through lessons or didactic units and independent activities. It allows, therefore, efficient planning and management of the EA processes that teachers design.
   In the following image we show an annual program where the different sequentially organized curricular levels are observed by using drop-down folders that include Folders and Cards of different colors.

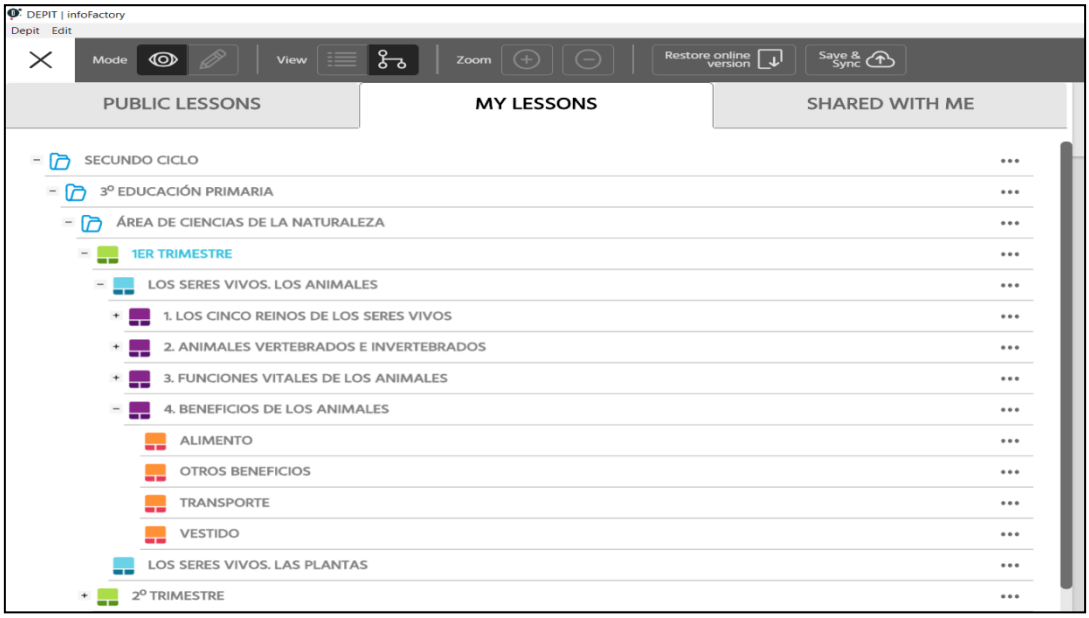


Image 2: *Organization of the Didactic Programming with the APP DEPIT.*
Source: Self made, 2019.

In this case, different Folders have been generated to identify the Cycle, the Course and the Area of the curriculum. At the same time, Cards have been used to classify contents by Quarters (Green Cards); by Modules (Blue Cards); and by Teaching Units (Purple Cards). Finally, different Activities have been incorporated in each Unit (Orange Cards).

3. *Adding teaching resources to teaching planning:* As a fundamental part of teaching planning, the tool allows teachers to introduce a variety of resources in their teaching program to facilitate the learning process of their students (texts, documents, images, videos, presentations, links, etc.). These materials also serve to capture the attention of students and increase their motivation. In addition, you can personalize each of these elements to make the proposal as attractive as possible (change images of the cards, insert shapes, enter arrows to establish connections, include backgrounds, etc.

4. *Personalizing the processes of EA (Teaching-Learning) to consider the diversity of the students:* From the APP you can personalize the educational itineraries and adapt the programmed activities to the different capacities or learning rhythms that coexist within the classrooms. This is done by using a color code that can be assigned to different levels of difficulty of the proposed activities. The possibility of rectifying the didactic design in real time is also considered to adapt them to the needs of the specific context.
5. *Integrating different teaching methodologies into the learning design:* The APP DEPIT allows the incorporation of different teaching methodologies tailored to the needs of students and the designed educational itineraries.
6. *Autonomous management of student learning in a digital environment:* DEPIT, being visible in the classroom through interactive digital projectors or blackboards and being available for both computers (Mac and PC) and mobile devices (Tablet / Smartphone), allows planning to be made explicit and open to offer students information about their own learning pace and process. This reinforces in the teacher a role of guide of training and an active role of students in their learning process.
   Once each didactic unit has been designed, the student can manage their learning by accessing the designed materials and the available resources and interacting with the itinerary created to work as appropriate at each moment of the process.
7. *Sharing the learning units created by teachers at the level of the center and / or departments:* One of the problems affecting teachers today is the lack of time to coordinate. With DEPIT, there is the possibility of sharing the developed teaching material among teachers. They themselves can choose to invite teachers and users they deem appropriate to share their own resources, or participate in the joint and simultaneous development of specific schedules. By making available to teachers the replacement and exchange of educational designs, materials and educational activities, the adoption of collaborative practices in teachers is promoted, generating a culture of cooperation at the institutional level.
8. *Cohesion of the educational intentions of the center and the teaching practice:* DEPIT favors the classroom programs to be harmonized with those of the center, favoring intra- and inter-level coordination, while allowing joint reflection on learning outcomes.
   Once the DEPIT Project has been presented, in the following sections we present the results of the experimentation of this technological tool in the classrooms of primary and secondary education in Spain.

2. OBJECTIVES

The experimentation and applied validation of the digital tool (DEPIT) at different educational levels, in the countries participating in the project, is one of the objectives of the DEPIT project. Hence, in this contribution we present the study carried out to provide empirical evidence about the value granted by teachers in Spain in their teaching functions.

Specifically, the objective of this study is to know the attitudes of non-university teachers towards the use of ICT applications in teaching and, in particular, towards the use of the APP DEPIT in a group of Spanish teachers and identify how the APP DEPIT can help cover the need of teachers for programming and design, from their point of view.

3. METHODOLOGY

This study uses a multimethod approach, as it integrates quantitative and qualitative methodology. A quantitative-descriptive methodology is used to know the attitudes of teachers towards the APP DEPIT. And a qualitative methodology to identify the programming and design needs in which the APP DEPIT can help teachers. Qualitative data are obtained from written contributions poured into a forum by teachers who have been trained and experienced with DEPIT. Quantitative data are obtained by using a Likert scale designed ad hoc for this study.

The participants in the study are Spanish teachers who participated in the APP DEPIT test. They belong to centers intentionally selected by the Teaching Center (CEP) of Seville (Spain), they were centers that were open to participate in the study and, on the other hand, they were centers with experience in collaboration with the CEP and with trajectory in the use and application of ICT. In addition, this teaching staff participated in the course "Designing for Personalization and Inclusion with Technology (DEPIT) - Module 1" (Code: CEPSE1_184127ALI021) taught by the CEP of Seville and designed by the Research, Evaluation and Educational Technology Group (HUM154) of the University of Seville. This course module consists of two presence hours and six non-presence hours and it took place from June 26 to July 13, 2018. Specifically, 23 teachers participated, 58.3% out of which were women and 41.7% men, their age ranging from 29 to 56 years. All had more than 5 years of teaching experience. 75% in Primary Education and the other 25% in Secondary Education, High School or Vocational Training. On a scale of 1 to 10, with 1 being the minimum score and 10 being the maximum, 70% of teachers consider that they have a level of digital competence above 8. And 75% participate in a working or innovating group in their center.

For objective 1 an ad hoc scale has been developed, consisting of 15 items, 8 out of which ask about the attitude of teachers on the use of ICT applications to schedule teaching and 7 items specifically referring to the application of APP DEPIT. In the following Image 9, you can see the list of items on the scale, in which those attitudes towards the use of ICT in general appear with an asterisk, and without an asterisk towards the specific use of the APP DEPIT.

Table 1. *Attitudes scale towards the use of ICT applications in the classroom.*

Overall, I feel confident about my ability to use computer applications to design classroom schedules*
I am stressed by the use of computers*
The challenge of using computer applications for teaching activity is exciting*

Anyone can learn to use a computer application if they are patient and motivated*
I prefer to do things in a traditional way, instead of having to use a new computer application*
I'm afraid that if I start using computer applications, I will be more dependent on them and lose some of my reasoning skills*
I am sure that with time and practice I will feel comfortable working with the DEPIT application
I prefer to do the programming by hand*
I feel I can follow the steps to properly use the DEPIT application
I have difficulty understanding the technical aspects of the DEPIT application
It scares me to think that I could lose my job and a lot of information due to a DEPIT application failure
I think that using the DEPIT application will save me a lot of tedious work when programming
I think that using the DEPIT application will generate frustration
I think that using the DEPIT application will improve my teaching activity
I feel that computer applications like this are necessary tools in educational environments*

Source: Self made, 2019.

It is requested that each of these statements be valued from 1 to 10, according to the level of agreement with them, 1=Do not Agree at all and 10=Completely Agree.

To respond to objective 2, an integrated forum is used in the course carried out in the CEP by teachers, in this space teachers are urged to present, debate and discuss interactively on the potential aspects of the DEPIT application to teaching programming.

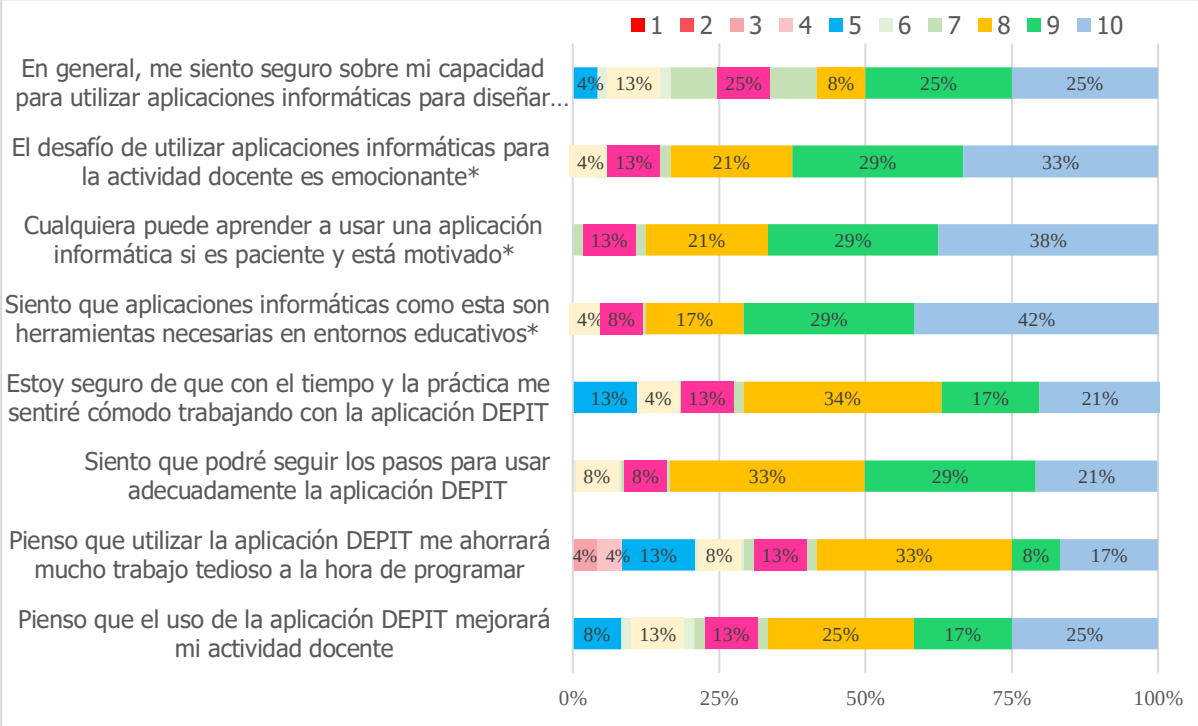
For the data analysis of the quantitative results derived from the application of the scale, the SPSS V.24 program is used to perform statistical descriptions of frequencies (%). For the statistical analysis of the qualitative data from the forums, Atlas.Ti V.8 is used, following the following methodological process:

1. Reading the contributions made by teachers in the forum.
2. Previous analysis and identification of variables and / or categories.
3. Codification of the contributions by assigning codes to the narration.
4. Organization and structuring of the information in order to make an explanatory theoretical construction or elaboration of the emerged dimensions.

4. RESULTS

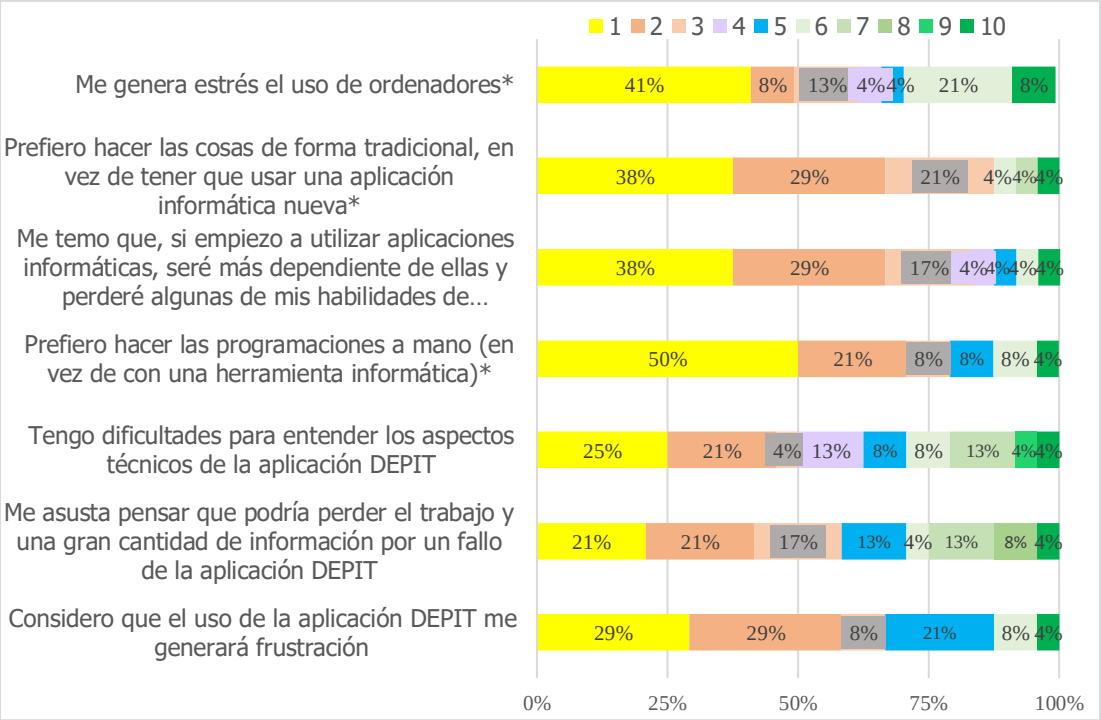
In relation to the first objective of this study, ie to know the attitudes of non-university teachers towards the use of applications, there are two groups of responses. On the one hand, we obtain positive responses from teachers in statements related to their ability to use digital applications to program their own teaching, considering that the application of tools is something motivating and exciting. In addition, they consider that the application of computer tools is necessary in educational settings and that any teacher can apply them, if patient and motivated. With respect to the APP DEPIT, they are sure that, with time and

practice, they will be able to feel comfortable using it, they will be able to follow their steps to apply them properly, and that it will save time when performing the tedious task of programming, considering that it will improve the teaching activity These results can be visualized in the following graph 1, in which it can be observed that the majority of the teachers are located, more than 75%, in positive values at the time of being in agreement with these affirmations.



Graph 1: *Positive assessments towards the use of ICT applications and the APP DEPIT.*
Source: Self made, 2019.

On the contrary, in the following graph 2, we can observe those statements with which the teachers disagree. It can be detected how they do not have a negative attitude towards the use of ICT in education, stating that they believe that the use of computers does not cause them stress, that they do not prefer to do things in a traditional way but rather use new computer applications, such as, for example, they prefer to use digital tools to make programming. In addition, they disagree with the statement that, if they make use of computer applications, they will be more dependent on them and lose reasoning skills. As for the APP DEPIT, they have a fairly open attitude concerning its use, since they consider that they have no difficulty in understanding it and consider that it will not generate frustration.



Graph 2: *Negative assessments of the use of ICT applications and the DEPIT APP.*
Source: Self made, 2019.

From what can be seen in Figure 2, in its response levels a quite positive attitude is detected for the use of computer and digital tools for teaching programming, also of DEPIT. Since the highest response rates are concentrated in a low assessment of these negative aspects.

The qualitative analysis applied to teachers' manifestations, in the forums of the training course, makes it possible to identify and extract dimensions in which the APP DEPIT digital tool can help in teaching programming. The following dimensions are observed and recorded.

1. **Dimension 1. Adaptation and versatility in educational contexts**: teachers who have tested the application consider that it has potential to be transferred and adapted to different school contexts, mainly because of its versatility, ease of use, access and inclusion of multiple resources ... what allows them to dedicate themselves to the task of programming their teaching and personalize it according to the different characteristics of the class. Some quotes that support this dimension are:

   The DEPIT project app, from my point of view, is a very versatile tool. It can be adapted without too much difficulty to programming by integrated teaching units. (Subject 1)

   An APP, specifically that of the DEPIT project, can help facilitate our programming as it allows us to access resources from any technological

device, both teachers and students, providing greater motivation and interest, facilitating participation and especially because it gives option to take into account the diversity of our students. (Subject 6)

Possibly an app can positively support our programming because it must be open and will adapt to students, their context, their difficulties, the variety of our children, and even the different forms of teaching that we can find in our schools. (Subject 3)

The usefulness of an APP is that it allows us to adapt programming to the needs of our classroom, allowing us to personalize it and make an inclusive design. (Subject 8)

Possibly an app can positively support our programming because it must be open and will adapt to students, their context, their difficulties, the variety of our children, and even the different forms of teaching that we can find in our schools. (Subject 3)

2. **Dimension 2. It facilitates interaction and communication:** teachers emphasize that, being so accessible and allowing teachers and students to work in the same space, the interactive opportunities between both agents are expanded. In addition, it is a platform that allows synchronous and asynchronous communication. They also emphasize that they expand and transcend the boundaries of the classroom, and what is included in this to other agents of the educational community.

   It is a new communication channel, faster and more direct, as well as accessible to all... Information accessible to all members of the educational community. (Subject 2)

   However, it catches my attention that we are going to work specifically, the fact that we can share it with the students, that they see our own programming that, after all, will fall on them. It is the teaching programming for their own learning, so if we can share it with them, better than better. (Subject 5)

   In addition, it will allow good communication among all members of the educational community, which, in my view, is essential. (Subject 7)

   It is a communication channel open to the whole community, it allows us to access the links and material in a simple way. (Subject 9)

3. **Dimension 3. Advantages related to the design and characteristics of DEPIT:** the design of the APP is marked as a potential. In addition, the functionality of allowing the incorporation of various resources is indicated as a positive feature.

Visually, it is attractive and very suitable to trace different itineraries within the didactic proposal, which conform to the different learning rhythms. (Subject 1)

Some of the features and utilities that the APP must have in my judgment are: Show the contents and activities that you propose, allowing them to be added in a simple way and in a wide variety of formats; also allow us to perform a hierarchy of units, topics and activities so that "where we are" can be ease to locate; to help our students understand the structure of the contents and units. I think this is one of the interesting aspects of this application, its visual character as opposed to the other applications that I have used that have a more linear character. (Subject 8)

Easy to handle...the different elements are displayed globally… Flexible and adaptable to change. (Subject 11)

As resources can be added at all levels, it is very practical and motivating. (Subject 1)

As students will also have access, it will be used to control their work and resources (images, websites, videos, files, etc.) will always be at hand. (Subject 1)

Possibility of accessing resources from any technological device (computer, Tablet, mobile,) and anywhere. (Subject 2)

4. **Dimension 4. Freedom, independence and autonomy are enhanced:** in relation to the above, the conception and design of the APP makes teachers agents of the entire teaching-learning process, modifying and adapting whenever necessary:

   Another interesting aspect of the APP is that it helps teachers to be the "orchestra directors", not leaving that function to any specific publisher. We must be the ones who program based on our students. (Subject 1)

5. **Dimension 5. personalization is achieved**: based on all the foregoing dimensions, teachers see this application allows personalization of teaching:

   A more specialized attention with links to various resources. (Subject 4)

   It adapts to the dynamism of the teaching units and, therefore, to inclusion. (Subject 7)

   The usefulness of an APP is that it allows us to adapt programming to the needs of our classroom, allowing us to personalize it and make an inclusive design. (Subject 8)

6. **Dimension 6. Development of digital competence**: the use of the tool encourages the training and improvement of digital competence:

   It improves digital competence in the era of new technologies. (Subject 2)

   Finally, it encourages digital competence and, of course, it is always positive to have a support tool. (Subject 7)

   We try to work with ICT and an application of this type can help us to offer our students a vision of our subject that is much more attractive, visual, virtual, adapted to their way to see the world around them. (Subject 10)

7. **Dimension 7. It improves motivation and engagement**: teachers believe that the use of DEPIT can help both teachers and students to greater motivation and involvement with the curriculum:

   Increased motivation towards learning by both students and teachers having an active role and connectivity among all of them, inside and outside school. (Subject 2)

   The APP of the DEPIT project is first a novelty. Novelties always manage to keep our students expectant and open to new learning. (Subject 7)

   ...it has "the novelty", so the motivation of the students is guaranteed. (Subject 9)

5. DISCUSSION

Regarding Objective 1 of the study, it can be concluded that teachers have a fairly positive attitude to the use of applications for the application of the teaching task of programming. Likewise, attitudes towards the APP DEPIT are equally positive. Which evidences an open attitude of teachers towards technological tools that can help them in their professional work.

With regard to objective 2, with respect to the APP DEPIT, teachers recognize its value in that it allows them to include a multitude of resources, its interactive and communicative nature, in addition to enabling its adaptation to multiple educational contexts.

The teacher is perceived as a change-transforming agent that uses this digital tool to mediate the personalization of his teaching, always adjusted to the particular characteristics of the classroom. The development of digital competence is a potentiating aspect, and very in line with the European guidelines, DIGCOMPEDU framework, which urges teachers not only to train their own digital competence but also that of their students. The different emerged dimensions allow the teacher to control their own teaching but also give the opportunity to empower their own students.

From a broader approach we can also conclude that this DEPIT project is a contribution to sustainable education, as it contributes to inclusion and educational improvement, in addition to vindicating individuality. The possibility of reworking programmatic proposals is another notable aspect of sustainability, since a sustainable initiative is a proposal that allows the use of resources, as well as the possibility of permanence and continuity of the work initially invested. For teachers, a flexible product is sustainable, as long as it is capable of channeling creativity and the possibility of adjusting in action, intuitive and rational, since even possible errors in didactic planning can be detected and therefore eliminated.

Therefore, and concluding, the experimental results of the DEPIT application presented herein provide contrasted and indicative data of the potential of the DEPIT APP for a planned and sustainable education.

6. RECOMMENDATIONS

This piece of research presents only the results of the piece of research carried out with Spanish teachers of primary and secondary education, it remains to be seen if these findings converge with other university levels and / or with the rest of the countries participating in the study. On the other hand, it is necessary to experiment and evaluate this technological tool in wider populations of teachers who have different levels of competence in the use of ICT in their classrooms, as well as different training and knowledge paths. The European character of this project offers the opportunity to have information from teachers of different levels and geographical backgrounds to reach more extensive and general conclusions.

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AUTHORS:

Pilar Colás Bravo
Professor of Research Methods and Diagnosis in Education. He teaches at the University of Seville (Spain). Founding member of the Research, Evaluation and Educational Technology (GIETE) group. He has led numerous national and international Research Projects and Innovation Projects originating patents. His lines of research are: Educational Research and ICT, Gender, Diversity and Inclusion, Evaluation and Educational Quality. Author of more than a hundred publications in impact journals. Author and publisher of impact books and scientific journals. It collaborates with the National Agency for Evaluation of Quality and Accreditation (ANECA) and with the National Agency for Evaluation and Prospective (ANEP). She also collaborates as an expert in other international agencies.
pcolas@us.es
Orcid ID: https://orcid.org/0000-0003-3000-075X
Google Scholar: https://scholar.google.com/citations?user=fjPPRJQAAAAJ&hl=es
ResearchGate: https://www.researchgate.net/profile/Pilar_Bravo2
Academia.edu: https://us.academia.edu/PilarColasBravo
Researcher ID: http://www.researcherid.com/rid/D-5889-2017
Publons: https://publons.com/researcher/2143710/pilar-colas/

Pier Giuseppe Rossi
Professor of General Didactics and Pedagogy of Special Educational Needs, in the Department of Education Sciences, Cultural Heritage and Tourism of the University of Macerata (Italy). Dean of the Faculty of Education from 2009 to 2012, and a member of the Board of Directors of the University of Macerata from 2012 to 2016. He is currently a delegate of informatics, didactic innovation and e-learning at the University of Macerata. He is president of SIREM (Italian Society for Research in Media Education) and member of scientific committees of impact journals and editorial collections. He has coordinated more than 10 European projects. Now he coordinates the European DEPIT project. And it has more than 200 publications (books, articles and book chapters).
piergiuseppe.rossi@unimc.it
Orcid ID: https://orcid.org/0000-0001-9801-6307
Google Scholar: https://scholar.google.com/citations?user=-Aiv3BEAAAAJ&hl=it
ResearchGate: https://www.researchgate.net/profile/Pier_Giuseppe_
Academia.edu: https://unimc.academia.edu/PRossi
ResearcherID: http://www.researcherid.com/rid/H-7776-2015

Juan de Pablos Pons
University Professor since 1995 in the area of Didactics and School Organization, at the University of Seville. Director of the Evaluation and Educational Technology Research Group, linked to the Andalusian Research Plan. He is the author of

numerous publications and has participated regularly in subsidized research projects, at regional, national and European level. Evaluator of R&D projects of different national and regional agencies. The preferred lines of research, developed during the last ten years have been: ICT applied to education; educational policies and the integration of ICT; teacher training; and the development of the European Higher Education Area. In the field of management, he has held the post of D ecano of the Faculty of Education from 2009 to 2017; He has been a resident of the Red University Science Association of Educational Technology (RUTE).

jpablos@us.es
Orcid ID: https://orcid.org/0000-0001-9147-5965
Google Scholar: https://scholar.google.com/citations?user=HlOusEkAAAAJ
ResearchGate: https://www.researchgate.net/profile/Juan_Pons2
Academia.edu: https://us.academia.edu/Juan+de+Pablos+Pons
ResearcherID: http://www.researcherid.com/rid/K-9981-2014
Publons: https://publons.com/researcher/2489576/juan-de-pablos-pons/

Jesús Conde-Jiménez

Doctor in Education Sciences, with International mention, Master in Management, Evaluation and Quality of Training Institutions and Degree in Psychopedagogy from the University of Seville (Spain). Currently, he is a full-time professor at Loyola Andalucía University and is a member of the Research, Evaluation and Educational Technology Group (GIETE) HUM-154, since 2011. During 2013-2017, I have been a beneficiary of a predoctoral assistance, from competitive nature, within the National University Teacher Training Program (FPU) of the Ministry of Education, Culture and Sports (Spain). He has participated in various projects internationally and nationally. It has several articles in journals indexed in JCR (Comunicar, Sustainability, Culture and Education...) and Scopus (in Bordón. Pedagogy Magazine or in the Electronic Journal of Educational Research).

jconde@uloyola.es
Orcid ID: https://orcid.org/0000-0002-4471-5089
Google Scholar: https://scholar.google.es/citations?user=yNjYUycAAAAJ&hl=es
ResearchGate: https://www.researchgate.net/profile/Jesus_Conde-Jimenez
Academia.edu:
https://independent.academia.edu/Jes%C3%BAsCondeJim%C3%A9nez
ResearcherID: http://www.researcherid.com/rid/F-6299-2013
Publons: https://publons.com/researcher/2640797/jesus-conde-jimenez/

Patricia Villaciervos Moreno

Doctor of Education Sciences and a degree in Pedagogy. Professor at the University of Seville and the Pablo de Olavide University (Spain). Member of the Educational Research, Evaluation and Technology Group (GIETE) HUM-154, since 2004. Member of the University Network for Educational Research and Innovation (REUNI + D). Associate Editor of Fuentes Magazine and Reviewer of other impact research journals. Researcher in national and European projects. Coordinator and collaborator in Innovation Projects and Teacher Improvement. Author of multiple publications, in books, book chapters and scientific journals. His lines of research deal with

applications of technologies to the educational field; gender stereotypes; or inclusion and educational quality.

pvillaciervo@us.es
Orcid ID: https://orcid.org/0000-0001-9812-5060
Google Scholar: https://scholar.google.es/citations?user=tr1tYXUAAAAJ&hl=es
ResearchGate: https://www.researchgate.net/profile/Patricia_Moreno6
Academia.edu: https://us.academia.edu/PatriciaVillaciervosMoreno
ResearcherID: http://www.researcherid.com/rid/K-3867-2017
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