THE METHODOLOGICAL DIGITAL COMPETENCE DEVELOPMENT IN CLASSROOM. PRESCHOOL AND PRIMARY TEACHERS’ PERCEPTIONS: FACILITIES AND BARRIERS

N. Carrasco, M.A. Prats, E.S. Ojando, J. Simón

FPCEE Blanquerna (SPAIN)

Abstract

Education is a social activity that is associated with the creation and acquisition of knowledge and preservation of culture, so the educational institutions have the responsibility to train citizens who are ready to live and face the challenges of today’s society. It’s a fact that digital technologies have a enormous role in our lives, so it should be obvious that they have to be a real part of the school context, because they have a great potential to improve the quality of the process and the teaching and learning activities. More specifically, focusing on the Catalan reality, since 2013, it has been working into the identification and development of basic competences in the digital field of the students, as well as the development of the digital competence of teachers. Consequently, this is the starting point of the approach of this article. We propose to carry out an investigation (which is associated to the PSITIC research group of FPCEE Blanquerna University, Barcelona) that starts with a question: Which are the teachers’ perceptions about the facilities and the barriers of the Digital Methodological Competence development? From this interrogant, we set out the general objective of identifying and describing the Preschool and Primary teachers’ perceptions -of four schools (Tecnos, Sadako, Sant Gervasi and Ciutat Comtal)- about the Digital Methodological Competence (CDM), in its five dimensions: 1st. Design, planning and didactic implementation; 2nd. Organization and management (spaces and educational resources); 3rd. Communication and collaboration; 4th. Ethical and digital civism and; 5th - Professional development. From this main objective, three specific objectives are identified: describe the Preschool and Primary teachers’ perceptions about the facilities to achieve and develop the CDM (in its five dimensions); describe the Preschool and Primary teachers’ perceptions about the barriers to achieve and develop the CDM (in its five dimensions) and, the last one; describe the Preschool and Primary teachers’ perceptions about its level of competence of CDM (in its five dimensions)

However, the main results of the research are, in broad terms, the following ones: A total of twenty eight facilities have been obtained by the research, based on the perceptions of teachers, which is the most present: the capacity of change (the individual’ predisposition to leave his comfort zone to improve in ICT); A total of thirty-five difficulties have been obtained by the research, based on the perceptions of teachers, which is the most present: the lack of time (to be able to dedicate themselves to the TIC world); In addition, according to the research participants, is the first dimension of the CDM, which contains the largest number of facilities and difficulties, by the perceptions of teachers and ICT coordinators. Finally, the dimension that achieved the highest degree of achievement, according to the perceptions of the fifty-four participants in the questionnaire is the dimension 4; and, the lowest degree of achievement is the dimension 5.

The main conclusion is that it is necessary to take into account all the difficulties that we have been obtained by this investigation, because they are the reflection of the reticent professors vision towards the ICT, so if we take it to account to solve them (using, for example, the facilities) it’s a good plan to achieve CDM progress and empower schools by using technology.

Keywords: Methodological Digital Competence (CDM), facilitators, barriers.

1 INTRODUCTION

Education is a social activity that is rooted in the creation and acquisition of knowledge and preservation of culture, so educational institutions have the responsibility to train citizens in order to be ready to live and face the challenges of today’s society. In addition, due to the role of the digital world at present, it should be obvious that this was part of the school context, because it has a great potential to improve the quality of the process and also the teaching and learning activities (Consell Escolar de Catalunya, 2013) [1]. Even so, the role of technology in education does not end up fitting,
so there is a present debate that basically reflects two positions regarding the use and inclusion of ICT in the school - the supporters and opponents - fact that is shown by the educational realities of countries: while, for example, France has prohibited the use of smartphones, tablets or clocks connected during the school day of 2018-2019 (Canton, 2018) [2], most states are working to strengthen and incorporate them.

More specifically, focusing on the Catalan reality, since 2013, the identification and development of the digital basic competences of the students has been worked on, as well as in the development of the digital competence of teachers (CDD). In addition, 2014 was born MIF Program, which seeks to improve the digital world in the initial training of teachers, also in this context (2015), Dr. Joan-Anton Sánchez created the Interuniversity Proposal of Initial Training of Teachers in Digital Technologies (FIMTED). It was on the closing day of the FIMTED, in 2018, when Dr. Sánche explained, on the one hand, that digital technologies have a very unequal treatment in the study programs of Catalan universities by the teaching staff, which shows that having a technical deployment of the CDD does not guarantee its development itself. On the other hand, he stressed the presence of fear and / or current resistance to the use of ICT by university and non-university teaching staff.

Consequently, this is the starting point of the approach of this article. We propose to carry out an investigation (associated to the ARMIF 2017 project of the eduTIC line of the PSICIC research group of the FPCE Blanquerna - URL, which has as a title *Proposal for the deployment and validation of methodological digital competence in the education degrees*, coordinated by Dr. Miquel Àngel Prats) that starts with a question: What is the perception of the degree of achievement of teachers of the Methodological Digital Competence (CDM) and its associated facilities and difficulties? From this, we set out the general objective of identifying and describing the perceptions of teachers - childhood education (EI) and elementary education (EP) - of the Tecnos’ school (Terrassa), Sadako (Bcn), Sant Gervasi (Mollet) and Ciutat Comtal (Bcn) about the Digital Methodological Competition (CDM), in its five dimensions. Therefore, we determined three specific objectives: (1) describe the facilities of the CDM, in its five dimensions, according to the perceptions of the teachers of the EI and EP stage; (2) describe the difficulties of the CDM in its five dimensions, according to the perceptions of the teachers of the EI and EP stage and, finally, (3) identify the degree of achievement of the CDM, in its five dimensions, according to the perceptions of the teachers of the stage of EI and EP. In addition, these objectives are meaningful, because we have not found previous studies focusing on the study of the difficulties focused in school teachers and also, because there are no studies which focused on perceptions about CDM. So, it is an innovative article on the subject matter and the study objectives.

However, this research is relevant in the educational field because in order to achieve the basic digital competences in the students, it is necessary that teachers also acquire and implement it, understanding it not only as to instrument, but as a methodological tool, in order to know their possibilities and improve the learning of children (Prensky, 2011) [3]. Therefore, in this sense, it is necessary to listen more actively to the teaching staff and detect the facilities, as well as the difficulties to achieve it.

2 METHODOLOGY

This research it is included within the interpretative paradigm, is naturalistic, comprehensive and qualitative, because the educational reality to study (the CDM) is working as it is presented, without a deliberate manipulation of it and, moreover, it is constructed as a result of the subjective interpretations. So, the focus of the research lies in the perspective of these, in order to gain a full comprehension to their perceptions about the facilities, difficulties and their degree of achievement. Even so, in a smaller percentage of protagonism, this research is, at the same time, a quantitative investigation, because results are also extracted from the quantification of numerical values (Bisquerra and Sabariego, 2004).

Referring to the participants, it is composed by childhood and elementary teachers, which make up an intentional, casual and probabilistic sample, because all the teachers of the population of each center have the same chance to be part of them: they have been chosen by the reason of working in one of the four schools, which collaborate in the ARMIF 2017 project (which this article is associated with). These four schools are: Tecnos (located in Terrassa), Sadako (located in Barcelona), Sant Gervasi (located in Mollet) and Ciutat Comtal (located in Barcelona). Even so, from all the group of participants, in one of the two instruments (interview), we selected only, the TAC coordinator and one teacher (who could have a childhood or an elementary level). The fact is they have been chosen according to a pre-established item: their level of competence in ICT (the TAC coordinator, it is
assumed they have more domination in relation to these and, teachers have more deficient in this field).

In addition, four doctors (Jordi Díaz, Antoni Miralpeix, Elena Sofia Ojando and Miquel Àngel Prats), who are experts in methodology of educational research and Digital Competence (CDD), have validated the tools used in the investigation.

In relation to the instruments, this research uses a semi-structured interview, in order to know the perceptions of the participants regarding the facilities (first objective of this research) and the difficulties of the CDM (objective two), as well as having a on-line questionnaire, in order to collect information about the perceptions of the selected sample versus the level of achievement of the CDM (objective three). So, it is for this reason that it has been decided to create two different data tools.

On the one hand, referring to the questionnaire, it has been decided to create an ad hoc and virtual, because the respondent has the opportunity to think the answers before answering them and, for this reason, the sample has a greater accessibility to do it, achieving this, more dispersion from this (Rodríguez y José, 2008). In addition, it has been structured in twenty-six closed questions, which are solved with a Likert scale (allows knowing and measuring the attitude and the degree of opinion of CDM -objective three of this research-).

On the other hand, referring to the interview, it has been decided to create one that is ad hoc, semi-structured and personal: in which the investigator contribute directly, in order to interview the eight subjects (one TAC coordinator and one teacher, from each school). It incorporates a set of questions, the main ones are defined and raised before the interview, but leaving an open margin during its development for the appearance of new issues (Torrado, 2004). Furthermore, they are open, because as Padilla, González and Pérez emphasize (1998) explain, this is the best option to achieve the objectives (one and two) of the research, because they allow to obtain direct information from the interviewees; are the most appropriate ones to face a sample with a medium-high level of culture, knowledge and opinion about the topic; are the most favourable ones to acquire diversity and numerous answers; and, finally, they are the best ones to categorize and analyse heterogeneous responses. Finally, to analyse the data obtained, it is done through the deductive method: an open and flexible process that synthesizes, groups, encodes and tabulates all the information received and classifies it into basic units of meaning, in order to represent, interpret and elaborate the results and conclusions (Sabariego, 2004b).

3 RESULTS

In order to facilitate the task of comprehension for the reader, we emphasize that the criteria followed for the presentation and organization of the results of the eight interviews and the questionnaire has been based on the five dimensions of the Methodological Digital Competence. In addition, as a starting point, all the items, which have been named for teachers and coordinators, have been extracted and defined by the theoretical framework (tf) of this research, and added a new ones, based on the new ideas collected with the eight interviews developed in field work (fw). To be accurately, below appears the table of synthesis about the items (facilities and difficulties) that teachers and coordinators mention about the CDM, which are organised in four different ambits:

<table>
<thead>
<tr>
<th>Faculties</th>
<th>Ambit 1: Personal</th>
<th>Ambit 2: Professional</th>
<th>Ambit 3: Institutional</th>
<th>Ambit 4: Contextual</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1. Opinions (tf); 1.2. Motivation (ft); 1.3. Interest (ft); 1.4. Teacher’s effort (ft); 1.5. Trust (ft); 1.6. Capacity for change (ft); 1.7. Preference (fw) and 1.8. Utility (fw)</td>
<td>2.1. Have time (ft); 2.2. Training (ft); 2.3. Update (ft); 2.4. Pedagogical conception (ft); 2.5. Experience with ICT (ft); 2.6. Collaborative practice (ft) and 2.7. Recognition (fw)</td>
<td>3.1. Planning (ft); 3.2. Infrastructures (ft); 3.3. Equipment (ft); 3.4. Technological support (ft); 3.5.Institutional support (ft); 3.6. Leadership (ft); 3.7. Economic resources (ft); 3.8. Capacity for change (ft); 3.9. Training (fw); 3.10. Teaching team with good digital competence (fw)</td>
<td>4.1. Families connected to the digital world (ft); 4.2. Children: good digital competence (fw) and 4.3. Families: economic resources (fw)</td>
<td></td>
</tr>
</tbody>
</table>


DIFFICULTIES

| Ambit 1: Personal | 1.1. Opinions (ft); 1.2. Lack of motivation (ft); 1.3. Lack of interest (ft); 1.4. Unsupportive Effort (ft); 1.5. Lack of confidence (ft); 1.6. Inability to change (ft) and 1.7. Lack of preference (fw) |
| Ambit 2: Professional | 2.1. Lack of time (ft); 2.2. Lack of training (mt); 2.3. Lack of update (ft); 2.4. Generational break (ft); 2.5. Pedagogical conception (ft); 2.6. Lack of experience with ICT (ft) and 2.7. Collaborative practice (ft) and 2.8. Implementation area (fw) |
| Ambit 3: Institutional | 3.1. Lack of planning (ft); 3.2. Problem with infrastructure (ft); 3.3. Problem with the equipment (ft); 3.4. Lack of institutional support (ft) 3.5. Lack of technological support (ft); 3.6. Institutional rigidity (ft); 3.7. Lack of leadership (ft); 3.8. Lack of recognition (ft); 3.9. Lack of economic resources (ft); 3.10. Inability to change (ft) and 3.11. Lack of training (fw) |
| Ambit 4: Contextual | 4.1. Constant evolution of ICT (ft); 4.2. Rigid curriculum (ft); 4.3. Families: few economic resources (ft); 4.4. Families: low digital competence (fw); 4.5. Families: insecurity (fw); 4.6. Children: age (fw); 4.7. Families: unmotivated (fw); 4.8. Children: low digital competence (fw) and 4.9. Lack of control (fw) |

3.1 Interviews results

Considering the five dimensions of the Methodological Digital Competence, the results that we highlight are:

![Figure 1: facilities towards CDM (own creation, 2019).](image1)

![Figure 2: facilities towards CDM (own creation, 2019).](image2)
Referring to the facilities, taking into account the two groups (teachers and coordinators) is dimension 1: Design, planning and didactic implementation which contains the most number, however, the one with less numbers of facilities is dimension 5: Professional Development -data that differs, with the vision of the coordinators, because for them is dimension 4: Ethics and digital civility-. The lack of consensus is probably by the difference in discourse between both groups: teachers have shown the lack of interest to dedicate themselves to the ICT world beyond their classroom (so it is logical to be this one Fifth dimension -the most professional of all- the one with less facilitates by the teachers), while the coordinators have shown in their speech a certain concern about the difficulty of managing and controlling the digital identity (theme that related to the fourth dimension, which has had the least number of facilities provided by the coordinators).

![CDM: Facilities](image)

Figure 3: Items of facilities versus CDM (own elaboration, 2019).

More specifically, of the twenty-eight items of facilities obtained from the theoretical framework and fieldwork, the most repeated in the discourse of the teachers and the coordinators, is the fact to leave his comfort area, in order to incorporate, develop and improve his role towards the digital world. Therefore it is the ability to change the most appointed facility by both groups. Although, it differs from being the most prominent, specifically, in each of the five dimensions. However, it is considered that the set of facilities obtained from this research are the key to progress towards the CDM, because these are the strengths that teachers and coordinators highlighted.

![CDM: Difficulties](image)

CDM Dimensions

0306
Referring to the difficulties, it is dimension 1: Design, planning and didactic implementation which contains the greatest number of difficulties, from the vision of the teachers and the coordinators, but, it is dimension 5: Professional development, which the less number of difficulties -fact that differs from the teachers vision, which is dimension 4: Digital ethics and civility. This lack of consensus is probably justified by the difference in the discourses of both group: teachers have shown little obstacles to covering the demands of the school towards the digital identity of their students (thematic that corresponds to the dimension with less difficulties named by this group), while coordinators have highlighted a great deal of dedication to the digital world -going beyond the tasks entrusted to become a TAC coordinator- (so, for this reason, it becomes this dimension the one with the less difficulties by coordinators perception).
More specifically, there are a total of thirty-five difficulties obtained from the theoretical framework and field work, which is the lack of time to devote to digital world (due to the excess of work that occupies teaching) the main difficulty appointed by the teachers and the coordinators. Although, it differs to be this the most named difficulty, specifically, in each of the five dimensions. However, all the difficulties highlighted by the investigation are essential to determine the obstacles that impede the progress and evolution of the CDM and, therefore, they have to be studied in order to provide solutions to people who show more aversion to ICT.

3.2 Questionnaire results

![CDM: Level of achievement](image)

The results shown in the previous graph correspond to the grouping of the participants’ responses for each descriptor and dimension. Therefore, the value that appears in each graph is the result of the average level of achievement towards the Methodological Digital Competence of the population sample for each dimension and taking into account, for each one, all their respective descriptors.

However, paying attention to the last figure, the highest number which shows the highest level of achievement is dimension 4: Ethics and digital civility, even though is dimension 5: Professional development, which has the lowest degree of competence.

It is important to highlight that the level of overall achievement of the CDM is between items 4-5 of Likert scale, so it shows a fairly and highly competence, according to the perceptions of the fifty-four participants. However, it is essential to take a look at all the CDM dimensions that have the lowest degree of achievement, in order to focus the work on them in order to progress towards the Methodological Digital Competence.

4 CONCLUSIONS

In the first place, referring to the first objective of the research: describe the facilities of the CDM, in its five dimensions, according to the perceptions of the teachers of childhood and elementary stage:

- We have obtained a total of twenty-eight facilities, which is the most present -including the five dimensions of the CDM-, the capacity for change, that is, the willingness of an individual to make it and leave his comfort zone. Followed by the opinion (conceive ICTs and their digital competence, with a positive attitude: as a key and fundamental element for the present time), collaborative practice (be part of a teaching staff where we create, work and cooperate to build and advance knowledge in ICT), training (have a mastery of the ICT world) and planning (be part of a center with plans, documents and norms that regulate the use and development of ICT). It’s important to mention that are the coordinators who stand out more facilitated, in comparison with the group of teachers.

- According to the coordinators and teachers, it is dimension 1: Design, planning and didactic implementation (which refers to the use of ICT in teaching and learning processes) which has the greatest number of facilities and, in change, it is dimension 5: Professional development
(which refers to the use of having a digital profile and an updated curriculum online, having/or participating in a digital space, as well as in projects or training activities towards the digital world), the one that presents the lowest.

However, it is necessary to keep in mind the set of facilities obtained -achieved by this research- in order to promote them, as well as use them in response to the obstacles or problems facing the digital world and, at the same time, it’s important to focus the work towards the dimensions with fewer number of facilities, in order to continue progressing towards the achievement of the teachers’ CDM.

Secondly, regarding the second objective, which is equivalent to describing the difficulties of the CDM, in its five dimensions, according to the perceptions of the teachers of the childhood and elementary stage:

- We have obtained a total of thirty-five items of difficulties, which the most frequent -considering the five dimensions of the CDM - is the *lack of time* to dedicate itself to the ICT world, followed by the *lack of training* towards technologies and the *lack of interest* (not being predisposed to learning content or dynamics in relation to the digital world). It should be noted that, in general, teachers emphasize, in each dimension of the CDM, more difficulties on a personal (which refers to: opinion, interest, motivation, trust, etc.) and professional level (which refers to their pedagogical conception, training, experience, etc.), while the group of coordinators emphasize also in the contextual level (referring to external agents, such as: the constant evolution of ICTs, families, etc.).

- According to the coordinators and teachers, it is dimension 1: *Design, planning and didactic implementation* (which refers to the use of ICT in teaching and learning processes) which contains the greatest number of difficulties and, in change is dimension 5: *Professional development* (which refers to the use of having a digital profile and an updated curriculum online, having/or participating in a digital space, as well as in projects or training activities towards the digital world), the one that presents the lowest.

Therefore, it is necessary to bear in mind the set of the difficulties obtained -based on this investigation- because they are the reflection of the justifications and reasons of the most reticent professors towards the ICT and, consequently, they are the key points that if they are solved, it will be possible to advance and progress towards the inclusion of ICT in the school. Consequently, we must first respond to the set of dimensions with the greatest number of outstanding difficulties.

Third, referring to the third objective of the investigation, that is, identify the degree of achievement of the CDM, in its five dimensions, according to the perceptions of the teachers of the childhood and elementary stage:

- The CDM, in its five dimensions, has a level of achievement *fairly high and very competent* (since the average of the answers obtained from all the dimensions -and its corresponding descriptors- is between items 4 and 5 of Likert scale of questionnaire).

- More specifically, the dimension with the highest level of achievement, according to the perceptions of the fifty-four participants in the questionnaire is dimension 4: *Digital ethics and civility*, whereas, it is dimension 5: *Professional development*, which the lowest grade presents.

Thus, we have to take into account the set of dimensions that show the least degree of achievement, in order to achieve homogeneity of competence in the five dimensions of the CDM and, consequently, advance (in a progressive way) towards the digitization of teachers -and school centers-.

Finally, as a prospective for the future, it should be noted that, through the results of this research, a new line of research will be initiated (developed by the ARMIF 2017 of the Rovira i Virgili University), which seeks to evaluate the perceptions obtained regarding the facilities, difficulties and the level of achievement of the CDM. However, the research team will be continue to work, in the near future, with the data obtained from the questionnaire, in order to make a cross between the participants profile and the degree of achievement towards CDM.

REFERENCES


